USAID - OIEE

THREE TOWERS PROJECT, AFGHANISTAN

WO-LT-0013

Specifications

Volume 1 of 1

Submitted to:

USAID Office of Infrastructure,
Engineering and Energy (OIEE-AESP)

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100% Prototype Design Submittal

August 15, 2010

100% PROTOTYPE DESIGN SUBMITTAL

THREE TOWERS PROJECT
AFGHANISTAN

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SECTION 00 01 15

LIST OF DRAWINGS

PART 1 GENERAL

1.1 SUMMARY

This section lists the drawings for the project pursuant to contract clause Contract Drawings, Maps and Specifications.

1.2 CONTRACT DRAWINGS

Contract drawings are as follows:

Sheet Reference Number	Issue Status	Date of Issue	Drawing Title
GENERAL DRAWINGS			
TWR00-G-000	REV A	8/15/10	TITLE SHEET PROTOTYPE DESIGN
TWR00-G-001	REV A	8/15/10	INDEX OF DRAWINGS PROTOTYPE DESIGN
STRUCTURAL DRAWINGS			
TWR00-S-001	REV A	8/15/10	GENERAL NOTES SHEET 1 OF 2
TWR00-S-002	REV A	8/15/10	GENERAL NOTES SHEET 2 OF 2
TWR00-S-100	REV A	8/15/10	TOWER PLAN & ELEVATION
TWR00-S-200	REV A	8/15/10	FOUNDATION PLAN & ELEVATION
TWR00-S-201	REV A	8/15/10	FOUNDATION DETAILS SHEET 1 OF 2
TWR00-S-202	REV A	8/15/10	FOUNDATION DETAILS SHEET 2 OF 2
TWR00-S-300	REV A	8/15/10	BRACE CONFIGURATION DETAILS SHEET 1 OF 5
TWR00-S-301	REV A	8/15/10	BRACE CONFIGURATION DETAILS SHEET 2 OF 5
TWR00-S-302	REV A	8/15/10	BRACE CONFIGURATION DETAILS SHEET 3 OF 5
TWR00-S-303	REV A	8/15/10	BRACE CONFIGURATION DETAILS SHEET 4 OF 5
TWR00-S-304	REV A	8/15/10	BRACE CONFIGURATION DETAILS SHEET 5 OF 5
TWR00-S-305	REV A	8/15/10	MEMBER SCHEDULE
TWR00-S-500	REV A	8/15/10	DIAGONAL CONNECTION DETAILS SHEET 1 OF 2
TWR00-S-501	REV A	8/15/10	DIAGONAL CONNECTION DETAILS SHEET 2 OF 2
TWR00-S-502	REV A	8/15/10	BOLT CONNECTION DETAILS

ELECTRICAL DRAWINGS

TWR00-E-001	REV A	8/15/10	GROUNDING LAYOUT
TWR00-E-002	REV A	8/15/10	TOWER PLAN VIEW OBSTRUCTION LIGHTING
TWR00-E-003	REV A	8/15/10	GROUNDING DETAILS
TWR00-E-004	REV A	8/15/10	TOWER PLAN VIEW OBSTRUCTION LIGHTING DETAIL VIEWS

-- End of Document --

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2009; Errata First Printing) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2008; AMD 1 2008) National Electrical Code
NFPA 101	(2009; Amd 09-1 & 09-2) Life Safety Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

TM 5-807-10	(1993) Signage

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 4-010-01	(2003; Change 1 2007) DoD Minimum Antiterrorism Standards for Buildings

1.2 SUBMITTALS

Submittals and a Submittal Register are required as specified in Section 01 33 00 SUBMITTAL PROCEDURES and as required in individual specification sections.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Normal duty hours for each tower site; G

Environmental goals for each tower site

Work experience resumes and graduation certificates; G

Standard UXO/Demining safety work plan

Clearance certificate; G

Site Adapt work

Site Improvement Design Work; G

Sign Placement Plan; G

Power system and tower aviation warning lights drawings; G

1.3 WORK COVERED BY CONTRACT DOCUMENTS

1.3.1 Project Description

The project consists of the construction of 80 meter tall communication towers, and related infrastructure such as site work, aviation safety lighting, and security fencing. The communication towers will be capable of supporting Cell, TV, Radio and Microwave Backhaul equipment that will be furnished and installed by others. A prototype tower design, engineering details and geotechnical information is being provided for these three sites.

The project is further defined as the design, geotechnical survey, material, labor, and equipment to construct buildings, security measures, utilities and other infrastructure. The work within this contract shall meet and be constructed in accordance with current U.S. design and building codes, safety and security standards and applicable local standards.

The Contractor will be required to coordinate the efforts required under this contract with at least one other contractor, the installation or base operation commanders, and the United States Department of Defense (US DOD) site liaison. Such coordination requirements will be required as part of this contract. The coordination effort is significant and will include such tasks as the exchange of information with other contractors such as phasing of construction, allowing access through the site, temporary security measures; and the sharing of design data, drawings, calculations, and technical information. Additionally it will be necessary for the Contractor to conduct meetings, hold weekly teleconferences, and prepare the submittal of additional information to the Contracting Officer Representative (COR) that demonstrates the coordination and integration of new work with existing and future work of other contractors or Government agencies. All coordination shall be in agreement with the COR and approved prior to the commencement of any work.

1.3.2 Location

The towers will be located on Forward Operating Bases (FOBs) in RC-South, RC-South West and RC- East, Afghanistan.

The work shall be located at three tower sites. The exact location of each tower site will be shown by the Contracting Officer.

This project involves the construction of three towers to be located on Kandahar Airfield (KAF), Camp Price and FOB Eagle.

1.3.3 Work Includes

The Contractor shall provide Site Adapt designs and construction of the standard tower design and civil infrastructure as specified.

The Contractor shall perform this work as a Site Adapt contract in accordance with the requirements specified and in Section 01 15 00

TECHNICAL REQUIREMENTS - SITE ADAPT. The construction of the Three Towers in Phase I shall be done in strict accordance with the Plans and specification furnished, with no changes made to any feature of work shown in these design drawings and specifications. All other Site Adapt work shall be the responsibility of the Contractor and submitted for review in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

1.3.4 Standard Tower Design

The design drawings and specifications for the Three Towers identified in Phase I are provided. The site adapt, design and construction work shall include, but not be limited to, that described herein and as shown on the Drawings. Site Improvement Design Work shall be executed in accordance with the requirements described in Section 01 15 00 TECHNICAL REQUIREMENTS - SITE ADAPT, and the provided Specifications and Drawings. In the case of an ambiguity, the Contracting Officer Representative (COR) shall make the final decision. The COR shall furnish the decision in writing if requested by the Contractor. Designs shall be approved by the COR prior to the start of work. The Contractor shall verify all dimensions provided in the scope of work prior to the start of any construction.

1.3.5 General Requirements

All requirements set forth in Section 01 11 00 SUMMARY OF WORK, but not included in other General Requirements Sections and the individual Technical Sections, shall be considered as set forth in both, and vice versa. All standard construction amenities and details including, but not limited to, lighting, site grading and drainage, and utility connections shall be implied as a design and construction requirement. Contractor shall provide positive drainage away from all structures and access driveways. Contractor shall take into account stormwater runoff from both on and offsite locations when relocating existing wadi's, installing roadside ditches and providing positive drainage away from all access points. This may require the Contractor to provide a satisfactory fill or retaining walls, which will be considered incidental to the site grading. All grading on site shall be completed prior to any other definable feature of work, excluding design. The Contractor shall maintain positive drainage away from structures and facilities at all times throughout the duration of the contract. Any damage cause by storm water runoff or snow melt during construction will be the Contractor's responsibility to correct at the Contractor's expense, without additional compensation. No additional payment or extension of time will be provided by the Government for any damage to the site or its contents resulting from runoff. All specific requirements under this design-construct contract shall be in accordance with the requirements stated in Section 01 15 00 TECHNICAL REQUIREMENTS - SITE ADAPT and individual Technical Specifications Sections. In general, this project consists of designing and constructing of the following project phases.

1.3.5.1 Project Phase - Construction Phases

The Contractor shall construct the Three Towers in accordance with the design documents provided.

1.3.5.2 Site Work

Site work shall include grading all areas where Towers, at individual sites, will be located and relocation/realignment of existing drainage features, as needed, to convey stormwater runoff for a 25-year storm

event. In general, grading around all Towers shall direct stormwater away from the permanent structures toward the roadway drainage system or wadi's.

1.3.5.3 Signage

Exterior Signs: Exterior signage shall be provided, on the gate of the site, so that a person wishing to enter the facility would know who to contact for access. All signs shall comply with the sign standards provided in TM 5-807-10. Contractor shall provide drawings indicating Sign Placement Plan and details of signs including mounting details. Contracting Officer Representative shall approve signage.

1.3.5.4 Power System and Tower Aviation Warning Lights

The Contractor shall design and construct a power system and tower aviation warning lights to be served by FOB Power and a standby a portable generator. All electrical design and installation shall meet NFPA 70 requirements. All wiring shall be run and pulled through conduits. Electrical receptacles shall be provided as indicated. Conductors and circuits shall be sized for the specific loads. The electrical system shall be 220/380 V, single phase, 50 hertz. Contractor shall design and all interior and exterior electrical systems as specified in these specifications. Power system and tower aviation warning lights drawings shall be submitted to the COR for approval.

1.3.5.5 Foundation Design

Foundations shall be properly placed on suitable compacted ground area and shall be in accordance with the recommendations from the geotechnical investigation. Foundation designs shall be corroborated with the geotechnical findings and recommendations. The geotechnical investigation shall confirm bearing capacity to be no less than assumed in the design. If geotechnical investigation shows a bearing capacity less than the assumed in the design, Contractor shall redesign footings based on the geotechnical investigation data. Foundation designs shall be corroborated with the geotechnical findings and recommendations. No reduction in the footings in the Standard Tower Designs will be permitted.

1.3.6 Codes and Standards

ICC IBC

NFPA 101

UFC 4-010-01

See Section 01 15 00 TECHNICAL REQUIREMENTS - SITE ADAPT and individual specification sections for additional references, codes and standards.

1.3.7 English Language Requirement

All information shall be presented in English. The Contractor shall have a minimum of one English speaking representative on site, at each site, to communicate with the COR at all times when work is in progress.

1.4 CONTRACT DRAWINGS

See Section 00 01 15 LIST OF DRAWINGS.

Five sets of full size contract drawings, maps, and specifications will be furnished to the Contractor without charge. Reference publications will not be furnished.

Contractor shall immediately check furnished drawings and notify the Government of any discrepancies.

1.5 WORK RESCHEDULING

Normal duty hours for work shall be determined by the Contractor for his work forces and the work forces of the Contractor's subcontractors. Normal duty hours for each tower site shall be submitted to the COR for approval. Requests for additional work shall require written approval from the Contracting Officer 7 days in advance of the proposed work period.

1.6 PROJECT ENVIRONMENTAL GOALS

Contractor shall develop Environmental Goals for each site and distribute copies of the Environmental Goals to each subcontractor and the Contracting Officer. The Contractor's forces and the forces of each subcontractor shall adhere to the Environmental Goals. The overall goal for design, construction, and operation is to produce a facility that meets the functional program needs and incorporates the principles of sustainability. Specifically:

a. Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion. Minimize offsite environmental impact.

b. Manage construction site and storage of materials to ensure no negative impact.

c. Reduce construction waste through reuse, and recycling.

d. Burning of trash or rubbish is not permitted.

1.7 LOCATION OF UNDERGROUND FACILITIES

Scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities,and any type of underground obstruction discovered at each tower site during scanning in locations to be traversed by piping, ducts, and other work to be conducted or installed, and at the tower foundation location.

1.7.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

1.8 SECURITY

Security is critical to construction in Afghanistan, especially on roads and remote areas away from Coalition Force bases. The risk/threat level for the area surrounding this project site is low, relative to the chance of attack, improvised explosive devices (IEDs), kidnapping, theft, and vandalism, however, the road network used to access the facility remains dangerous due to frequent attacks and must be addressed in the security plan. The Contractor must have an appropriate amount of security/protection to match the threat in the project area and along the

supply routes. A detailed security plan in accordance with Section 01 35 30 SECURITY shall be approved by the Government before construction Notice to Proceed (NTP).

1.9 CONTRACTOR QUALITY MANAGER REQUIREMENT

See Section 01 45 00.00 10 QUALITY CONTROL paragraph CQM TRAINING REQUIREMENT for Contractor's Quality Control Manager training requirements.

The Contractor's quality control plan, as defined in Section 01 45 00.00 10 QUALITY CONTROL, entitled "Contractor Quality Control", must include "The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function." For the QC Manager, qualifications must include a certificate demonstrating completion of an approved CQM course.

1.10 ELECTRICAL WORKERS QUALIFICATIONS

Electrical work shall be performed by qualified personnel with verifiable credentials that are thoroughly knowledgeable with applicable code requirements. Verifiable credentials consist of a certificate of graduation from an approved trade school and required amount of experience, depending on work being performed. The electrical workers, with credentials listed, should be identified in the proposal that is submitted. A qualified person is one who has received training in and has demonstrated skills and knowledge in the construction and operation of electrical equipment and installations and the hazards involved. This includes the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment, to determine the nominal voltage of exposed live parts, the clearance distances and corresponding voltages to which the qualified person will be exposed.

1.10.1 Supervisory Electrician

Supervisory electricians must be graduates of an approved trade school, and must have two years of relevant electrician experience. Approved programs include but are not limited to the Afghanistan Technical and Vocational Institute (in Kabul), the Kunar Trades Training Center and the Commercial Technical Training Center (in Jalalabad). Work experience resumes and graduation certificates shall be submitted and approved prior to commencement of any design or construction involving electrical work. Approval is granted by the Contracting Officer Representative.

1.10.2 Electricians

Electricians must be graduates of an approved trade school and must be able to provide, upon request, a certification of successful course work completion and graduation in addition to a resume of work experience.

1.11 UNEXPLODED ORDNANCE

1.11.1 Unexploded Ordnance Removal and Clearance

The Contractor is not responsible for the clearance or removal of mines and unexploded ordnance (UXO) from the individual sites prior to the commencement of construction. The sites have been cleared to a minimum depth of one meter and the certificate of clearance is available for review. No construction activities are to be conducted without review of the written clearance certification for the individual sites. If

sub-surface construction activities will be performed on any site by the Contractor, the clearance certification must state that the clearance depth was conducted to a minimum one meter in depth. ***If the contract parameters for sub-surface construction exceed the minimum one meter clearance depth the Contractor will be responsible for clearance to the required depth beyond one meter***. The Contractor may only provide clearance/removal services via UN Mine Action Center for Afghanistan (UNMACA) accredited entities and clearance/removal may only be undertaken in accordance with International Mine Action Standards (IMAS), Afghanistan Mine Action Standards
(AMAS), and applicable U.S. Army Corps of Engineer (USACE) Ordnance & Explosives (OE) safety standards.

NOTE 1:

For previous UXO/mine information, and a copy of the clearance certification, the following points of contact from the UN Mine Action Center of Afghanistan are provided:

Mohammad Sediq, Chief of Operations,
Email: sediq@unmaca.org
Cell: +93 070 295207

Hansie Heymans, Chief Information Officer,
Email: hansie@unmaca.org
Cell: +93 070 294286

UXO Safety/ Demining COR, USACE
tan.uxo.demining.safety@usace.army.mil, Roshan: 079-778-6848 Comm: 540-667-2127

NOTE 2:

For construction in excess of one meter in depth on areas previously cleared. The Contractor will provide a standard UXO/Demining safety work plan to the US Army Corps of Engineers UXO / Demining COR for review prior to commencement of all UXO clearance / demining activities on the project sites. Once the UXO/ Demining clearance has concluded, the Contractor shall provide the US Army Corps of Engineers UXO / Demining COR a clearance certificate for review and approval before any construction activities are to commence.

NOTE 3:

The Contractor should be aware that many areas demined by NGOs and other groups may have only been cleared to a depth of 13 cm for humanitarian purposes. If construction will take place, a minimum of one meter in depth is mandatory.

It is the responsibility of the Contractor to be aware of the risk of encountering UXO/mines and to take all actions necessary to assure a safe work area to perform the requirements of this contract. The Contractor assumes the risk of any and all personal injury, property damage or other liability arising out of or resulting from any Contractor action taken hereunder. The Contractor and its subcontractors may not handle, work with, move, transport, render safe, or disarm any UXO/mine, unless they have appropriate accreditations from the MAC.

If a UXO/mine is encountered during project construction, the Contractor shall immediately stop work in the affected area, mark the area of the UXO/Mine and immediately notify the Contracting Officer, or the Government Construction Representative. UXO/Mine disposal will not be the responsibility of the Contractor unless the area exceeds the one meter clearance depth of the original clearance certificate.

1.12 COMPLETION OF WORK

All work required under this contract shall be completed within 480 calendar days including Government review time from Notice to Proceed (NTP) for site work. All work under this contract shall be completed and ready for use by the Government and other contractors in accordance with the following schedule:

a. For Construction Phase Work Items to be completed refer to Attachment 1, Statement of Work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 15 00

TECHNICAL REQUIREMENTS - SITE ADAPT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 301M	(2005; Errata 2008) Metric Specifications for Structural Concrete
ACI 318	(2008; Errata 2008; Errata 2009; Errata 2009; Errata 2009; Errata 2009; Errata 2009) Building Code Requirements for Structural Concrete and Commentary
ACI 530/530.1	(2008; Errata 2008; Errata 2009) Building Code Requirements and Specification for Masonry Structures and Related Commentaries

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE/SEI 7-05	(2005; R 2006) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2008; Errata 2008) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 185/A 185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 307	(2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A 500/A 500M	(2009) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 615/A 615M	(2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C 270	(2008a) Standard Specification for Mortar for Unit Masonry
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 36/C 36M	(2003e1) Gypsum Wallboard
ASTM C 39/C 39M	(2009) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 476	(2009) Standard Specification for Grout for Masonry
ASTM C 90	(2009) Loadbearing Concrete Masonry Units
ASTM C 926	(2006) Application of Portland Cement-Based Plaster
ASTM D 1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 2487	(2006e1) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM F 1554	(2007a) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2009; Errata First Printing) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1	(2009) Fire Code
NFPA 10	(2010) Standard for Portable Fire Extinguishers

NFPA 101	(2009; Amd 09-1 & 09-2) Life Safety Code
NFPA 110	(2010; Am 10-1) Standard for Emergency and Standby Power Systems
NFPA 70	(2008; AMD 1 2008) National Electrical Code
NFPA 72	(2010; Am 10-2; Am 10-3; Proposed Am 971) National Fire Alarm and Signaling Code
NFPA 780	(2008) Standard for the Installation of Lightning Protection Systems
NFPA 80	(2010; Am 10-1) Standard for Fire Doors and Other Opening Protectives

1.2 SITE ADAPT REQUIREMENTS

1.2.1 Compliance

The Contractor's design and construction must comply with technical requirements contained in these specifications. The designer shall have a minimum of 5 years experience with the design and construction of the same magnitude and complexity as required in this project. The Contractor shall provide design and construction using the best blend of cost, construction efficiency, system durability, ease of maintenance and environmental compatibility.

1.2.2 Minimum and Alternate Requirements

The design and product requirements stated in these documents are minimum requirements. Exceeding the minimum requirements as improvements to the design stated herein is highly encouraged, at no additional cost and as approved by the Government. The technical requirements listed in paragraph Codes and Technical Criteria and in the individual specification sections apply to this project. Any deviation from the technical requirements shall be approved by the Contracting Officer Representative (COR). Request for deviations shall be submitted for approval. The Contractor is encouraged to propose alternate design or products (equipment and material) that are more commonly used in the region; but these variations shall be equal in performance from a technical standpoint as well as more cost effective or allow for more timely completion. Variations shall furnish the same system safety, durability, ease of maintenance and environmental compatibility. The Contractor will be required to submit information as specified in Section 01 33 00 SUBMITTAL PROCEDURES, for all proposed variations with which to make a comprehensive comparison of the proposed alternate. All variations of approved designs must be approved by the Contracting Officer Representative.

1.2.3 Asbestos Containing Materials

Asbestos containing material (ACM) shall not be used in the design and construction of this project. If no other material is available which will perform the required function or where the use of other material would be cost prohibitive, a waiver for the use of asbestos containing materials must be obtained from the Contracting Officer Representative.

1.2.4 Safety

Refer to Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS for additional safety and occupational health requirements.

1.2.4.1 Unexploded Ordnance and Mine Discovery During Project Construction

It is the responsibility of the Contractor to be aware of the risk of encountering unexploded ordnance and mines (UXO/Mines) and to take all actions necessary to assure a safe work area to perform the requirements of this contract. It is highly recommended that all construction ground guide / ground observation personnel maintain a minimum 16 meter buffer zone from all heavy equipment during excavation activities. A daily check of the area for signs of recently emplaced UXO/Mines is also highly recommended, to include unusual disturbed soil areas or mounds of soil from the previous day. If during construction, the Contractor becomes aware of or encounters UXO/Mines or potential UXO/Mines, the Contractor shall immediately stop work at the site of encounter, clearly mark the area of UXO/Mines, move to a safe location, notify the COR, and mitigate any delays to scheduled or unscheduled contract work. Once the Contractor has informed the COR, the Contractor will await further direction. The Contractor assumes the risk of any and all personal injury, property damage or other liability arising out of or resulting from any Contractor action taken hereunder.

Note: The Contractor and its subcontractors may not handle, work with, move, transport, render safe, or disarm any UXO/mine, unless they have appropriate accreditations from the UN Mine Action Center for Afghanistan (UNMACA).

Also see Section 01 11 00 Summary of Work.

1.2.5 Limitation of Working Space

The Contractor shall, except where required for service connections or other special reason(s), confine his operations strictly within the boundaries of the site. Workmen will not be permitted to trespass on adjoining property. Any operations or use of space outside the boundaries of the site shall be by arrangement with all interested parties. It must be emphasized that the Contractor must take all practical steps to prevent his workmen from entering adjoining property and in the event of trespass occurring the Contractor will be held entirely responsible.

Areas located immediately outside the construction area are known to contain mines and unexploded ordnance (UXO). Contractors assume all risks when venturing in or out of the designated work area.

1.2.6 Temporary Structures

The Contractor shall erect suitable temporary fences, lighting, and necessary structures to safeguard the site, materials and plant against damage or theft and for the protection of the general public and shall adequately maintain the same throughout the course of the contract.

Refer to Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS for additional requirements.

1.2.7 Subcontractors

Compliance with the provisions of this Section by subcontractors will be

the responsibility of the Contractor.

1.2.8 Codes and Technical Criteria

The following codes and technical criteria and those referenced in these specifications shall be required for this project. References within each reference below shall be required and adhered to. If there is conflict in the criteria the most stringent requirement shall be applied. This list is not exhaustive and is not necessarily complete. All codes and standards shall be the latest edition.

a. ACI 301M Specifications for Structural Concrete, American Concrete Institute

b. ACI 318 Building Code Requirements for Structural Concrete, American Concrete Institute

c. ACI 530/530.1/ASCE 5/TMS 402, Building Code Requirements for Masonry Structures

d. Air Force Manual 32-1071, Security Engineering, volumes 1-4

e. American Institute of Steel Construction (AISC), Specifications for Structural Steel Buildings

f. ASCE/SEI 7-05, Minimum Design Loads for Buildings and Other Structures

g. AWS D1.1/D1.1M, Structural Welding Code - Steel, American Welding Society

h. Department of the Army Pamphlet 385-64, Ammunition and Explosives Safety Standards

i. DOD 6055.9-STD, DoD Ammunition and Explosives Safety Standards

j. EIA ANSI/TIA/EIA-607: (1994) Commercial Building Grounding/Bonding Requirement Standard

k. Factory Mutual (FM) Approval Guide-Fire Protection

l. IBC - International Building Codes, 2006 edition (and its referenced codes)

m. IEEE C2, National Electrical Safety Code (NESC)

n. Lighting Handbook, IESNA

o. Ministry of Rural Rehabilitation and Development (MRRD) and Ministry of Public Works (MPW)Standards

p. National Electrical Safety Code (NESC), Institute of Electrical and Electronic Engineers (IEEE C2)

q. NFPA 1, General Fire Protection

r. NFPA 10, Portable Fire Extinguishers

s. NFPA 70, National Electrical Code

t. NFPA 72, National Fire Alarm Code

u. NFPA 80, Fire Rated Doors and Windows

v. NFPA 101, Life Safety Code

w. NFPA 110, Standard for Emergency and Standby Power Systems

x. International Mine Action Standards; (see http://www.mineactionstandards.org for copy of standards)

In addition, technical criteria provided in USACE-AED Design Requirements (most recent version) shall be required for use in design and construction specifications as indicated in the following documents.

The following design criteria shall be used:

a. AED Design Requirements - Site Layout Guidance

b. AED Design Requirements - Hydrology

c. AED Design Requirements - Culvert and Causeway Design

d. AED Design Requirements - Vertical Curves

e. AED Design Requirements - Horizontal Curves & Super elevation

f. AED Design Requirements - Geotechnical Investigations for USACE Projects

Standards other than those mentioned above may be accepted if the standards chosen are internationally recognized and meet the minimum requirements o the specified standards. The Contractor shall be prepared to submit proof of this if requested by the Contracting Officer Representative.

1.2.9 AED Design Requirements Documents

AED Design Requirements documents specified shall be adhered to in this contract.

These documents are available from the Contracting Officer Representative.

These documents are available from the AED-N website located at: http://www.aed.usace.army.mil/engineeringtop2010.asp. These documents shall be used as the basis for design and construction, and for selecting options within the scope of the work required at individual sites based on the Drawings and these specifications.

1.3 SITE DEVELOPMENT

1.3.1 General

The project includes furnishing all materials, equipment and labor for constructing electrical, and storm sewer service lines, as applicable.

1.3.2 Environmental Protection

1.3.3 Civil Site Development

Requirements for environmental goals are specified in Section 01 11 00 SUMMARY OF WORK.

1.3.3.1 Demolition

Demolition shall include removal of all structures, foundations, pavements, and utilities, to include clearing and grubbing. All refuse and debris shall be disposed of off-site as described in Section 01 74 19 CONSTRUCTION AND WASTE MANAGEMENT. Holes and depressions shall be backfilled and compacted in lifts not to exceed 200 mm in height unless specified otherwise. Fill materials shall be composed of satisfactory soils or aggregates defined in ASTM D 2487 as GW, GP, GM, SP, SM, and SW. Minimum soil compaction shall be 95 percent of maximum density as defined in ASTM D 1557.

Scrap metal shall be the property of the Host Government. The scrap metal on site shall be moved to an area away from the site perimeter as directed by the Contracting Officer Representative and left for the Host Government to remove and/or salvage. Demolished fencing and concertina wire shall be neatly rolled up for reuse by the Host Government. Used fence posts and outriggers shall be neatly stockpiled for reuse by the Host Government.

1.3.3.2 Site Grading and Drainage

The Contractor shall provide all necessary site grading to insure adequate drainage so that no areas will be flooded due to a rainfall of a 25-year frequency. Drainage of the area should be compatible with the existing terrain. Tower base elevation, shall be a minimum 150 mm above grade and slope away from the tower base on all sides at a minimum of 3 percent for 3 m. Protection of facilities from flood waters originating offsite of an installation is required and shall be based on a rainfall for a 25-year frequency event.

Tower Bases are to be located a minimum of 300 mm above the finished grade of the roadway at the entrance to the facility.

Rainfall data utilized for hydrology calculations shall be based on data obtained from meteorological records collected in Afghanistan. National agencies may be consulted for data. In the absence of site specific data, intensity-duration-frequency curves contained in the AED Design Requirements -Hydrology shall be used by extrapolating the rainfall intensity information from the stations in closest proximity to the project. Under no circumstances will relationships developed by extrapolation from foreign countries be used for hydrologic studies.

1.4 STRUCTURAL

1.4.1 General

Foundations shall be properly placed on suitable compacted ground area and shall be in accordance with the recommendations from the geotechnical investigation. Building foundations shall be founded a minimum of 800 mm below grade. Foundation designs shall be corroborated with the geotechnical findings and recommendations. The geotechnical investigation shall confirm bearing capacity to be no less than assumed in the design. If geotechnical

investigation shows a bearing capacity less than the assumed in the design, Contractor shall redesign footings based on the geotechnical investigation data. Foundation designs shall be corroborated with the geotechnical findings and recommendations.

1.4.2 Design

Design shall be performed and design documents signed by a registered professional engineer. Calculations shall be in SI (metric) units of measurements. All components of the structures shall be designed and constructed to support safely all loads without exceeding the allowable stress for the materials of construction in the structural members and connections.

1.4.3 Standards

The Contractor should use the following American standards, latest edition, to provide sound structural design. The Contractor shall follow American Concrete Institute Standards (ACI) for design and installation of all concrete structures. All codes are latest edition.

Concrete ASTM C 39/C 39M and ACI 318; 28 MPa (f'c minimum specified compressive strength at 28 days), and maximum water-cement ratio of 0.45.

Steel Reinforcement ASTM A 615/A 615M; 420 MPa

Welded Wire Fabric ASTM A 185/A 185M.

Anchor Bolts ASTM F 1554; Grade 36 steel.

Bolts and Studs ASTM A 307.

Plaster ASTM C 926.

Concrete Masonry Units ASTM C 90; Type I (normal weight, moisture control); 14 MPa.

Mortar ASTM C 270; Type S (ultimate compressive strength of 13 MPa).

Grout ASTM C 476; 14 MPa (2,000 psi) minimum compressive strength at @ 28 days (Slump between 200 mm to 250 mm).

Structural Steel ASTM C 36/C 36M; 250 MPa.

Tube Steel ASTM A 500/A 500M, Grade B.

Welding AWS D1.1 (American Welding Society).

1.4.4 Dead and Live Loads

Dead loads consist of the weight of all materials of construction incorporated in the structures. Live loads used for design shall be in accordance with the Structural Load Data, UFC-3-310-01.

1.4.5 Wind Loads

Wind loads shall be calculated using a "3-second gust" wind speed of 135 kph.

1.4.6 Seismic

The building and all parts thereof shall be designed for the seismic requirements as defined by the ICC IBC.

1.4.7 Structural Concrete

Concrete structural elements shall be designed and constructed in accordance with the provisions of the American Concrete Institute, Building Code Requirements for Structural Concrete, ACI 318, latest edition. A minimum cylinder 28-day compressive strength of 28 MPa (4,000 psi) shall be used for design and construction of all concrete. Reinforcing steel shall be deformed bars conforming to American Society for Testing and Materials publication ASTM A 615/A 615M. Concrete shall have maximum water-cement ratio of 0.45. No concrete shall be placed when the ambient air temperature exceeds 32 degrees C unless an appropriate chemical retardant is used. In all cases when concrete is placed at 32 degrees C or hotter it shall be covered and kept continuously wet for a minimum of 48 hours. Concrete members at or below grade shall have a minimum concrete cover over reinforcement of 75 mm.

1.4.8 Structural Steel

Structural steel shall be designed and constructed in accordance with the provisions of American Institute of Steel Construction (AISC), Specifications for Structural Steel Buildings (latest edition). Design of coldformed steel structural members shall be in accordance with the provisions of American Iron and Steel Institute (AISI), Specifications for Design of Cold-Formed Steel Structural Members.

1.4.8.1 Open Web Steel Joists

Open web steel joists shall conform to SJI Specifications and Tables. Joists shall be designed to support the loads given in the standard load tables of SJI Specifications and Tables.

1.4.9 Foundations

Foundations shall be in accordance with the Geotechnical Report.

1.4.10 Earthwork And Foundation Preparation

1.4.10.1 Capillary Water Barrier

ASTM C 33/C 33M fine aggregate grading with a maximum of 3 percent by weight passing ASTM D 1140, 75 micrometers,or 37.5 mm and no more than 2 percent by weight passing the 4.75 mm and conforming to the soil quality requirements of paragraph Satisfactory Materials.

1.4.10.2 Satisfactory Materials

Any materials classified by ASTM D 2487 as GW, GW-GM, GW-GC, SW, SW-SM, or SW-SC and free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

1.4.10.3 Unsatisfactory Materials

Any materials which do not comply with the requirements of paragraph Satisfactory Materials. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 75 mm. The Contracting Officer Representative shall be notified of any unsatisfactory materials.

1.4.10.4 Clearing And Grubbing

Unless indicated otherwise, remove tress, stumps, logs, shrubs, brush and vegetation, and other items that would interfere with construction operations within lines 1.5 m outside of the structure line. Remove stumps entirely. Grub out matted roots and roots over 50 mm in diameter to at least 460 mm below existing surface.

1.4.10.5 Stripping

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

1.4.10.6 Excavation and Compaction of Fill

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed. Refill with satisfactory material and compact to at least 95 percent of the maximum dry density, as determined by the Modified Proctor laboratory procedure. ASTM D 1557 shall be used for producing the Modified Proctor moisture-density curve, unless the soil to be compacted includes more than 30 percent retained on the 19 mm sieve. In this case, the Contractor must replace the ASTM D 1557 laboratory compaction procedure with AASHTO T 180, Method D, corrected with AASHTO T 224. During compaction, the moisture content of the soil shall be within 1.5 percent of the optimum moisture content, as determined by the Modified Proctor laboratory procedure. The thickness of compacted lifts shall not exceed 15 cm and the dry density of each compacted lift shall be tested by either sand cone (ASTM D 1556) or nuclear gage (ASTM D 2292). If the nuclear gage is used, it must first be compared to sand cone tests for each soil type to verify the accuracy of the nuclear gage measurements for moisture content, wet density, and dry density. Furthermore, every tenth nuclear gage test must be accompanied by a sand cone test and these verification data must be summarized and submitted to the Contracting Officer. Density tests shall be performed at a frequency of not less than one test for each 200 square meters and not less than two tests per compacted lift.

1.5 DESIGN REQUIREMENTS

1.5.1 General

All material approved shall become standardized material to be used throughout the facilities under contract. Different sub-contractors shall not use different material or standards under the contract. Intent of the project is to use locally procured materials (unless specified otherwise) and labor to the maximum extent possible while satisfying seismic, international building code, and national fire protection agency life safety code. Conflicts between criteria shall be brought to the attention of the Contracting Officer Representative for resolution. In such instances, the Contractor shall furnish all available information with justification to the Contracting Officer Representative.

1.5.2 Design Criteria

The Codes, Standards, and Regulations listed in these documents shall be used in the construction of this project. The publications shall be the most recent editions. Standards other than those mentioned may be accepted provided they meet the minimum requirements and the Contractor shall submit proof of equivalency to the Contracting Officer Representative for approval.

1.5.2.1 Life Safety/Fire Protection/Handicapped Accessibility

In keeping with the intended function of these facilities, handicapped accessibility will not be incorporated in this project. Due to the war contingency requirement, it is assumed that only able-bodied military and civilian personnel will use the facilities listed herein.

1.5.2.2 Antiterrorism/Force Protection

Force protection/anti-terrorism measures for this location shall be followed and incorporated into this project as indicated, in accordance with the referenced DoD Regulations. Information regarding force protection may be found herein and at the following link: www.tisp.org

1.5.3 Submittals

The Contractor shall submit the following for the equipment to be provided under this section of the specification: manufacturer's data including performance characteristics at design conditions; catalog cuts showing dimensions, performance data, electrical requirements, drawings indicating location and installation details.

1.6 ELECTRICAL

1.6.1 General

Contractor shall design and construct all electrical systems for the facilities to be provided as described in the Scope of Work in Section 01 11 00 SCOPE OF WORK. This includes design, construction, all necessary labor, equipment, and material for a fully functional system.

1.6.2 Design Criteria

1.6.2.1 Applicable Standards

a. Design shall be in the required units as specified.

b. Conflicts between criteria and/or local standards shall be brought to the attention of the Contracting Officer Representative for resolution. In such instances, all available information shall be furnished to the Contracting Officer Representative for approval.

c. All electrical systems and equipment shall be installed in accordance with the requirements set forth in the documents referenced herein.

d. Acceptance Testing: Contractor shall develop and submit for approval complete acceptance test procedures on all systems provided. As a minimum the testing procedures shall comply with the requirements of the National Fire Protection Association (NFPA) and the International Electrical Testing Association Inc. (NETA).

1.6.3 Material

1.6.3.1 General

Unless noted otherwise, all material used shall be in compliance with the requirements of UL standards. In the event that UL compliant materials are not available, Contractor may then select applicable British Standards (BS), IEC, CE, CSA, GS, DIN listed material (or equivalent), but the Contractor must prove equivalence and must provide the Government with a full copy of the relevant specification(s)/standard(s). Material and equipment installed under this contract shall be for the appropriate application and installed in accordance with manufacturers recommendations.

Equipment enclosure types shall be in compliance with the National Electrical Manufacturers Association (NEMA) or the International Electro-Technical Committee (IEC) standards.

Major components of equipment shall have the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a non-corrosive and non-heat sensitive plate, securely attached to the equipment. All equipment delivered and placed in storage, prior to installation, shall be protected from the weather, humidity and temperature variation, dirt and dust, and any other contaminants. All equipment shall be in new condition, undamaged and unused.

1.6.3.2 Standard Product

All material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least two years prior to bid opening.

1.6.3.3 Design Conditions

All equipment shall be rated and designed for the maximum ambient temperature and altitude of the construction site. Equipment that is

altitude and temperature sensitive, such as generators, shall be derated according to the manufacturer's recommendations. Generic derating criteria for altitude and for ambient temperature may be used to approximate the required size of such equipment during the design phase, but a stipulation shall be placed on the construction plans to adjust the size according to the derating criteria specific to the manufacturer's equipment chosen before the equipment is ordered.

1.6.3.4 Restrictions

Aluminum conductors shall not be specified or used.

1.6.4 Design Requirements

1.6.4.1 Conductors

All cable and wire conductors shall be copper. Conductor jacket or insulation shall be color coded to satisfy IEC requirements. For a three-phase system, phase A shall be brown, phase B shall be black, phase C shall be grey, the neutral shall be blue and the ground shall be green and yellow. The use of 75 or 90 degrees C (minimum) terminals and insulated conductors is required. Use of higher degree C rated conductors on circuits with protective device terminals rated at a lower degree C is allowed but must be derated to the rating of the device terminals. Conductors 6 mm2 and smaller shall be solid copper.

1.6.5 Grounding And Bonding

Grounding and bonding shall comply with the requirements of NFPA 70, NFPA 780, Department of the Army Pamphlet 385-64, and DoD 6055.9-STD. Underground connections shall be exothermally welded. All exposed non-current carrying metallic parts of electrical equipment in the electrical system shall be grounded. Insulated grounding conductor (separate from the electrical system neutral conductor) shall be installed in all feeder and branch circuit raceways. Grounding conductor shall be green-colored, unless the local authority requires a different color-coded conductor. Ground rods shall be 20 mmin diameter and 3 meters long made of copper-clad steel. Final measurement of the ground resistance shall be in compliance with the requirements of the local authority but shall not exceed 25 ohms when measured more than 48 hours after rainfall.

1.6.6 Lightning Protection System

A lightning protection system shall be designed and installed in accordance with NFPA 780, Department of the Army Pamphlet 385-64, and DoD 6055.9-STD. The system shall be complete, and consist of (but not be limited to): air terminals, low impedance paths to ground, side flash protection, and earth electrode systems.

1.6.7 Enclosures

Enclosures for exterior and interior applications shall be NEMA Type 3S (IEC Classification IP54) and NEMA Type 1 (IEC Classification IP10) respectively.

1.6.8 Identification Nameplates

Major electrical equipment including, but not limited to, transformers, panelboards, and load centers shall be provided with permanently installed

engraved identification nameplates.

1.6.9 Schedules

All panel boards and load centers shall be provided with a directory. Directory shall be typed written in English, Dari and Pashto

1.6.10 Single Line Diagram

Complete single line diagrams shall be provided for all systems installed. All major items in each system shall be identified and labeled for respective ratings. Single line diagrams for each system, installed in a clear plastic frame, shall be provided.

1.6.11 Operations And Maintenance For Electrical

a. Contractor is required to provide a 12 month supply of parts for operation and maintenance of equipment according to the manufacturer's recommendations. In addition to this, the Contractor shall provide an inventory of all items, location/address stored and secured, and commissioning plans.

b. The operations and maintenance manuals must be provided in the English language and prior to any training activities.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 20 00.00 20

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

1.1.1 Content of Invoice

a. The Contractor's invoice, on a form furnished by USAID, showing in summary form, the basis for arriving at the amount of the invoice. The form will include a certification requirement to be signed by the Contractor's Quality Control (QC) Manager.

b. A final invoice shall be accompanied by a certification and the Contractor's Final Release.

c. Updated Project Schedule and any reports required by the contract.

1.1.2 Submission of Invoices

All invoices shall be submitted to the Contracting Officer.

a. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies.

1.2 CONTRACTOR'S INVOICE

1.2.1 Content of Invoice

Request for payment in accordance with the terms of the contract shall include the following:

a. Contractor's Invoice, which shall show, in summary form, the basis for arriving at the amount of the invoice.

b. Copy of subcontractor and supplier payment certification.

c. Updated copy of submittal register.

d. Updated copy of progress schedule

e. Materials on Site

1.2.2 Quantities of Monthly Invoices and Supporting Forms

Forms will be furnished by the Contracting Officer.

Monthly invoices and supporting forms for work performed through the award date of the contract shall be submitted to the Contracting Officer by the fifth day of each month.

Forms shall be submitted in accordance with the Contracting Officer's contract invoicing instructions.

a. Contractor's invoice

b. Updated submittal register

c. Progress schedule

1.3 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

The Contracting Officer may allow progress payment for material delivered on the site (but not installed) and for completed preparatory work for (1) major high cost items and (2) long lead special order items. Materials that will not be paid for prior to installation include, but are not limited to, bulk quantities such as nails, fasteners, conduits, gypsum board, etc. In the request for progress payment, such items shall be specifically identified in the Contractor's estimates of work. At the time of invoicing, the amount billed shall be supported by documents establishing its value.

1.3.1 Obligation of USAID Payments

The obligation of USAID to make payments required under this contract will, at the discretion of the Contracting Officer, be subject to reductions and/or suspensions as follows:

a. Reasonable deductions due to defects in material or workmanship;

b. Claims which USAID may have against the Contractor under or in connection with this contract;

c. Unless otherwise adjusted, repayment to USAID upon demand for overpayments made to the Contractor; and

1.4 CHANGES ESTIMATES

In making all adjustments under the Changes Clause, compensation for additions will be based upon estimated costs at the time the work is performed and credit for deductions will be based upon estimated costs at the time the Contract was made. In arriving at the amount of the change in price, if any, allowance may be made for profit overhead and general expenses, plant rental and other similar items.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 32 17

NETWORK ANALYSIS SCHEDULE

PART 1 GENERAL

1.1 DESCRIPTION

The network analysis schedule (NAS) shall consist of a cost loaded Critical Path Method (CPM) schedule and associated reports. The scheduling of all design, procurement and construction shall be the responsibility of the Contractor. All design, procurement and construction activities will be integrated in a single schedule. The schedule will start at NTP Acknowledged and end at Contract Completion. The schedule may extend beyond Contract Completion, for activities such as demobilization, with the approval of the Contracting Officer Representative. The contractual period of performance will be shown as a hammock under Contract Milestones.

The approved NAS constitutes the baseline schedule and represents the contractor's plan for executing the project. The schedule will be updated monthly to show current status. The monthly updates will be used to measure work progress, aid in the evaluation of requests for time extensions, and to provide the basis of all progress payments. All progress payment amounts will equal the earned values calculated in the monthly NAS updates.

For consistency, when scheduling software terminology is used in this specification, the terms in Oracle's Primavera scheduling programs are used. Primavera Project Planner, P#, Primavera P6, and Primavera Contractor are registered trademarks or service marks of Oracle. Adobe and Acrobat are registered trademarks of Adobe Systems Incorporated.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Scheduler Qualifications; G
Project Execution Plan; G
Activity Code Dictionary; G
Baseline Network Analysis Schedule; G
Pay Requests; G
Monthly Network Analysis Updates; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.3 SCHEDULE ACCEPTANCE

Review comments made by the Government on the Contractor's schedules will not relieve the Contractor from compliance with the requirements of the

Contract Documents. The Contractor is responsible for scheduling, sequencing, and prosecuting the Work to comply with the requirements of the Contract Documents. The Government will review the schedule for compliance with the contract (including contractual milestones and scope), cost loading and cost distribution, schedule organization and activity coding, logic, durations, and general conformance with established scheduling concepts and acceptable industry standards.

1.3.1 SCHEDULE ACCEPTANCE PRIOR TO START OF WORK

The Baseline NAS described in paragraph Baseline Network Analysis Schedule must be accepted by the Government before the Contractor will be allowed to start construction of permanent facilities, including demolition, site preparation and facility layout.

1.3.2 ACCEPTANCE

a. After the Baseline NAS is accepted by the Contracting Officer Representative, it will be used by the Contractor for planning, organizing, and directing the work, reporting progress, and to support pay requests. The schedule will be updated monthly by the Contractor to reflect the current status of the work and will be submitted with the progress pay requests. Processing pay requests is conditional upon receipt and acceptance of the Baseline NAS and accurate updated schedules accompanying the pay requests. Only DBA insurance will be paid prior to acceptance of the Baseline NAS

b. The Baseline NAS and subsequent schedule updates will be considered to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor work plan, accurately reflects the work that has been accomplished, and the sequence in which it was performed.

1.4 SOFTWARE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. The program selected by the contractor shall be used for the duration of the project. The contractor shall provide electronic files saved in the proper backup format for all schedule submittals. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer Representative.

1.5 SCHEDULER QUALIFICATIONS

The Contractor shall assign a Scheduler who will be responsible for the development, preparation, and maintenance of an accurate, computerized Network Analysis Schedule. The Scheduler shall perform on-site coordination, attend project meetings, prepare reports and perform updates as required to support the project. The Scheduler shall have previously developed, created and maintained computerized schedules for at least two projects similar in size and complexity to this contract.

A resume outlining the qualifications of the Scheduler shall be submitted for acceptance to the Contracting Officer Representative. If at a later date, the Contracting Officer Representative considers the Contractor's Scheduler to be incompetent or objectionable, the Contractor will propose a

new Scheduler who meets the qualification requirements. Payments will not be processed until an acceptable Scheduler is assigned.

1.6 SCHEDULE FORMAT

1.6.1 STRUCTURE

The NAS shall consist of a cost loaded CPM network displayed as time scaled bar charts supported by specified tabular and graphical reports. Sample standard reports are included in Appendix 01321a. The NAS will show the order and interdependence of activities and the sequence in which the work is planned to be accomplished. The basic concept of the network will be followed to show how the start and/or finish of a given activity is dependent on the execution of preceding activities and how it restrains the succeeding activities. Activity durations shall not be resource driven; activities shall not have date constraints, and shall start and finish according to network logic. Diagrams shall be organized with a four or five level work breakdown structure, sorted by Early Start and Early Finish Dates and will show a continuous flow from left to right. With the exception of the NTP Acknowledged and Contract Completion milestones, every activity must have predecessor and successor ties and every finish must have a successor. Activities with only start-to-start successor relationships will not be allowed. Activities in an accepted schedule may not be renamed or renumbered. Critical activities will be shown in red.

Critical activities are defined as having zero or less days of Total Float. Near critical activities will be defined as having Total Float in the range of 1 to 14 calendar days. Barcharts will be submitted formatted for 11X17 sheets.

The following information will be shown for each activity:

a. Activity ID
b. Activity Description
c. Original Duration in Work Days
d. Remaining duration (schedule update reports only)
e. Early Start Date
f. Early Finish Date
g. Total Float
h. Budgeted Cost
i. Baseline Start Variance (schedule update reports only)
j. Baseline Finish Variance (schedule update reports only)

1.6.2 ACTIVITY PROPERTIES AND LEVEL OF DETAIL

Numbering shall be assigned so that, in general, predecessor activity numbers are smaller numerically than the successor activity numbers. Skip numbering shall be used on the network to allow insertion of additional activities for contract modifications and logic changes. All activities in RMS are sorted by activity ID. Government Activities. All government activities shall be clearly identified in the schedule. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted inspections/tests, environmental permit approvals by State regulators, utility outages, Notice(s) to Proceed (including Notices to Proceed for each Fast-Track Phase as indicated in other sections of this specification and as directed by the Contracting Officer Representative) and delivery of Government Furnished Material/Equipment. Show activities indicating Government furnished materials and equipment utilizing delivery dates indicated in "FAR

52.245-2, Government Property (Fixed-Price Contracts)". Government activities will be driven by a 7-day calendar, i.e. one with no non-work days. Construction Quality Management (CQM) Activities. All activities will have a Definable Feature of Work (FOW) as identified in the Contractor's Quality Control Plan. The FOW will be entered in the FOW activity code as defined in the SDEF specification.

1.6.2.1 ACTIVITY BANDS

The schedule will use the following (phases=PHAS) as the first level of organization:

a. Milestones. This band contains the contract milestones. If the contractor includes other project milestones, contract milestones and project milestones will be shown as separate bands below MILESTONES.

b. Pre-Construction. Included in this band are pre-construction meetings and submittals. Preconstruction submittals will be shown as a separate band under PRE-CONSTRUCTION.

c. Design. This band contains activities related to site investigation, surveys and design including, but not limited to Design Notice to Proceed, Contractor's design by design phase, application for and receipt of required permits, Contractor's constructability reviews, submittal of design packages to Government, Government's design review periods, specified design meetings, transition periods prior to Construction Notice to Proceed, (including Notice to Proceed for each Fast-Track Phased Design as indicated in Section 01335 SUBMITTAL PROCEDURES FOR DESIGN/BUILD PROJECT and as directed by the Contracting Officer Representative). The Government review period shall be from the time the design is received by the Government to the time it is sent back to the Contractor, in calendar days. Design activities will be linked to their associated Submittal, Procurement, and/or Construction activities. If the Government's review of any submittal requires resubmission or does not clear the design for construction, a new series of Design Activities will be inserted into the schedule. The predecessor for the new design preparation activity will be the original approval activity and the successor will be the beginning of the next design phase.

d. Procurement. This band contains tasks related to the procurement of installed material or equipment including but not limited to material submittal preparation, submittal and approval, fabrication, delivery, delivery of spare parts, extra stock, special tools, O&M manuals, notification of Government Furnished Material/Equipment delivery requirement. As a minimum, separate procurement activities will be provided for every specification section. Submittal approval activities shall be logically tied to associated procurement, delivery, and/or construction activities. If the contractor requires payment upon delivery for materials or equipment, i.e. "stored materials", a one day activity must succeed the delivery activity. The activity description should be "Stored Materials: name of materials or equipment". The activity will carry the documented cost of the materials or equipment and will be changed to actual only after review and approval of the supporting documentation by the COR. Payment for stored materials is subject to COR approval and must be requested in writing prior

to submittal of the baseline schedule. If the Government's action on any submittal is "Disapproved" or "Revise and Resubmit", a new series of Submittal Activities will be inserted into the schedule. Predecessor for the new submittal preparation activity will be the original approval activity and the successor will be the fabrication/deliver activity for the equipment or material.

e. Construction. This band will have as many subordinate bands as are required to provide a logical organization of construction work. These bands will contain all construction activities including but not limited to mobilization, demobilization; installation of temporary facilities tradesman; testing and inspection of installed work; start-up and testing of equipment; commissioning of building and related systems; scheduling of specified manufacturer's representatives. No construction activity shall have a duration greater than 20 working days. Construction activities will be driven by calendars that reflect all scheduled non-work days, i.e. Fridays, official Afghan holidays and severe weather days as listed in section 01060 of the contract.

f. Contract Closeout. This band will have two or more subordinate bands to provide a logical organization of the closeout work. These bands will contain all closeout activities including but not limited to Punch Out Inspection, Pre-Final Inspection, Final Acceptance Inspection, final clean-up. as builts, O&M manuals and training.

1.6.2.2 PROJECT MILESTONES

The NAS will include milestones for the start of the project; any contract required interim start and completion dates, contract completion date and other significant milestones. Only Contract Milestones will be recognized by the Government.

a. NTP Acknowledged: The schedule shall start no earlier than the NTP Acknowledged Date. NTP Acknowledged will be shown as a start milestone with a start-no-earlier-than constraint date equal to the date shown in RMS.

b. Contract Complete: The last activity in the schedule will be the Contract Complete milestone. This milestone will have finish-no-later-than constraint date equal to the Contract Required Completion date in RMS.

1.6.2.3 MANDATORY ACTIVITIES

The following activities, and the procurement activities described in 1.6.2.1d, when applicable, shall be listed as separate activities:

a. Submission, review and approval of the demining plan and required demining activities through receipt of the certificate.
b. Submission and approval of the accident prevention plan.
c. Submission and approval of the security plan.
d. Submission and approval of the contractor quality control plan
e. Submission and approval of the design quality control plan
f. Submission and approval of the area use plan.
g. Mobilization
h. Demobilization
i. Submission, review and acceptance of design packages and all

related activities required to support design.
j. Submission and approval of mechanical/electrical layout drawings.
k. Submission and approval of O & M manuals.
l. Submission and approval of as-built drawings.
v. Other systems testing, if required.
w. Pre-final inspection.
x. Correction of punch list from pre-final inspection.
y. Final inspection.

1.6.2.4 ACTIVITY NUMBER (ID) AND DESCRIPTION

a. Activity Numbers: Activity numbers will consist of up to 10 alphanumeric characters beginning with a letter and ending with a number. Only letters and numbers will be used. Activities must be numbered in ascending order from start to finish of the project.

b. Activity ID Codes: The Contractor shall submit the alphanumeric coding scheme for Activity Numbering that shall be used throughout the project. Activity ID Codes may be used to create a work breakdown structure (WBS). Four Activity ID fields are allowed in P3; user defined fields may be used in P6. Other scheduling software shall be used in a similar manner. The coding dictionary shall include the value and description of each code. Once accepted, the coding scheme will be used for the duration of the project. PHAS and AREA are the top two levels of codes.

c. Activity Description: Each activity shall have a narrative description consisting of a Location (e.g.; Building 1, 3rd floor, northeast quadrant, basement - abbreviate as necessary), Verb (e.g.; form, pour, excavate), and Object (e.g.; slab, footing, under floor plumbing).

1.6.2.5 ACTIVITY CODE DICTIONARY AND VALUES

The Contractor shall use the activity coding structure defined in USACE Regulation ER 1-1-11 Standard Data Exchange Format (SDEF) Appendix 01321a. The use of this exact structure is mandatory, even if some fields are not used. The SDEF fields may be used only for the purpose for which they are intended. The characters remaining after the SDEF codes are limited to eight in Primavera P3. These activity codes may be used to replace or supplement the Activity ID Codes. The codes will have values assigned that will allow the scheduling program to sort, select, group and organize the activities in the schedule.
Activity codes are used to:

a. Group and summarize project activities in a hierarchical structure, in the same way as a work breakdown structure (WBS), to facilitate updating and analysis of the schedule.

b. Group and summarize activities and related costs by CLIN and Bid Item

c. Select and sort activities to create ad hoc views and reports

1.6.2.6 COST LOADING

a. Cost Loading Activities:

1. Payment for design work will be made after a design submittal is approved. The cost of the design submittal will be applied to a one day "Design Approved" task after the approval activity.

2. Payment for mobilization and demobilization shall be paid according to the approved CLIN amount for these items. Unless specified otherwise in the contract, then the amount shall be split 60 percent for mobilization and 40 percent for demobilization and each of these costs applied to these separate cost loaded activities.

3. The cost of installed materials and equipment will be included in the appropriate construction activities except where the COR agrees in advance to payment for stored materials.

4. If payment is allowed by the COR for stored materials, the cost of the stored materials will be applied to a one day "Stored Materials Accepted" activity after the delivery activity.

5. Unless assigned a CLIN, indirect costs such as management, supervision, security, overhead, G&A and profit will be included in each activity budget. The total of all cost loaded activities shall equal the value of the contract.

6. Cost shall be rounded to zero decimal places if the contract and CLIN costs are in whole dollars. Cost shall be assigned to activities as a resource as described in the QCS requirements for SDEF file transfer.

7. Hammocks (summary bars) will not be cost loaded.

8. CLINs and resources will not be entered for activities with no budget.

b. Cost Loading Milestones: Milestone activities may not be cost loaded. A one day task should be used in instead of a cost loaded milestone such as Design Approved or Stored Materials Accepted.

c. Contract Line Item Number (CLIN): As described in Cost Loading, cost shall be assigned to every task type activity. Every activity shall also be assigned to a CLIN. All cost and earned value reports will be grouped by Project and CLIN with sub groups as appropriate. Group totals will be shown for Project and CLIN.

1.6.2.7 CALENDARS

Three calendars will be used in preparing the schedule:

a. Seven day week, no weekends or holidays, and no weather (7 Day Calendar) This calendar is used for any activity whose duration is measured in consecutive calendar days. These activities are mainly in the design and procurement phases. Examples are AED design review, fabricate & deliver.

b. Six day week, with non work weekend days, and public holidays, no weather (Standard Calendar) This calendar is used for construction activities which are not affected by severe weather conditions. Examples are all interior work and above ground structural work which is not temperature sensitive such as

structural steel erection. Some activities may require interior heating in cold weather for example, painting and plastering.

c. Six day week with public holidays and severe weather days as listed in Section 01060 Special Clauses (Weather Calendar) This calendar is used for construction activities which cannot or will not be performed in severe weather conditions (such precipitation, high or low temperature, wind), such as earthwork, excavation, compaction, concrete work, exterior plastering. If the site is shut down for any reason, for example severe weather or adverse security conditions, the shut down periods will be shown as non-work days on Calendars 2 and 3. Site shutdowns will be documented in the EWP (paragraph 1.7.3b). Although the use of additional calendars is not recommended, the contractor may submit other calendars for approval. Afghan Public Holidays All calendars except Calendar 1 must show official Afghan holidays as non-work days. The dates for 2010 are listed below. The dates of Muslim holidays regress 11 days every year. This rule may be used to estimate the holiday dates for future years. 2010

1. Feb.15 Liberation Day
2. Feb.26 The Prophet's Birthday*
3. Mar.21 Nauruz (Afghan New Year)
4. Apr.18 Liberation Day
5. Apr.28 Victory Day
6. May 1 Labor Day
7. Aug.19 Independence Day
8. Aug.10 Start of Ramadan - approximate*
9. Sep.10 Eid al Fitr (End of Ramadan)*
10. Sep.11 Eid al Fitr Holiday*
11. Sep.12 Eid al Fitr Holiday*
12. Nov.16 Eid al Adha (Feast of the Sacrifice)*
13. Nov.17 Eid al Adha Holiday*
14. Nov.18 Eid al Adha Holiday*
15. Nov.19 Eid al Adha Holiday*
16. Dec.17 Ashura*

Notes:Holidays marked ** are observed according to the Muslim calendar. Dates are tentative. The calendar should be adjusted as required to reflect official announcements for each calendar year within the project schedule. The month of Ramadan is not included in the construction calendar as non-working time. It should be borne in mind, however, that during this month productivity and availability of manpower tend to be lower than normal. This should be taken into consideration when scheduling work during this period.

1.6.2.8 SCHEDULE SOFTWARE SETTINGS AND RESTRICTIONS

Activity Constraints: Date constraints other than those required by the contract will not be allowed unless accepted by the Contracting Officer Representative. The contractor will identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.

Lags: Lags will not be used in place of activities in the logic. For example concrete curing time must be shown as an activity, not as a lag between the activities Pour Concrete and Remove Formwork. Negative lags must not be used. The contractor will identify all lags and provide an explanation for the purpose of the lag in the Narrative Report.

Actual Dates: Actual start and finish dates shall not be automatically updated by default mechanisms that may be included in the scheduling software. Actual Start and Actual Finish dates on the CPM schedule must match the dates in the Daily QC Report. These reports will be the basis for updating actual dates in the schedule.

Percent Complete: The reported percent complete of an activity will be based on the quantity of acceptable work in place.

Actual Hours: The schedule will be updated with actual labor hours as reported in the Daily QC Reports.
Software Settings for Other Scheduling Software: Settings will be used so as to comply with the requirements of the specification and may only be changed with the Contracting Officer Representative's approval.

Software Settings for Primavera P3: Use the P3 defaults for settings which are not otherwise specified. Settings may only be changed with the Contracting Officer Representative's approval.

Project Overview:

a. Set decimal places to zero if all CLIN values are in whole dollars
b. Set Project Start to NTP Acknowledged Date
c. Set Project Must Finish By to Contract Required Completion date

Schedule/Level Calculation Options:

a. Automatic scheduling and leveling - off
b. When scheduling activities apply - retained logic
c. Calculate start-to-start lag from - early start
d. Schedule durations - contiguous
e. Show open ends as - noncritical
f. Calculate total float as - finish float

Autocost Rules:

a. Uncheck Link Remaining Duration and Schedule Percent Complete
b. Check Freeze Resource Units per time period

Summarization:

a.Default calendar is 1 (7-day calendar)
b.Weighting factor for calculating percent complete is by cost

Critical Activities: Critical activities are activities which have zero or negative total float. The critical path is as calculated by the software longest path.

Format:

a. Bars: Activities will be shown as bars with no start and end points. Relationship lines will not be shown unless required for a specific report. Activity descriptions will be shown to the right of the bar. Target bars will be shown as a thin black bar above the current schedule. Progress will be shown based on percent complete.

b.Timescale: The timescale will show calendar dates with the minimum unit being weeks.

c. Vertical Sight Lines: The major and minor vertical sight lines will generally be months and weeks, respectively. For short term reports such as the 3-week look ahead, the increments will be week and day.

d. Fonts: The default font will be Arial 10.

e. Dates: The date format will be ddMMMyy. For example, 12JAN10.

f. Activity type: The default activity type is "Task".

g. Activity Number Increment: The initial activity number increment will be 10 to allow inserting activities in sequential order.

h. Store Period Performance: Upon completion of each monthly update, period performance must be stored in order to preserve historical cost distribution.

i. Software Settings for Primavera P6: Use the P6 defaults for settings unless otherwise stated for P3 above. Settings may only be changed with the Contracting Officer Representative's approval.

j. Out-of-Sequence Progress: Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) will not be allowed. The Contractor shall make logic corrections to reflect the as-built construction sequence.

1.6.2.9 FILE NAME

Each schedule submitted must have a unique name. The schedule ID will consist of four alpha-numeric characters.

a. The first character is assigned by the contractor to uniquely identify a USACE contract. It may be a letter from A to Z. The numbers 0 to 9 may be used if the contractor needs to identify more than 26 USACE contracts.

b. The second character is B (for Baseline or C for Current update).

c. For a baseline schedule the third character is the baseline number and the fourth character is the submittal number. For example, the second submittal of the initial baseline would be 12.

d. For a current update the third and fourth characters are the update sequence number from 01 to 99.

e. Example baseline schedule ID: AB12 for contract A, initial baseline, second submittal

f. Example current update: AC12 for contract A, current update No.12

1.6.3 REQUIRED REPORTS

The following reports will included with the specified schedule submittals. A PDF of each report will be included on the CD submitted by the Contractor. Barchart reports will be saved as layouts. Tabular and graphical reports will be saved as report specifications. All redundant layouts, report specifications and filter specification will be deleted from the project before it is transmitted. Baseline Schedule

1.6.3.1 PROJECT SCHEDULE REPORT

This is a barchart showing all activities organized by WBS and sorted by early start and early finish.

a. Cost Report. This is a barchart showing budget totals by CLIN.

b. Critical Path Report. This is a barchart showing activities on the longest path. The report layout will be the same as the Project Schedule Report.

Update Schedule. These reports will be submitted with the monthly pay request.

a. Project Schedule Report. This is a barchart showing all activities organized by WBS and sorted by early start and early finish. This report will display the baseline and current update on separate bars.

b. 3 Week Look Ahead. This is a barchart showing activities in continuing or scheduled to start or finish in the three week period after the data date.

c. Earned Value Report. This is a barchart listing all activities which have an earned value. The report will be organized by CLIN and WBS, sorted by early start and early finish.

d. Critical Path Report. This is a barchart showing activities on the longest path. The report layout will be the same as the Project Schedule Report.

e. Other Reports - Reports necessary to monitor and evaluate the project shall be provided by the contractor as requested by the COR.

1.7 SUBMISSION AND ACCEPTANCE

1.7.1 PRELIMINARY MEETING

Before the contractor begins preparation of the initial Baseline Network Analysis Schedule, the Contracting Officer Representative, the Contractor and the scheduling consultant shall participate in a preliminary meeting to discuss the proposed schedule and the requirements of this section.

1.7.2 BASELINE NETWORK ANALYSIS SCHEDULE

Once review comments are resolved and the Contracting Officer Representative has accepted the Baseline Network Analysis Schedule, the contractor shall furnish the following within 5 calendar days:

a. Two copies of the reports listed in the paragraph entitled "Required Reports".

b. Two copies of the Cost Loading S-Curve and Histogram indicating the cost loading based upon both early and late dates.

c. Two sets of CDs containing an electronic file of the project schedule along with a PDF print copy and required reports shall be provided for the initial submission and every periodic project update. A permanent label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Baseline, Update, Recovery, Change, etc.), full contract number, Project Name used to identify project in scheduling software, contract name & location, data status date, diskette number with total number of diskettes in set, software name and version used to run the schedule, and the name and telephone number of person responsible for the schedule.

d. The schedule reports shall include a footer which shows the contractor name, contract number, contract title, project ID and data date. A sample footer will be provided at the preliminary meeting.

1.7.3 PROJECT EXECUTION PLAN

a. Initial Work Plan
The purpose of the Initial Work Plan (IWP) is to ensure that the contractor understands the scope of work and demonstrates that the project has been properly planned to be executed within the period of performance. The IWP is prepared and submitted with the baseline schedule. It supplements and explains the baseline schedule.

The IWP must conform to the following outline:

1. Introduction
2. Scope of work
3. Period of performance
4. Location
5. Climate and topography
6. Management Plan
7. Non-manual (management and supervision) staffing
8. Mobilization and demobilization
9. Security: on-site and transportation
10. Logistics
11. Engineering and Design
12. Performed by whom and where
13. Design submittals
14. Constraints on procurement
15. Constraints on construction
16. Partial releases for construction, if required
17. Procurement
18. Materials submittals
19. Long lead or critical materials and equipment: sources and lead times
20. Constraints on design and construction
21. Subcontracting
22. Subcontracting plan
23. Subcontractor resources
24. Construction

25. General sequence of construction
26. Schedule allowances for Ramadan, holidays and weather (defer work to favorable weather; methods for cold weather concrete, etc.)
27. Critical constraints on construction
28. Labor and equipment constraints
29. Construction methods: for example machine excavation vs. hand excavation, pre-fabricated steel vs. on-site fabrication, in-situ vs. precast concrete
30. Productivity calculations used for the work durations for all major trades
31. Materials testing and quality control

b. Execution Work Plan
The Execution Work Plan (EWP) is an update of the IWP incorporating any issues which could affect performance of the work. The EWP must be revised if there is a significant change in scope or site conditions, or if there is a delay in the schedule. As part of the contract closeout, the EWP will be revised to document how the work was executed.

1.7.4 MONTHLY NETWORK ANALYSIS UPDATES

The Contractor and Government representatives will meet monthly to review and agree on the status of each activity after which the contractor shall update the project schedule with the agreed on percentages for each activity progressed during the update period. The purpose of the meeting is to determine progress payment amounts for each activity, allow all parties to evaluate project status at the data date, provide a complete and accurate update of procurement and construction progress, create an historical record of the project and forecast contract completion based upon current status. The contractor is responsible to gather all supporting documentation, present the update data for the schedule and record the meeting minutes. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities. Submit at monthly intervals a report of the actual construction progress by updating the required reports and the time scaled bar charts. Meeting to update the schedule and the submission of an error free, acceptable updated schedule to the Government is a condition precedent to the processing of the Contractor's pay request.

As a minimum, the following actions will be accomplished during the meeting:

a. Identify activities started and completed during the previous period and enter the Actual Start and Actual Finish dates. It will be understood that Actual Start is defined as the date that work begins on an activity with the intent to pursue the work represented by the activity to substantial completion, and Actual Finish is defined as the date that the activity's work is substantially complete to the point that its successor activity(s) may begin. Actual dates must agree with the daily reports.

b. Show estimated duration (in workdays) to complete each activity started but not completed (remaining duration). Forecast finish dates may not be on the data date.

c. Show forecast start dates. Forecast start dates may not be on the data date.

d. Update the percent of work complete for activities which are in progress or have been completed.

e. Reflect changes in the network diagram. All changes (i.e., remaining duration changes, logic changes, new logic, conformed change orders, new activities, changes due to Conformed Modifications, changes in work sequence, entry of as-built relationship logic, etc.) shall be recorded and a note added to the activity log field. The log shall include as a minimum, the date and reason for the change, and description of the change. All changes to the schedule shall be clearly identified and explained in the monthly narrative report.

f. A complete update of the project schedule containing all approved progress, revisions, and adjustments shall be submitted by the10th of each month to allow adequate time for review and for the contractor to perform any necessary revisions prior to submittal of the updated schedule with the monthly pay request. The progress reported on the updated schedule shall be consistent with and in support of the information reported on the pay request. Processing of the monthly pay request shall be dependent upon the accompanying receipt of an acceptable progress schedule.

g. The Narrative Report will include:

1. Progress made in each area of the project
2. Changes in the following: activities, original durations, logic interdependencies, milestones,planned sequence of operations, critical path, and resource and loading
3. Pending items and their status including permits, change orders, and time extensions
4. Status of Contract Completion Date and interim milestones
5.Current and anticipated delays (describe cause of the delay and corrective action(s))
6. Discussion of the critical path
7. Description of current and future schedule problem areas
8. Forecast of expected progress in each area of the project for upcoming reporting period or the following 30 calendar days. Each entry in the narrative report will cite the respective Activity ID and Activity Description.

h. Submit two copies of the reports listed in the paragraph entitled "Required Tabular Reports".

i. Submit two hard copies of the network diagrams and two sets of data disks.

j. Submit two copies of the Update Meeting minutes.

1.7.5 RECOVERY PLAN

In the event the contractor falls 20 or more work days behind schedule then the contractor will be required to submit a recovery plan (schedule and a detailed narrative) describing the steps that will be taken to recover the lost time and return the critical path of the project to at least zero days total float. The contractor shall submit the recovery plan within 7 calendar days of submitting a periodic schedule update that indicates the contractor is 20 or more work days behind schedule. The detailed narrative shall be an update of the Execution Work Plan and will provide a full explanation of the recovery schedule.

1.7.6 AS-BUILT SCHEDULE

As a condition for the release of retention and making final payment, the Contractor shall submit an "As-Built Schedule", which is the last schedule update. The As-Built Schedule shall reflect the exact manner in which the project was actually constructed (including actual start and finish dates, activities, sequences, and logic) and shall be certified by the Contractor's Project Manager and Construction Scheduler as being a true reflection of the way the project was actually constructed. If more than one person filled the position(s) during the course of the project, each person will provide certification for the period of time they were responsible.

1.8 CONTRACT MODIFICATION

When a contract modification is required, the contractor shall submit proposed revisions to the network with a fragnet and a cost proposal for each proposed change. A narrative and all supporting documentation shall be included with the fragnet and cost proposal. All modifications shall be incorporated into the network analysis system as separately identifiable activities broken down and inserted appropriately on the first update following issuance of a directive to proceed with the change. Submit two copies of the Total Float Report, Log Report and a copy of the proposed Time Impact Analysis on disk, with the cost proposal no later than 14 days after the incident (if a delay issue) or after receiving written direction to proceed. Unless the Contracting Officer Representative requests otherwise, only conformed contract modification fragnets will be added into the subsequent monthly updates. All revisions to the baseline schedule that are necessary to further refine the schedule so that the changed work activities can be logically tied to the schedule shall be made. Financial data shall not be incorporated into the schedule until the Contracting Officer signs the contract modification.

1.8.1 TIME IMPACT ANALYSIS:

The Time Impact Analysis method shall be used by the Contracting Officer and the Contractor in determining if a time extension or reduction to the contract milestone date(s) is justified. The Contractor shall provide a Time Impact Analysis to the Contracting Officer for any proposed contract change or as support for a Value Engineering Proposal, Variance Request, Claim or Request for Equitable Adjustment by the Contractor. The Time Impact Analysis schedule must be submitted on disk and a printed /plotted hardcopy. A narrative and all supporting documentation shall be included with the fragnet and cost proposal.

a. The Contractor shall submit a Time Impact Analysis illustrating the influence of each change or delay on the Contract Completion Date or milestones. Unless the Contracting Officer requests an interim update to the schedule, the current monthly updated schedule accepted by the Government shall be used to display the impacts of the change. Unless requested by the Contracting Officer, no other nonconforming changes will be incorporated into the schedule being used to justify the change impact.

b. Each Time Impact Analysis shall include a Fragmentary Network (fragnet) demonstrating how the contractor proposes to incorporate the impact into the project schedule. A fragnet is defined as the sequence of new activities and/or activity revisions, logic relationships and resource changes that are proposed to be added

to the existing schedule to demonstrate the influence of impacts to the schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Contractor shall provide a hardcopy printout of the fragnet activities and relationships being added and also insert the fragnet into the most current, accepted Monthly Network Analysis Update, run the schedule calculations and submit the impacted schedule with the proposal, claim, etc. Include a narrative report describing the effects of new activities and relationships to interim and contract completion dates, with each Time Impact Analysis. Submit tie extension requests with a Time Impact Analysis and three hardcopies of the fragnet, impacted schedule (with fragnet loaded), Total Float Report, Narrative Report and Log Report.

c. Following the Contractor's receipt of a contract modification on a Standard Form 30 signed by the Government; all changes in the fragnet used to determine impacts, shall be incorporated into the schedule. Changes will occur during the next monthly schedule update meeting.

1.8.2 NO RESERVATION-OF-RIGHTS

All direct costs, indirect costs, and time extensions will be negotiated and made full, equitable and final at the time of modification issuance.

1.9 CHANGES TO THE NETWORK ANALYSIS SCHEDULE

If changes in the method of operating and scheduling are desired, the Contracting Officer shall be notified in writing stating the reasons for the change. If the Contracting Officer considers these changes to be of a valid nature, the Contractor may be required to revise and submit for acceptance, without additional costs to the Government, the network diagrams and required reports. A change may be considered of a major nature if the estimated time required or actually used for an activity or the network logic has varied from the original plan to a degree that there is a reasonable doubt as to the effect on the contract completion date(s). Changes that affect activities with adequate float time shall be considered a major change when their cumulative effect would extend the contract completion date.

1.10 FLOAT

Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to Government caused delay), unjustifiable relationship lags, zero total or free float constraints, extended activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

1.10.1 DEFINITION OF FLOAT

Free Float is the time the start of an activity can be delayed without delaying the start of a successor activity. Total Float is the time finish of activity can be delayed without delaying the project completion date. Project Float is the length of time between the Contractor's Forecast Early

Completion and the Contract Required Completion.

1.10.2 OWNERSHIP OF FLOAT

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Government or the Contractor. During the course of the project, any positive float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the reserve of float. A schedule showing work completing in less time than the contract time, and accepted by the Government, will be considered to have Project Float. Project Float will be a resource available to both the Government and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the project's critical path, consumes all available float or contingency time, and extends the work beyond the Contract Required Completion Date.

1.10.3 NEGATIVE FLOAT

Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the paragraphs entitled "CONTRACT MODIFICATION". Scheduled completion date(s) that extend beyond the contract or phase completion date(s) may be used in computations for assessment of payment withholdings. The use of this computation is not to be construed as a means of acceleration.

1.11 3-WEEK LOOK AHEAD SCHEDULE

The 3-Week Look Ahead Schedule provides a focus on the day-to-day planning and execution of near term work. This schedule is filtered from the NAS and shows activities which fall in the period extending from one week before the data date to three weeks after the data date. This schedule will use the standard barchart format described under Current Schedule Update. Two bars will be shown to allow comparison of the current week update with the previous week's schedule. The report will, formatted for printing on 8 ½ by 11 sheets. A pdf of the 3-week schedule shall be emailed to the Contracting Officer Representative at least 3 work hours prior to the start of the weekly coordination meeting.

1.12 WEEKLY COORDINATION MEETING

A coordination meeting will be held each week to discuss the near term work as shown on the 3-Week Look Ahead schedule. The contractor will present an overview of the previous week's work, the current week's work, and the work planned for the following two weeks. Items which should be discussed are changes in the 3-week schedule. Issues which affect execution of the work such as coordination, procurement, labor and equipment. The Contractor will take meeting minutes. All meeting minute entries will be keyed to the schedule activity numbers) being addressed. Within one day of the meeting, the Contractor will provide a draft copy of the meeting minutes to the Contracting Officer Representative for review and comment. Final copies of the minutes containing the comments provided by the Contracting Officer will be issued within 3 days of the meeting.

1.13 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs, etc.) and test reports (e.g., concrete, soil compaction, weld, pressure, etc.) shall reference the Schedule Activity Number(s) that are being addressed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

The Contractor shall check and approve all items prior to submittal. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring USAID approval are to be scheduled and made prior to the acquisition of the material or equipment covered.

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to issuance of notice to proceed commencing work on site or the start of the next major phase of the construction on a multi-phase contract. Includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work, submitted prior to contract notice to proceed or next major phase of construction.

List of proposed Subcontractors

List of proposed products

Construction Progress Schedule

Submittal register

Schedule of prices

Work plan

Quality control(QC) plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS)concerning impedances, hazards and safety precautions.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

Interim "DD Form 1354" with cost breakout for all assets 30 days prior to facility turnover.

1.1.2 Approving Authority

Office or designated person authorized to approve submittal.

1.1.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

USAID approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Designer of Record Approved (DA)

Designer of Record (DOR) approval is required for extensions of design, critical materials, any deviations from the plans, the accepted proposal, or the completed design.

1.3.2 USAID Conformance Review of Design (CR)

USAID will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation.

1.4 PREPARATION

1.4.1 Identifying Submittals

When submittals are provided, the Prime Contractor is to prepare, review and stamp with Contractor's approval all specified submittals prior to submitting for USAID approval.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Date of the drawings and revisions.

d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other subcontractor associated with the submittal.

e. Section number of the specification section by which submittal is required.

f. Submittal description (SD) number of each component of submittal.

g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.

h. Product identification and location in project.

1.4.2 Format for SD-02 Shop Drawings

Shop drawings are not to be less than 210 by 297 mm nor more than 1189 by 841 mm, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required.

Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

Present A4 297 by 210 mm sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled, "Identifying Submittals," of this section.

Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the USAID contract number in the margin, immediately below the title block, for each drawing.

1.4.3 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

Provide product data in metric dimensions. Where product data are included in preprinted catalogs with English units only, submit metric dimensions on separate sheet.

Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, submit as specified for SD-07 Certificates.

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal. Mark each copy of the product data identically. Partial submittals will be accepted for expedition of construction effort.

Submit manufacturer's instructions prior to installation.

1.4.4 Format of SD-04 Samples

Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

a. Sample of Equipment or Device: Full size.

b. Sample of Materials Less Than 50 by 75 mm: Built up to A4 297 by 210 mm.

c. Sample of Materials Exceeding A4 297 by 210 mm: Cut down to A4 297 by 210 mm and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 250 mm length or length to be supplied, if less than 250 mm. Examples of linear devices or materials are conduit and handrails.

e. Sample of Non-Solid Materials: 750 ml. Examples of non-solid materials are sand and paint.

f. Color Selection Samples: 50 by 100 mm. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

g. Sample Panel: 1200 by 1200 mm.

h. Sample Installation: 10 square meters.

1.4.5 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 297 by 210 mm paper. Provide a bound volume for submittals containing numerous pages.

1.4.6 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Provide reports on 297 by 210 mm paper in a complete bound volume.

Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

1.4.7 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.4.8 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with English units only, submit metric dimensions on separate sheet.

1.5 QUANTITY OF SUBMITTALS

1.5.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

1.5.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.5.3 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be

retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.5.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.5.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.5.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit three copies of O&M Data to the Contracting Officer for review and approval.

1.5.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit three sets of administrative submittals.

1.6 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. USAID reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the USAID laboratory or for check testing by USAID in those instances where the technical specifications so prescribe.

1.7 VARIATIONS / SUBSTITUTION REQUESTS

1.7.1 Considering Variations

Discussion with Contracting Officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in USAID requiring rejection and removal of such work at no additional cost to USAID.

1.7.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to USAID. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.7.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.7.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by USAID of submittals with variations.

1.8 SUBMITTAL REGISTER

1.8.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.2 Contractor Use of Submittal Register

Update the following fields with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.8.3 Approving Authority Use of Submittal Register

Update the following fields.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p)List Date related to review actions.

Column (q) List date returned to Contractor.

1.8.4 Contractor Action Code and Action Code

Entries for columns (j) and (o), are to be used are as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.8.5 Copies Delivered to USAID

Deliver one copy of submittal register updated by Contractor to USAID with each invoice request.

1.9 SCHEDULING

Schedule and submit concurrently submittals covering items forming a system or items that are related. Include certifications to be submitted with the pertinent drawings at the same time. Time extensions will be allowed for time lost in late submittals.

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work.

b. Submittals called for by the contract documents will be listed on the register.

c. Re-submit register and update monthly by the Contractor with actual submission and approval dates.

d. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer approval begins when USAID receives submittal from QC organization.

e. Period of review for each resubmittal is the same as for initial submittal.

1.9.1 Reviewing, Certifying, Approving Authority

The Contractor is responsible for reviewing and certifying that submittals are in compliance with contract requirements. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates Contracting Officer is approving authority for that submittal item.

1.9.2 Contractor's QC Organization Responsibilities

a. Note date on which submittal was received from Contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

(1) Forward submittal to USAID with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate.

e. Ensure that material is clearly legible.

Stamp each submittal with the following statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed for contract Number _____ and is in compliance with the contract drawings and specifications.

Certified by QC Manager _____, Date _____"
(Signature)

f. Update submittal register as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Contracting Officer.

g. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

1.10 USAID APPROVING AUTHORITY

When approving authority is Contracting Officer, USAID will:

a. Note date on which submittal was received from QC Manager.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.

Upon completion of review of submittals requiring USAID approval, stamp and date approved submittals. One copy of the approved submittal will be retained by the Contracting Officer and 1 copy of the submittal will be returned to the Contractor.

1.10.1 Review Notations

Contracting Officer review will be completed within 14 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted" "or approved except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required , does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.11 DISAPPROVED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes," is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in USAID requiring rejection.

If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.12 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s)

SIGNATURE: _____

TITLE: _____

DATE: _____

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 35 10

SPECIAL REQUIREMENTS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Meeting Minutes; G

Area Use Plan; G

1.2 PRECONSTRUCTION CONFERENCE

1.2.1 Schedule of Meeting

At the earliest practicable time, prior to commencement of the work, the Contractor and any subcontractors whose presence is necessary or requested, shall meet in conference with representatives of the Contracting Officer Representative to discuss and develop a mutual understanding relative to the details of the administration and execution of this contract. This will include, but not necessarily be limited to, the Contractor's Quality Control (CQC) Program, the Contractors Accident Prevention Program, submittals, correspondence, schedule, access to the work site, security requirements, interface requirements, temporary facilities and services, hazards and risks, working after normal hours or on weekends or holidays, assignment of inspectors, representations, special requirements, phasing, and other aspects of this project that warrant clarification and understanding.

1.2.2 Meeting Minutes

It shall be the responsibility of the Contractors CQC System Manager to prepare detailed minutes of this meeting and submit those minutes to the Contracting Officer Representative for approval within three (3) workdays. Any corrections deemed necessary by the Contracting Officer Representative shall be incorporated and resubmitted within two (2) calendar days after receipt. Upon approval of the minutes by the Contracting Officer Representative, the Contractor shall distribute the minutes to all parties present or concerned.

1.3 AREA USE PLAN

The Contractor shall submit to the Contracting Officer Representative, within ten (10) calendar days after award of this contract, an Area Use Plan designating intended use of all areas within the project boundaries. This plan shall include, but not necessarily be limited to, the following: the proposed location and dimensions of any area to be fenced and used by the Contractor; construction plant and building installations/the number of

trailers and facilities to be used; avenues of ingress/egress to the fenced areas and details of the fence installation; drawings showing temporary electrical installations; temporary water and sewage disposal installations; material storage areas; hazardous storage areas. Any areas that may have to be graveled shall also be identified. The plan shall also include a narrative description of the tower and foundation structural system, the site utility system and the office or administration facilities. The Contractor shall also indicate if the use of a supplemental or other staging area is desired. The Contractor shall not begin construction of the mobilization facilities prior to approval by the Contracting Officer Representative of the Area Use Plan described herein.

1.4 CONTRACTOR'S MOBILIZATION AREA

The Contractor will be permitted to use an area approved by the Contracting Officer Representative within the contract limits for operation of his construction equipment and plants, shops, warehouses, and offices. Utilities will be provided for the Contractor as described below. The Contractor is responsible for obtaining any required additional mobilization area above that designated. The construction site shall be cleared of construction debris and other materials and the area restored to its final grade.

1.4.1 CONTRACTOR'S TEMPORARY FACILITIES

1.4.1.1 GENERAL

All facilities within the Contractor's mobilization area shall be of substantial construction suitable for the local weather conditions. Sanitary facilities shall meet the requirements of Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1. Local nationals will not be granted any privileges under this contract. Government provided services are for American and Foreign national contractors only.

1.4.1.2 ADMINISTRATIVE FIELD OFFICES

The Contractor may provide and maintain administrative field office facilities within the mobilization area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.4.1.3 STORAGE AREA

The Contractor shall construct a temporary 1.8 meter high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored green or brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless approved in writing by the Contracting Officer Representative.

1.4.1.4 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. If radio communication is approved by Contracting Officer Representative / installation security office,

frequency selection shall be approved by Contracting Officer to prevent interference with installation operations. Such devices shall be provided by the Contractor and made available for use by Government personnel as requested.

1.4.1.5 APPEARANCE OF MOBILIZATION SITE FACILITIES AND/OR TRAILERS

Mobilization Site Facilities and/or Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers or other transportable structures which, in the opinion of the Contracting Officer Representative, require exterior painting or maintenance will not be allowed on the construction site until such work or maintenance has been performed to the satisfaction of the Contracting Officer Representative.

1.4.1.6 MAINTENANCE OF STORAGE AREA

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse unpaved areas which are not established roadways with construction equipment or other vehicles, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of soil onto paved or established roadways; gravel gradation shall be at the Contractor's discretion.

1.4.1.7 SECURITY PROVISIONS

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own facilities and equipment in accordance with

1.4.1.8 SANITATION

a. Sanitary Facilities: The Contractor shall be responsible for maintaining such facilities at no expense to the Government.

b. Trash Disposal: The Contractor shall be responsible for collection and disposal of trash from the work areas and from the mobilization area. General construction debris and demolition debris shall be collected and transported by the Contractor to a location designated by the Government. Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Loose debris capable of being windblown, shall be immediately placed in sealed or covered containers to prevent it from being blown onto taxiways or runways. Any dirt or soil that is tracked onto paved or surfaced roadways shall be cleaned daily. Materials resulting from demolition activities that are salvageable shall be stored within the fenced area described above. Stored material not indoors, whether new or salvaged, shall be neatly stacked when stored.

1.4.1.9 TELEPHONE

The Contractor shall make arrangements to install and pay all costs for telephone facilities desired.

1.4.1.10 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of mobilization facilities, trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor.

Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse unpaved areas shall be removed and all such areas restored to their original conditions.

1.4.2 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer Representative. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the Host Nation and base authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with base traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.4.2.1 USE OF EXISTING ROADS AS HAUL ROUTES

The Contractor shall be responsible for coordinating with the base authorities for use of any existing roads as haul routes. Construction, and routing of new haul roads, and/or upgrading of existing roads to carry anticipated construction traffic shall be coordinated with the Base authorities and is the sole responsibility of the Contractor.

1.4.2.2 EMPLOYEE PARKING

The Contractor's employees may be allowed parking on the military installation. The Contractor is responsible for transporting workers (local nationals) from off post to the worksite, coordinating security identification screening, and cooperating in gate searches with the base authorities. The government reserves the right to terminate any and all contractor parking at any time.

1.4.3 TEMPORARY PROJECT SAFETY FENCING AND BARRICADES

The Contractor shall impose all measures necessary to limit public access to hazardous areas and to ensure the restriction of workers to the immediate area of the construction and mobilization site. The Contracting Officer Representative may require in writing that the Contractor remove from the work any employee found to be in violation of this requirement.

1.4.3.1 BARRICADES

Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night. Travel to and from the project site shall be restricted to a route approved by the Contracting Officer Representative.

1.4.4 HOST NATION AUTHORIZATIONS, PERMITS AND LICENSES

It shall be the Contractor's responsibility to obtain such local authorizations, permits and licenses necessary to establish his quarry operations, batching operations and haul routes (See Special Clause entitled: COMPLIANCE WITH HOST COUNTRY RULES AND CUSTOMS).

1.5 RESPONSIBILITY FOR PHYSICAL SECURITY

Prior to mobilization, the Contractor shall submit his proposed means of providing project security to meet the requirements of Section 01 35 30 SECURITY and prevent unauthorized access to equipment, facilities, materials and documents, and to safeguard them against sabotage, damage, and theft. The Contractor shall be responsible for physical security of all materials, supplies, and equipment of every description, including property which may be Government-furnished or owned, for all areas occupied jointly by the Contractor and the Government, as well as for all work performed.

1.6 DUST CONTROL

The Contractor shall be required to control objectionable dust in the work areas, access roadways, and haul roads by means of controlled vehicle speeds or dust palliatives. Vehicles transporting sand, cement, gravel or other materials creating a dust problem shall be covered, as directed by the Contracting Officer Representative, or in accordance with local Laws, codes, and regulations.

1.7 DIGGING PERMITS

1.7.1 REQUIREMENTS FOR DIGGING PERMITS

Prior to the start of any work activity that requires excavation within the current base, the Contractor shall obtain a digging permit.

1.7.2 REQUESTS FOR DIGGING PERMITS

Requests for Digging Permits shall be submitted to Contracting Officer Representative a minimum of seven (7) days prior to the start of the work activity covered by the permit. The request for a Digging Permit shall include a narrative description of the work to be performed and a detailed map of the area of the excavation clearly marking the location of all known utilities or other obstructions. If the work activity covered by the Digging Permit request also requires a utility outage, a separate request for the outage shall be submitted in accordance with the paragraph entitled CONNECTIONS TO EXISTING UTILITIES.

1.7.3 PREPARATION OF REQUESTS FOR DIGGING PERMITS

Prior to submitting a request for a Digging Permit, the Contractor shall carefully review the area to be excavated to determine the location of existing utilities and other obstructions. The Contractor will review available drawings and will conduct a visual inspection of the site. The Contractor will utilize underground utility detecting devices such as metal and cable detectors to determine the location of existing utilities. All utility lines found shall be clearly flagged or marked and the location of the utility shall be shown on the drawing to be submitted with the request for Digging Permit.

1.7.4 EXISTING UNDERGROUND UTILITIES

The Contractor shall exercise utmost care in researching locations of existing utilities and reducing damage to existing utilities. Any utilities damaged by the Contractor shall be promptly repaired by the Contractor. The Contracting Officer Representative will review and approve any proposed repairs. Any damage to existing utilities will be immediately reported to the Contracting Officer Representative and the Base Commander.

1.8 CONNECTIONS TO EXISTING UTILITIES

1.8.1 GENERAL

Any outage involving disruption of electrical service beyond the site area shall be requested in writing at least ten (10) days in advance of the date requested for the commencement of the outage. The Contractor shall provide a request, detailing the type of outage needed (water, sewer, electrical, steam, etc.), the time needed to perform the work, the reason for the outage, and the known affected facilities. The Contracting Officer Representative shall be contacted prior to the outage to confirm the time and date. If the Contractor fails to initiate work at the approved time, the Contracting Officer Representative may cancel the approved outage and may direct the Contractor to resubmit a new request. No part of the time lost due to the Contractor's failure to properly schedule an outage shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

1.8.1.1 PERFORMANCE OF WORK DURING NON-STANDARD HOURS

While outages are not expected or required by this contract if they are needed the following applies: To minimize outage impact to the mission of the installation, all outages shall be scheduled on weekends or from 2100 - 0530 hours on duty days and/or as directed by Contracting Officer Representative (COR). The period proposed for performance of the outage shall include sufficient contingencies to preclude impact to the peak working hours 0530 - 1800 hours during the workweek.

1.8.1.2 EXTERIOR NIGHT LIGHTING

Exterior night lighting shall be provided in conformance with EM-385-1-1 entitled Safety and Health Requirements Manual.

1.8.2 EXISTING UNDERGROUND UTILITIES

The Contractor is provided notice that existing utilities may be present in the construction area. The Contractor shall exercise the utmost care in researching locations of existing utility lines by implementing control measures to eliminate, or reduce to a level acceptable to the Contracting Officer Representative, the chance of damaging or destroying existing utilities.

1.8.2.1 USE OF UNDERGROUND UTILITY DETECTING DEVICE

Prior to any excavation, a metal and/or cable-detecting device shall be used along the route of the excavation. All underground utilities discovered by this method will be flagged a minimum distance of one-half (1/2) meter on each side of the location.

1.8.2.2 HAND EXCAVATION

Hand excavation methods and special supervisory care shall be used between any flagged markers, in areas of known or suspected hazards, and in areas known or suspected to have multiple and/or concentrated utility lines or connections.

1.8.3 REPAIR OF DAMAGED UTILITIES

The Contractor shall be responsible to repair any utilities damaged by him. The method of repair and schedule for performance of the repair shall be coordinated with, and subject to the approval of, the Contracting Officer Representative. The repair work and any temporary work required to keep the system operational while repairs are being completed, shall be performed at no cost to the Government.

1.9 WATER

The Contractor shall install and maintain necessary supply connections and piping for same, but only at such locations and in such manner as may be approved by the Contracting Officer Representative.

1.10 ELECTRICITY

Electrical service is not available for use under this contract; therefore all electric current required by the Contractor shall be the responsibility of the Contractor, furnished at his own expense. The Contractor shall provide diesel generators to meet his demand requirements. Electricity required for final testing systems will be furnished by the Government. The Government will provide permanent high voltage electricity to a point indicated by the Contracting Officer Representative for use by the Contractor in the performance of final testing of systems. The means of doing so, such as by temporary distribution systems, shall be the responsibility of the Contractor. All temporary connections for electricity shall be subject to the approval of the Contracting Officer Representative and shall comply with Corps of Engineers manual EM 385-1-1 entitled Safety and Health Requirements Manual. All temporary lines shall be furnished, installed, connected and maintained by the Contractor in a workmanlike manner satisfactory to the Contracting Officer Representative. Before final acceptance of systems, or facilities, all temporary connections installed by the Contractor shall be removed at his expense in a manner satisfactory to the Contracting Officer Representative.

1.11 WORK OUTSIDE REGULAR HOURS

If the Contractor desires to carry on work outside regular base duty hours, or on holidays, including the following U.S. holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving and Christmas. The Contractor shall submit an application to the Contracting Officer Representative. Due to reliance upon local national laborers and time off due to local observances, there may be disruptions. Potentials dates are the following local observances: National Islamic Holiday of Ashura, Ramadan (actual date varies - check with local authorities). The Contractor shall allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night, exterior lighting shall be provided in conformance with EM-385-1-1 entitled "Safety and Health Requirements Manual".

1.12 SCHEDULING OF WORK IN EXISTING FACILITIES

As soon as practicable, but in any event not later than thirty (30) calendar days after award of this contract, the Contractor shall meet in conference with the Contracting Officer Representative, or his duly authorized representatives, to discuss and develop mutual understanding relative to the scheduling of work in and access to the existing facilities where work has to be performed under this contract, so that the Contractor's proposed construction schedule is coordinated with the operating and security requirements of the installation.

1.13 PREPARATION OF AS-BUILT DRAWINGS (CONTRACTOR)

1.13.1 AS-BUILT DRAWING SUBMITTALS

a. Government approval is required for As-Built drawings as below in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.

b. Drawings showing final as-built conditions of the project. The final CADD as-built drawings shall consist of two sets of electronic CADD drawing files in the specified format, and one half-size and two full-size paper copies of the approved as-built drawings.

1.13.2 AS-BUILT DRAWINGS

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract drawings which are revised to be used for final as-built drawings.

1.13.2.1 GOVERNMENT FURNISHED MATERIALS

One set of electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file as-built drawings.

1.13.2.2 WORKING AS-BUILT AND FINAL AS-BUILT DRAWINGS

a. The Contractor shall revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and at least one set shall be available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Final as-built drawings shall be prepared after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final asbuilt drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer Representative and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final as-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated

drawings. In addition, if the Contractor fails to provide the final as-built drawings within thirty (30) calendar days after contract completion, the Contracting Officer will deduct from the final contract payment an amount representing the lesser of 1% of the total contract cost or $50,000. The working and final as-built drawings shall show, but shall not be limited to, the following information:

b. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

c. The location and dimensions of any changes within the building structure.

d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

e. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

f. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

g. Changes or modifications which result from the final inspection.

h. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.

i. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

j. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

k. Modifications (change order price shall include the Contractor's cost to change working and final asbuilt drawings to reflect modifications) and compliance with the following procedures.

1. Directions in the modification for posting descriptive changes shall be followed.

2. A Modification Circle shall be placed at the location of each deletion.

3. For new details or sections which are added to a drawing, a Modification Circle shall be placed by the detail or section title.

4. For minor changes, a Modification Circle shall be placed by the area changed on the drawing (each location).

5. For major changes to a drawing, a Modification Circle shall be placed by the title of the affected plan, section, or detail at each location.

6. For changes to schedules or drawings, a Modification Circle shall be placed either by the schedule heading or by the change in the schedule.

7. The Modification Circle size shall be 12.7 mm diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.13.3 DRAWING PREPARATION

The as-built drawings shall be modified as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned to the Contracting Officer Representative after approval by the Government. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

1.13.4 COMPUTER AIDED DESIGN AND DRAFTING (CADD) DRAWINGS

a. Only personnel proficient in the preparation of CADD drawings shall be employed to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings shall be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols shall be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final as-built drawings shall be identical to that used on the contract drawings. Additions and corrections to the contract drawings shall be accomplished using CADD files. The Contractor will be furnished "as-designed" drawings in AutoCAD Release 2007 or Microstation V8 format compatible with a Windows XP operating system. The electronic files will be supplied on compact disc, read-only memory (CD-ROM). The Contractor shall be responsible for providing all program files and hardware necessary to prepare final as-built drawings.

b. Prior to submittal of the first design submittal involving CADD drawings, the Contractor shall prepare one typical CADD drawing for the project and furnish, via ENG Form 4025, the electronic CADD drawing file for review and approval by the Contracting Officer Representative. All Government comments involving changes to this single drawing shall be accomplished and resubmittal(s) made until the Government is satisfied that all CADD Standards are being followed and all subsequent drawings will also be in compliance with these Standards.

c. CADD colors shall be the "base" colors of red, green, and blue. Color code for changes shall be as follows:

1. Deletions (red) - Deleted graphic items (lines) shall be colored red with red lettering in notes and leaders.

2. Additions (Green) - Added items shall be drawn in green with green lettering in notes and leaders.

3. Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes shall be in blue.

d. The Contract Drawing files shall be renamed in a manner related to the contract number (i.e., 98-C- 10.DGN) as instructed in the Pre-Construction conference. Marked-up changes shall be made only to those renamed files. All changes shall be made on the layer/level as the original item. There shall be no deletions of existing lines; existing lines shall be over struck in red. Additions shall be in green with line weights the same as the drawing. Special notes shall be in blue on layer #63.

e. When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 5 mm high. All other contract drawings shall be marked either "As-Built" drawing denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions. Original contract drawings shall be dated in the revision block.

f. After Government approval of all of the working as-built drawings for a phase of work, the Contractor shall prepare the final CADD as-built drawings for that phase of work and submit two sets of full size paper copy prints of these drawings for Government review, comparison with approved red-line marked up drawings, and approval. The Government will promptly return one set of prints annotated with any necessary corrections to the CADD file(s) if corrections are required prior to approval. Within 20 days of substantial completion of all phases of work, the Contractor shall submit the final as-built drawing package for the entire project. The submittal shall consist of one set of electronic files on compact disc, read-only memory (CD-ROM), one set of full size paper prints and one set of the approved working as-built drawings. They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the CADD system. Upon approval by the Government of the final as-built drawing package for the entire project, the Contractor shall provide the number of as-built copies specified in these specifications.

g. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final as-built drawing files and marked prints as specified shall be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.13.5 PAYMENT

No separate payment will be made for as-built drawings required under this contract, and all costs accrued in connection with such drawings shall be

considered a subsidiary obligation of the Contractor.

1.14 CERTIFICATES OF COMPLIANCE

Any certificates required for demonstrating proof of compliance of materials with specification requirements shall be executed in accordance with Section 01 33 00 SUBMITTAL PROCEDURES FOR DESIGN/BUILD. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturing company involved and shall contain the name and address of the Contractor, the project name and location, description and the quantity of the items involved, and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material.

1.15 ACCIDENT PREVENTION

The Contractor shall comply with all applicable Host Country laws and with such additional measures as the Contracting Officer Representative may find necessary in accordance with CONTRACT CLAUSE 52.236-13 entitled ACCIDENT PREVENTION (NOV1991)-ALTERNATE 1 (APR 1984). Applicable provisions of the Corps of Engineers manual entitled Safety and Health Requirements Manual EM 385-1-1 will be applied to all work under this contract. The referenced manual may be obtained from the from the Afghanistan Engineer District at Kabul, Afghanistan.

1.15.1 ACCIDENT PREVENTION PROGRAM

Within fifteen (15) days after award of this contract, and at least ten (10) days prior to the accident prevention pre-work conference, four (4) copies of the Accident Prevention Plan required by the CONTRACT CLAUSE 52.236-13 entitled ACCIDENT PREVENTION (NOV 1991)- ALTERNATE I shall be submitted for review by the Contracting Officer Representative. The Contractor shall not commence physical work at the site until the Accident Prevention Plan (APP) has been reviewed and accepted by the Contracting Officer Representative. The APP shall meet the requirements listed in Appendix "A" of EM385-1-1. The program shall include the following: TAC Form 61 " Accident Prevention Program Hazard Analysis (Activity Hazard Analysis)" fully completed and signed by an executive officer of the company in block No. 13. The Activity Hazard Analysis is a method in which those hazards likely to cause a serious injury or fatality are analyzed for each phase of operations. Corrective action is planned in advance, which will eliminate the hazards. An analysis is required for each new phase of work. On large or complex jobs the first phase may be presented in detail with the submittal of the Accident Prevention Plan rather than presenting the complete analysis. If the plan is to be presented in phases, a proposed outline for future phases must be submitted as a part of the initial Accident Prevention Plan submittal. Accident Prevention Plans will be reviewed for timeliness and adequacy at least monthly with a signature sheet signed and dated documenting that these reviews took place. Copy of company policy statement of Accident Prevention and any other guidance as required by EM 385-1-1, Appendix A.

1.15.2 GROUND FAULT CIRCUIT INTERRUPTER (GFCI) REQUIREMENT - OVERSEAS CONSTRUCTION

The Corps of Engineers Health and Safety Manual, EM 385-1-1, section

11.C.05.a. states: "The GFCI device shall be calibrated to trip within the threshold values of 5 ma +/- 1 ma as specified in Underwriters Laboratory (UL) Standard 943." A variance from USACE has been granted allowing 10 ma, in lieu of 5 ma, for overseas activities that use 220 Volts (V)/50 hertz (Hz) electrical power.

1.15.3 TEMPORARY POWER - ELECTRICAL DISTRIBUTION BOXES

EM 385-1-1 section 11.A.01.a. states, "All electrical wiring and equipment shall be a type listed by a nationally recognized testing laboratory for the specific application for which it is to be used." This includes temporary electrical distribution boxes. Locally manufactured electrical boxes will not be allowed. Only manufactured electrical distribution boxes that meet the European CE requirements, with 10 ma CE type GFCIs installed shall be allowed. Contractors shall:

a. Make no modifications that might void any CE or manufacturer certification.

b. Test the installed systems to demonstrate that they operate properly and provide the 10 ma earth leakage protection.

c. Ensure GFCIs will have an integral push-to-test function. The testing shall be performed on a regular basis.

d. Check that proper grounding is checked regularly and flexible cords, connectors, and sockets inspected before each use.

1.16 HAZARDOUS MATERIALS

Should the Contractor encounter asbestos or other hazardous materials, during the construction period of this contract, he shall immediately stop all work activities in the area where the hazardous material is discovered. The Contractor shall then notify the Contracting Officer Representative; identify the area of danger; and not proceed with work in that area until given approval from the Contracting Officer Representative to continue work activities. Hazardous material is considered to be asbestos, explosive devices, toxic waste, or material hazardous to health and safety. The Contractor shall secure the area from daily traffic until it is safe to resume normal activities.

1.17 SPARE PARTS

1.17.1 GENERAL

The requirements of this clause are in addition to any requirements for the provision of specific spare parts to be provided by the Contractor included in Technical Provisions. The Contractor shall furnish spare parts as directed by the Contracting Officer Representative under the provisions of this clause for all equipment for which O&M data is to be provided under Clause OPERATION AND MAINTENANCE (O&M) DATA of this contract. The term "spare parts" as used herein shall include spare parts, special tools and test equipment.

1.17.2 SELECTION OF SPARE PARTS TO BE FURNISHED

The Contractor shall provide master parts lists, recommended spare parts lists and lists of special tools and test equipment as a part of the equipment O&M data required by Clause OPERATION AND MAINTENANCE (O&M) DATA.

The master parts list shall include the supplier's price for each part. After review of the lists, the Contracting Officer Representative will select spare parts and furnish written direction to the Contractor indicating quantities and types of spare parts to be furnished by the Contractor. Written directions for spare parts orders may be provided on an incremental basis as reviews of O&M data submitted by the Contractor are completed but will not necessarily be issued in the sequence in which the Contractor submitted the equipment O&M data.

1.17.3 PROCUREMENT AND DELIVERY OF SPARE PARTS

The Contractor shall procure and be responsible for delivery, receipt, handling, placing in storage, inventory, and turnover to the Contracting Officer Representative all spare parts selected by the Contracting Officer Representative. In addition to the recommended spare parts list required in paragraph SELECTION OF SPARE PARTS TO BE FURNISHED above, the Contractor is responsible to have one (1) year supply of manufacturer's recommended spare parts on site ready to turn over to the Contracting Officer Representative at the time of acceptance of the facility.

1.17.3.1 SHIPMENT AND DELIVERY

The Contractor shall be responsible for the shipment and delivery of spare parts to the location on or near the site in Afghanistan as selected by the Contracting Officer Representative. The Contractor shall provide all manpower and equipment required to receive and place into designated storage areas all spare parts purchased under this clause. The Contractor shall give the Contracting Officer Representative thirty (30) calendar days notice of arrival at the site of the first shipment.

1.17.3.2 TURNOVER OF SPARE PARTS

The Contractor shall notify the Contracting Officer Representative seventy-two (72) hours prior to delivery of spare parts to the designated storage area. The Contractor and the Contracting Officer Representative will perform a joint inventory of the spare parts and the spare parts will be turned over to the Contracting Officer Representative. Spare parts purchased under this clause shall not be used by the Contractor.

1.17.3.3 PARTS AND PACKAGE IDENTIFICATION

Prior to shipment from point of purchase, each spare part shall be tagged or otherwise marked or labeled. Such labeling may be placed or affixed to the container, box or packaging in which spare parts are located when it is not feasible to place or affix such labeling directly on each spare part. Tags or labels shall include, but not necessarily be limited to; part number, description, parent equipment name and number location, project and/or other data as directed by the Contracting Officer Representative.

1.17.3.4 PRESERVATION AND PACKAGING INSTRUCTION

a. Items ordered under this contract shall be preserved and packed for a minimum of three (3) years shelf life storage. All items shall be individually packaged except when the manufacturer specifies that the items are to be used in sets. Appropriate identification labels must be affixed to the items protective box or package. After the spare parts are packaged, the manufacturer shall weigh the spare parts and packaging and place the weight and size of the packaged container on the label with other information as outlined herein. Each item, not

normally identified with manufacturer's name and part number, shall have an appropriate label affixed to it with manufacturer's name and part number.

b. Machined spare parts shall be lubricated or coated in order to withstand extensive periods of storage in a highly corrosive atmosphere.

c. Large items (greater than 22.7 kg (50 lbs.), or larger than 0.03 CM (one cubic foot) shall be packaged in waterproof wooden boxes and properly braced. Cushioning shall be used to prevent damage to the item and to the packaging material.

d. Solid state components, such as diodes, transistors, integrated circuits or equipment consisting of such parts that can be damaged as a result of static electricity and other stray electro-magnetic fields shall be packaged in heat-sealed, aluminum foil, laminated, flexible packages.

e. All other spare parts shall be packaged in heat sealed plastic bags or wrap. Delicate and more fragile items such as test equipment shall be cushioned or wrapped with transparent bubble wrap material prior to being inserted into the plastic package.

1.17.4 WARRANTY

All spare parts provided by the Contractor under this clause are subject to the general warranty clauses of this contract.

1.17.5 PAYMENTS FOR SPARE PARTS

Payments for spare parts ordered under the paragraph entitled "Selection of Spare Parts To Be Furnished" will be made under the work item of the Work Breakdown Sheet entitled "Spare Parts". Payments for spare parts specifically required elsewhere in this contract shall be considered as part of those equipment costs and shall be included in other payment items as appropriate. Payments for spare parts ordered under this clause shall be based on the invoice price (FOB supplier) plus certified invoice price of surface shipment to the site in Afghanistan. The invoice price (FOB supplier) shall include the separately listed cost for preservation and packaging by the manufacturer as specified herein. The Contractor shall provide invoices and any additional backup, which may be required to demonstrate that the invoices presented represent the cost of spare parts, preservation and packaging, and cost of surface shipment to the site. Payment for handling, delivery, inventory, turnover, customs, overhead or profit shall not be paid or allowed under this Contract Provision, and shall be included in the cost for installation of this equipment under the other appropriate payment items of this contract. Price increases over prices furnished under paragraph SELECTION OF SPARE PARTS TO BE FURNISHED shall be fully substantiated. Payment for spare parts will be made after the spare parts have been accepted at the site by the Contracting Officer Representative. If the total payments under the work item entitled "Spare Parts" does not reduce the balance of this work item to zero, the remaining balance will be deducted from the final contract amount. If orders exceed the work item entitled "Spare Parts", a modification for equitable adjustment will be issued in accordance with Contract Clause 52.243-4 entitled CHANGES. Payments for spare parts ordered under this clause shall constitute full payment for all cost of the spare parts and associated cost of preservation and packaging, and cost of surface shipment to the site. Other ancillary costs shall be included by the Contractor under the other appropriate work items of this contract and no additional cost except as

provided herein will be allowed.

1.18 OPERATION AND MAINTENANCE (O&M)

1.18.1 GENERAL

The requirements contained herein are in addition to all shop drawings submission requirements stated in other sections of the specifications. The Contractor shall include the provisions for all items required under this clause in all purchase orders and sub-contract agreements. Submittals required hereinafter will not relieve the Contractor of any responsibilities under the Warranty of Construction Provisions of this contract or under the various Guarantee Clauses of the Technical Provisions.

1.18.2 SUBMITTALS

The Contractor shall submit all items requiring submission of O&M data under this and other sections of these specifications in accordance with Section 01 33 00 SUBMITTAL PROCEDURES FOR DESIGN/BUILD of the specifications.

1.18.3 OPERATION AND MAINTENANCE (O&M) DATA

The Contractor shall furnish operation and maintenance manuals for all facilities constructed under this contract. The manuals shall be loose leaf, indexed and shall consist of manufacturer's brochures, manufacturer's operation and maintenance manuals, service and repair manuals, catalogs, service bulletins, instruction charts, diagrams, other information as necessary to support the operation and maintenance of the end items of equipment, assemblies and systems. Each type of facility (housing, barracks, mosque, etc.) shall be covered by a separate manual (or manuals) consisting of all data pertaining to the equipment and/or systems within that facility. Identical equipment within a single major system shall require only one submittal of data. The Contractor shall furnish all O&M manuals to the Contracting Officer Representative not less than thirty (30) calendar days prior to contract completion. If the Contractor fails to furnish all O&M manuals to the Contracting Officer Representative as specified herein, the Contracting Officer will deduct from the final contract payment an amount representing the lesser of 1 percent of the total contract cost or $50,000. Required number of submittals (number of sets) shall be as specified in Section 01 33 00 SUBMITTAL PROCEDURES FOR DESIGN/BUILD.

1.18.4 RECOMMENDED SPARE PARTS LIST

The Contractor shall furnish a recommended spare parts list containing equipment manufacturers' recommendations for five (5) years; two (2) years and one (1) year spare parts stock levels in Afghanistan. Current unit price and effective date, lead time, shelf life for each individual part, and total cost of all recommended parts shall be furnished.

1.18.5 SUPPLEMENTAL SUBMITTALS OF DATA

After initial submittal of O&M manuals and until final acceptance of all equipment, the Contractor shall prepare and deliver to the Contracting Officer supplemental technical data as previously described for all changes, modifications, revisions and substitutions to equipment and components. For equipment or systems introduced into the contract under change order, or modified by change order, supplemental data shall be

furnished within forty-five (45) calendar days after issuance of the change order. The supplemental data furnished shall be properly prepared and identified for insertion into the O&M manuals.

1.18.6 FRAMED INSTRUCTIONS FOR SYSTEMS

Approved wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed under glass or in approved laminated plastic, shall be posted, where applicable, in all mechanical equipment rooms. In addition, detailed operating instructions explaining safe starting and stopping procedures for all systems shall be prepared in typed form along with the inspections required to insure normal safe operations. The instructions shall be framed as specified above for the wiring and control diagrams and posted beside the diagram. Proposed diagrams, instructions, and other sheets shall be submitted for approval prior to posting. Operating instructions shall be posted before acceptance testing of the systems and verified during acceptance testing.

1.18.7 ADDITIONAL SUBMITTALS/RE-SUBMITTALS

The Contracting Officer Representative reserves the right to determine whether the above specified information, as furnished by the Contractor, is adequate and complete and to require such additional submittals by the Contractor as necessary to insure that adequate information has been furnished to provide the satisfactory operation and maintenance of the various items of equipment and to fulfill the intent of the specifications. Additional submittals or resubmittals supplementing incorrect or incomplete data shall be made within thirty (30) calendar days after receiving notice by the Contracting Officer Representative. All costs arising from these resubmissions shall be borne by the Contractor.

1.19 INSTRUCTIONS AND TRAINING FOR OPERATION AND MAINTENANCE

1.19.1 GENERAL

The Contractor shall be responsible for the instruction and training of operating and maintenance personnel as specified below and in the Technical Provisions of the specifications. Unless otherwise indicated in the Technical Provisions, operating and maintenance instructions shall be given for a minimum period as follows: Title Duration of Training Mechanical Systems 1 Day Electrical Systems 1 Day

1.19.2 OPERATION AND MAINTENANCE TRAINING

The Contractor shall provide competent instructors for training of personnel designated by the Contracting Officer to operate mechanical and electrical building systems and equipment, perform the required preventive maintenance to minimize breakdown, and to perform necessary repairs when malfunction or breakdown of equipment occurs. Such training shall consist of on-the-equipment training for the period specified, which shall be completed prior to acceptance of a system or equipment, as applicable. The instructor(s) shall have no other duties during the period of training. Classroom instruction shall not exceed fifty percent (50 percent) of the total training time, with the balance devoted to on-the equipment demonstration and familiarization.

1.19.3 ARRANGEMENTS

The training shall be for not less than the periods of time specified, five (5) days per week, and eight (8) hours per day, subject to review and approval by the Contracting Officer Representative. Each individual training session shall be presented one time only and be scheduled in a manner acceptable to the Contracting Officer Representative.

1.19.4 SCHEDULING

The Contractor shall contact the Contracting Officer Representative for the purpose of preliminary planning, scheduling, and coordination of training, to maximize effectiveness of the training program for available operating and maintenance personnel. The Contractor shall initiate and make arrangements for such contact within thirty (30) calendar days after receipt of notification of award of contract; and shall include all significant times in scheduling and completing training in his PROJECT SCHEDULE. The Contractor shall provide a draft outline of training outline in sufficient detail to provide a broad indication of the type of scope of training to be given. It shall include but not be limited to; (a) a list of subjects to be presented; (b) estimated amounts of classroom and on-the-equipment instruction for each subject; (c) a list of minimum qualifications for instructors; and (d) discussions concerning the types and amounts of visual aids, reference materials, tools and test equipment, mock-up and other training materials that will be employed during training.

1.19.5 PRELIMINARY PLAN

The Contractor shall submit seven (7) copies of an outline of his proposed training plan to the Contracting Officer for review and approval not later than 60 calendar days after award of this contract. The plan will be reviewed and coordinated with the content of the O&M manuals.

1.19.6 PLAN

The Contractor shall submit seven (7) copies of his proposed training plan to the Contracting Officer Representative for approval not later than ninety (90) calendar days prior to start of any training. The plan shall include the following; (a) a weekly outline showing overall form and design of training presentation; (b) a day-by-day schedule showing time intervals, the major and subordinate subjects to be covered in each, the name of the instructor(s) and qualification summary of each, and identification of related handouts; (c) summary of the number of hours of classroom and on-the-equipment training; (d) a list of reference materials to be provided by the Contractor to the trainees; and (e) a list and description of the training materials to be used, such as text, visual aids, mock-up, tools, etc. The Contractor shall be responsible for furnishing all training materials except the following: The Government will provide space, chairs, and tables for classroom training, and three (3) sets of the five (5) sets of O&M Manuals required by the Contractor per Section 01 33 00 SUBMITTAL PROCEDURES FOR DESIGN/BUILD of the specifications. Provision of these manuals is solely for reference purposes, and in no way relieves the Contractor from providing all instruction and materials necessary for training personnel designated by the Government. All costs for resubmission of training plans, training materials, etc., as requested by the Contracting Officer Representative shall be borne by the Contractor. Resubmittals shall be made within twenty (20) days of notice from the Contracting Officer Representative.

1.19.7 ATTENDANCE ROSTER/TAC FORM 356

The Contractor shall develop an attendance roster or a similar document indicating each student's attendance, prior to the start of each class, subject and/or topic. This includes both "Hands-On" and classroom training. It is strongly recommended that each student trained be required to sign this document at the beginning of each class day for each and every class, subject and/or topic taught on that day. The Contractor's failure to have student attendance verified in writing may be cause for the Government to order the Contractor to repeat schooling where evidence of attendance cannot be verified. No part of the time lost due to such repeat instruction shall be made the subject of claim for extension of time or for excess costs or damage by the Contractor. Within ten (10) working days after completion of Operation and Maintenance Training conducted in accordance with this clause and/or applicable Technical Provision section, the Contractor shall complete and submit TAC Form 356 "Operation and Maintenance Training Validation Certificate". The attendance roster shall be included as an attachment to TAC Form 356.

1.20 CONTRACTOR FURNISHED EQUIPMENT LISTS

The Contractor shall furnish a list of all items, other than integral construction type items, furnished under the contract. Items such as furniture, drapes, rugs, vehicles, office machines, appliances, etc., shall fall under this category. The Contractor's list shall describe the item; give the unit price and total quantities of each. Model and serial numbers for equipment shall be provided when applicable. The Contractor shall keep an up-to-date register of all covered items and make this information available to the Contracting Officer at all times. Prior to acceptance, the Contractor shall submit the complete register to the Contracting Officer Representative.

1.21 TIME EXTENSIONS

1.21.1 GENERAL

This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the Contract Clause 52.249-10 entitled DEFAULT (FIXED-PRICE CONSTRUCTION) APR 1984. The listing below defines the anticipated monthly unusually severe weather for the contract period and is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the geographic location of the project. The schedule of anticipated unusually severe weather will constitute the baseline for determining monthly weather time evaluations. Upon award of this contract and continuing throughout the contract each month, actual unusually severe weather days will be recorded on a calendar day basis (including weekends and holidays) and compared to the monthly anticipated unusually severe weather in the schedule below. The term "actual unusually severe weather days" shall include days actually impacted by unusually severe weather. The Contractor's schedule must reflect the anticipated unusually severe weather days on all weather dependent activities. Kabul Province - Kabul Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 22 18 11 10 7 1 2 1 1 3 16 22 114

1.21.2 TIME EXTENSIONS

The number of actual unusually severe weather days shall be calculated chronologically from the first to the last day in each month. Unusually

severe weather days must prevent work for fifty percent (50 percent) or more of the Contractor's workday and delay work critical to the timely completion of the project. If the number of actual unusually severe weather days exceeds the number of days anticipated in the paragraph above, the Contracting Officer Representative will determine whether the Contractor is entitled to a time extension. The Contracting Officer Representative will convert any qualifying delays to calendar days and issue a modification in accordance with the Contract Clause 52.249-10 entitled DEFAULT (FIXED-PRICE CONSTRUCTION) APR 1984.

1.21.3 OTHER DELAYS

Construction delays due to full or partial base closures due to incidents such as demonstrations, civil unrest and outright attacks will be examined on an individual basis for consideration of time extensions.

1.22 STANDARDIZATION

Where two or more items of the same type or class of product, system or equipment furnished in this project are required, the units shall be products of the same manufacturer and shall be interchangeable when of the same size, capacity, performance characteristics, and rating. The only exception to this requirement is where the items are interchangeable due to conformance with industry standards (valves, fittings, etc.); they need not be by the same manufacturer. This requirement applies to all manufactured items in the project that normally require repair or replacement during the life of the equipment.

1.23 COMPLIANCE WITH HOST COUNTRY RULES AND CUSTOMS

The laws of Host Country may prohibit access to certain areas of the country that are under military control. The Contractor shall furnish the Contracting Officer Representative the names of personnel, type, and amounts of equipment, dates and length of time required at the site, and the purpose of entering the host country. It is understood that areas to which rights of entry are provided by the Host Government are to be used only for work carried out under the contract and no destruction or damages shall be caused, except through normal usage, without concurrence of the Host Government.

1.23.1 CONTRACTOR'S RESPONSIBILITIES

The following items are the sole responsibility of the Contractor to investigate, estimate as to cost, and assume the risk, as normally encountered by Contractors. The Contractor shall be responsible for determining the effect of the following on his own cost of performance of the contract and for including sufficient amount in the contract price:

a. Official language and type of accounts required to satisfy the officials of the Local Government.

b Entry and exit visas, residence permits, and residence laws applicable to aliens. This includes any special requirements of the Host Government, including those required by local Labor Offices, which the Contractor may have to fulfill before an application for a regular block of visas will be accepted.

c. Passports, health and immunization certificates, and quarantine clearance.

d. Compliance with local labor and insurance laws, including payment of employer's share of contribution, collecting balance from employee and paying into insurance funds.

e. Strikes, demonstrations and work stoppage.

f. Collection through withholding and payment to local Government, of any Host Country income tax on employees subject to tax.

g. Arranging to perform work in the Host Country, to import personnel, to employ non-indigenous labor, to receive payments and to remove such funds from the country.

h. Operating under local laws, practices, customs and controls, and with local unions, in connection with hiring and firing, mandatory wage scales, vacation pay, severance pay, overtime, holiday pay, 7th day of rest, legal notice or pay in lieu thereof for dismissal of employees, slowdown and curtailed schedules during religious holidays and ratio of local labor employed in comparison to others.

i. Possibility of claims in local bureaus, litigation in local courts, or attachment of local bank accounts.

j. Compliance with workmen's compensation laws and contributions into funds. Provisions of necessary medical service for Contractor employees.

k. Special license required by the local Government for setting up and operating any manufacturing plant in the Host Country, e.g. concrete batching, precast concrete, concrete blocks, etc.

l. Sales within the host country of Contractor-owned materials, and equipment.

m. Special licenses for physicians, mechanics, tradesmen, drivers, etc. ss. Identification and/or registration with local police of imported personnel.

n. Stamp tax on documents, payments and payrolls.

o. Base passes for permanent staff, day laborers, motor vehicles, etc.

p. Compliance with all customs and import rules, regulations and restrictions, including, but not limited to, local purchase requirements.

1.24 EMPLOYEE ACCESS TO PROJECT SITE

1.24.1 EMPLOYEE IDENTIFICATION

The Contractor shall be responsible for furnishing to each employee and for requiring each employee engaged on the work, to display identification as approved and directed by the Contracting Officer Representative. Prescribed identification shall immediately be delivered to the Contracting Officer Representative for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.24.1.1 PREPARATION OF IDENTIFICATION BADGES

The Contractor shall be required to prepare a written application inclusive color photographs and provide all materials and labor necessary to prepare an identification badge, laminated in plastic, containing the employee's name, badge number, color photo, height and weight, the name of the Contractor's organization and for requiring each employee engaged on the work to display this identification as directed by the Contracting Officer Representative. The Contractor shall submit each application and draft badge through the Contracting Officer Representative to the Base Security Office. A minimum of thirty-five workdays shall be allowed for Government review and certification of badges. The Base Security Office will certify each draft badge by signature, stamp, seal or any combination thereof. Upon certification by the Base Security Office, the badges will be returned to the Contractor for final preparation, lamination, and issuance. Badges shall not be taken out of country during periods of travel or absence. During such periods, the Contractor may be permitted to issue temporary identification badges.

1.24.1.2 EMPLOYEE BACKGROUND AND HISTORICAL INFORMATION

The Contractor shall be required to prepare and maintain personal background and historical information forms on each employee. These forms may be reviewed by the Base Security Office. The required information shall include but not necessarily be limited to the following:

a. Full name.

b. Place and date of birth.

c. Three (3) current color photographs.

d. Copy of Citizenship/Nationality identification.

e. Copy of Passport.

f. Copy of drivers license.

g. Police Background Check.

h. Work History.

i. Personal background information.

j. Copy of Work Permit and/or Visa.

k Permanent home of record and in-country address.

l. Other information mandated by local law, the Base Security Regulations or that may be required to coordinate and process the necessary documentation with the government offices responsible for the approval.

m. Registration, insurance company, policy number and expiration date for each vehicle.

1.24.2 IDENTIFICATION OF CONTRACTOR VEHICLES

The Contractor shall be responsible for requiring each vehicle engaged in the work to display permanent vehicular identification as approved and directed by the Contracting Officer Representative. If acceptable to the Base Security Office and approved by the Contracting Officer Representative, the Contractor may institute a system of nonpermanent temporary identification for one-time delivery and transit vehicles. Each Contractor vehicle, machine, piece of equipment, or towed trailers, shall show the Contractor's name such that it is clearly visible on both front doors of the vehicle and both sides of a towed trailer. A valid license plate shall be displayed at all times. Contractor vehicles operated on Government property shall be maintained in a good state of repair, shall be insured, and shall be registered in accordance with Afghan Law.

1.24.3 SECURITY PLAN

The Contractor shall submit to the Contracting Officer Representative a security plan as required in Section 01 35 30 SECURITY.

1.25 RADIO TRANSMITTER RESTRICTIONS

To preclude accidental actuation of sensitive electronic equipment, the Contractor shall not use radio transmitting equipment without prior approval of the Contracting Officer Representative.

1.26 PUBLIC RELEASE OF INFORMATION

1.26.1 PROHIBITION

There shall be no public release of information or photographs concerning any aspect of the materials or services relating to this bid, contract, purchase order, or other documents resulting there from without the prior written approval of the Contracting Officer Representative.

1.26.2 SUBCONTRACT AND PURCHASE ORDERS

The Contractor agrees to insert the substance of this clause in all purchase orders and subcontract agreements issued under this contract.

1.27 CONSTRUCTION PROJECT SIGN

The contactor shall fabricate and display at least one sign to identify the project site as a Department of State sponsored project associated with the Public Affairs Section. The Department of State logo and text. The sign shall be fixed to posts with a sufficient number of bolts to ensure that the sign will not be damaged by weather or vandalism. A minimum of three posts will be utilized. If lumber is used for support posts, the minimum dimension of the lumber vertical posts and bracing will be 10 cm x 10cm. The post will set in field-prepared site-grade concrete. No rebar (reinforcement) and no form work are required for concrete. At any point during construction if deemed necessary by the COR the sign shall be repaired or replaced. Exact placement at the project site shall be coordinated with the COR. The black, green and red colors on the left side of the sign shall be the Pantone colors listed below:

Black: Pantone Process Black PC

Red: Pantone 485 PC

Green: Pantone 370 PC

Sign panels shall be fabricated from 19mm thick High Density Overlay (HDO) plywood or 2 mm thick sheet metal primed and painted (exterior paint) with lumber or metal uprights and bracing (see the "pdf" Attachment). The sign will be primed and two-coat painted. The sign shall be placed in a location that is visible to pedestrians and/or vehicles passing the project site. Sign face and graphics shall be nonreflective vinyl film prepared on a white adhesive backing or enamel-based exterior type paint. All logos shall be aligned left with typography center text.. If the Text Group T6 (which is the Project Title taken from the Contract) does not make it clear to the public viewing the sign what the project purpose is, succinct wording shall be added to Text Group T2 to make this clear (for example, "Hospital Wastewater Treatment Facility Expansion" or "20 KM paved road" or other project summary), to be submitted and approved by the COR.

1.28 ATTACHMENTS

TAC FORM 61 - Accident Prevention Program Hazard Analysis

TAC FORM 356 - Operation and Maintenance Training Validation Certificate Construction Project Sign Dimensions Mounting Diagram Ministry Logo

PART 2 SPECIAL CONTRACT REQUIREMENTS

2.1 APPLICATION OF US CRIMINAL JURISDICTION

Reference DODI 5525.11. The contractor is directed to provide all of its personnel working under this contract, and to require all of its subcontractors to provide their personnel, with written notification that - with the exception of nationals of Afghanistan and those ordinarily resident in Afghanistan - contractor and subcontractor personnel, and the dependents of contractor and subcontractor personnel who are residing with such personnel, may be subject to US criminal jurisdiction as provided for in the Military Extraterritorial Jurisdiction Act, 18 USC 3261-3267; see Section 3267(1)(A)(iii)(I) and (2)(A)(iii). A copy of the notice shall be furnished to the Contracting Officer Representative upon award of the contract, along with a certification by an authorized company representative attesting to the provision of the notification to contractor personnel.

2.2 ATTACKS FROM HOSTILE ENTITIES

This contract is firm fixed-price. Costs incurred in the performance of project execution that arise from the attacks of hostile entities, such as costs arising from damage to or destruction of contractor equipment and facilities, and damage to or destruction of the project prior to Government acceptance, are the sole responsibility of the contractor. The Government makes no guarantee to provide the contractor with security, and bears no obligation to reimburse the contractor for costs arising from the attacks of hostile entities. When appropriate, the Contracting Officer Representative may provide the contractor with an equitable adjustment with respect to time - but not cost - in accordance with clause 52.249-10; see 52.249-10(b)(1)(i) and (2).

2.3 INSTALLATION ACCESS AND BADGING

This contract is firm fixed-price. It is the responsibility of the contractor to be knowledgeable of and to abide by any and all applicable installation access procedures and requirements, to include any and all badging procedures and requirements, that may be necessary for contractor access to the project site. Such procedures and requirements may change over the course of contract performance; it is the responsibility of the contractor to plan accordingly in order to meet its existing obligations under this contract. The US Department of State, U.S. Embassy Kabul, neither controls nor is responsible for any such installation access procedures, requirements or changes thereto.

2.4 CUSTOMS CLEARANCE

Reference clauses 52.229-6 and 52.225-13. This contract is firm fixed-price. It is the responsibility of the contractor to be knowledgeable of and to abide by any and all applicable customs clearance procedures and requirements that may be necessary for the transportation of supplies and equipment into Afghanistan. Such procedures and requirements may change over the course of contract performance; it is the responsibility of the contractor to plan accordingly in order to meet its existing obligations under this contract. The US Department of State, U.S. Embassy Kabul, neither controls nor is responsible for any such customs clearance procedures, requirements or changes thereto.

2.4.1 CUSTOMS PROCEDURES

Background: Every contractor/carrier importing goods into Afghanistan or exporting goods out of the country must comply with national customs regulations and procedures administered by the Afghanistan Customs Department (ACD) of the Ministry of Finance, in compliance with Afghan law. Contractors performing contracts in Afghanistan for the Department of Defense (DoD), including the US Department of State, U.S. Embassy Kabul,, in support of Operation Enduring Freedom (OEF), may be entitled to certain exemptions from the payment of customs tariffs and duties on goods and materiel imported into Afghanistan for use at DoD construction projects within the country, and on export of materiel from Afghanistan after completion of a project.

Obtaining import tax exemptions and clearances for the release of construction goods and materiel through ACD is often time consuming. Early planning and realistic delivery timelines are essential to prevent avoidable project delays related to customs issues. This section provides general guidance and a list of customs procedures and documents that you may be required to fulfill or provide. Please note that this guidance is provided to alert contractors from the outset that the Afghan customs process is complex and time-consuming, and to strongly encourage early planning. The steps listed below are provided for informational purposes only and cannot be regarded as definitive because the ACD's procedures and requirements may change at any time.

ANY DEVIATIONS FROM THE PROCESS DESCRIBED HEREIN SHALL NOT FORM THE BASIS FOR A REQUEST FOR EQUITABLE ADJUSTMENT.

General Requirements: Contractors must designate an authorized employee of the company as the customs point of contact (POC), responsible for handling customs clearance issues, and must advise the DOS Customs Coordinator by e-mail of the name and contact information for the authorized customs POC.

This individual must hand-deliver all required documentation between the Customs Coordinator at Qalaa House and the US Embassy, the Afghan Ministry of Foreign Affairs, and the Customs Department of the Afghan Ministry of Finance in order to obtain required stamps and signatures. To initiate the customs clearance process, the following steps are necessary as of the time of publication of this solicitation, but cannot be regarded as definitive:

1) Prepare a Contractor's Letter of Introduction for the Afghanistan Customs Department. The Letter of Introduction should first be emailed to the Customs Coordinator at Qalaa House, Kabul Afghanistan.

2) The following hard copy original documents should be delivered to the Customs Coordinator at Qalaa House prior to the movement of goods into or out of Afghanistan:

a) A completed Tax Exemption Form ("Muaffi Nama"), purchased from the Afghan Customs Department and written in the Dari language.

b) A Bill of Lading (for cargo transiting via ship and motor carrier), Airway Bill (for cargo arriving via air) or CMR (for cargo that has only traveled overland).

c) An Invoice in US Dollars only. If the goods were purchased elsewhere and invoiced in a different currency, the equivalent U.S. Dollar amount must be clearly shown.

d) A Customs Clearance Request. See Section 01060b

e) A Packing List if the complete cargo manifest is not listed on the invoice.

f) A Certificate of Origin for cargo coming through Islam Qalat and Heart.

The Customs Coordinator will check the documents to ensure that they are complete, accurate, and ready for signature. Once all stamps and signatures are obtained on the documents listed under paragraph 2, the Afghanistan Customs Department will send them to the applicable customs clearing house and the shipment can be released for border crossing and final delivery. Note: When a contractor imports vehicles or equipment for use by the US Government, the items can only remain in country until the contracted project is complete. At the termination of the contract, the vehicles or equipment must be exported following procedures similar to those outlined above, or the original exempted duties must be paid to the Ministry of Finance if the vehicles or equipment remain in Afghanistan. It is the sole responsibility of the contractor to know of and abide by all Afghan customs clearance procedures and requirements applicable to the importation of supplies and equipment into Afghanistan, and to make accurate and truthful representations on all customs documents. Please recognize that Afghan customs procedures and requirements may change over the period of contract performance. The US Department of State, U.S. Embassy Kabul,, therefore provides the information in this section for general guidance purposes only, and advises you that responsibility for customs compliance, and awareness of changing customs procedures, remains your responsibility. Any contractor or shipping agency that violates Afghan customs procedures may be subject to legal action, including but not limited to revocation of contract, forfeiture of goods and enforced collection of fines and customs fees due the Afghan Government. All

contractors and suppliers that import goods tax and duty free are subject to warehouse and storage facility inspections by representatives to confirm that customs manifests are accurate and that abuse of the US Government's tax-exempt status has not occurred.

2.5 TRAVEL WARNINGS

The contractor shall provide all personnel working under this contract, and shall require subcontractors to provide their personnel, with a written notification advising such personnel to be aware of US State Department Travel Warnings with respect to Afghanistan, available at http://travel.state.gov, in the event they wish to consider bringing their dependants into Afghanistan. A copy of the notice shall be furnished to the Contracting Officer Representative upon award of the contract, along with a certification by an authorized company representative attesting to the provision of the notification to contractor personnel. At no time, subject to the written approval of the contracting officer, may the contractor allow such dependants, or any other unauthorized individuals, to be present on the project site grounds, whether in transit or otherwise.

2.6 DRUG-FREE WORKFORCE

Documentation of the contractor's drug-free workforce program as required by clause 252.223-7004(b) shall be furnished to the contracting officer upon award of the contract.

2.7 COMBATING TRAFFICKING IN PERSONS, COMMERCIAL SEX ACTS, FORCED LABOR

A copy of the employee notification statement as required by clause 52.222-50 Alt I shall be furnished to the contracting officer upon award of the contract, along with a certification by an authorized company representative attesting to the provision of the notification to contractor personnel.

2.8 PROMPT PAYMENT OF SUBCONTRACTORS

In accordance with 52.232.5 (b)(1)(v,), the contractor shall furnish documentation with each progress payment which indicates that all sub-contractors and suppliers have been paid with funds from the most recent progress payment. In order for the progress payment request to be considered complete, the contractor shall: - submit a listing of all subcontractors, the total amount paid to each subcontractor under the contract and the dates and methods of such payments; and - provide copies of payrolls for each subcontractor working under this contract.

2.9 SUBCONTRACTORS CLAUSE REQUIREMENT

In accordance with 52.232.27, the contractor shall include in each subcontract, a payment clause that obligates each subcontractor to pay their subcontractors for satisfactory performance of work not later than 7 days from the date they receive payment for work under this contract.

2.10 DEFENSE BASE ACT

In accordance with FAR 52.228-3 "Workers Compensation Insurance" (Defense Base Act) the offeror is required to provide, prior to commencing work under this contract, such workers' compensation insurance or security as the Defense Base Act ("DBA") (42 U.S.C.1651 et seq.) requires and to continue to maintain it until performance is complete. The amount listed by

the offeror on this Contract Line Item (CLIN) is the estimated DBA insurance premium (estimated payroll of the offeror and its subcontractors times the applicable rate(s)). The DBA insurance premium amount varies with payroll and the nature of services and will, therefore, be taken into account during price evaluation of offers. The actual amount paid by the government under that CLIN will be based on the amount of the Rutherford invoice, stamped "paid" and submitted by the offeror after contract award. In the event of recalculation of the premium by CNA based on actual payroll amounts, the contracting officer will adjust this CLIN by contract modification to reflect the actual premium amounts paid. Failure to fully comply with the Defense Base Act requirements may result in termination for default in accordance with FAR 52.249-10 Default (Fixed-Price Construction).

2.11 SUBMISSION OF DEFENSE BASE ACT CLAIMS

The offeror's Safety Officer shall, in addition to any other duties required to be performed under this contract, do the following:

- Make timely Defense Base Act insurance claims on behalf of each employee who is injured or killed in the course of their employment under this contract; and

- Make monthly written reports to the Contracting Officer, Administrative Contracting Officer, and the Agency Safety and / or Occupational Health Manger, providing the name(s) of each such injured or deceased employee, the circumstances surrounding each injury or death, the dates of each injury or death, the date the insurance claim was made on behalf of each employee(s), and the current status of each claim.

The Agency Safety and / or Occupational Health Manger POC will be provided at the pre-construction meeting.

-- END OF SECTION --

Construction Project Sign Dimensions (mm)

T1: Text Group 1 Typeface: 150mm Large Standard Da Font
Color: White

T2: Text Group 2 Typeface: 150mm Large Standard Dari Font
Color: Black

T3: Text Group 3 75mm Small Standard Dari Font
Color: Black

C E R T I F I C A T E

OPERATION AND MAINTENANCE TRAINING VALIDATION
References: 1. Special Clause: Instructions and Training for Operations and Maintenance

2. Technical Provision(s) _____
Equipment for which training conducted:
_____
_____
_____
Description of Training:
1. Number of Classroom Hours: _____
2. Number of Hands-on Equipment Hours: _____
3. Location of Training: _____
Training Instructors:
_____
Trainees: _____
_____
Contractor Certifying Official _____
Department of State Representative _____
User Acknowledgement _____
TAC Form 356
NOV 1999

Clearance Request Requirements Checklist
(Requirements as of 20 Sep 2009)

Please make sure your set of documents contains the following prior to submitting for Customs Clearance Process:

A**LL DOCUMENTS DELIVERED MUST BE ORIGINALS!**
No Item Name Details

1. Cover Letter to be on Company Letterhead; for more details please refer to annex A (Sample Cover Letter Format)

2. Original Bill of Lading/CMR/Air Waybill (Verified copy of original is Not acceptable)
This document should include the following information in **English Language**:

A. Document Number
B. Date
C. Consignee: (DOS, c/o Contractor Name & Address in Afghanistan)
D. Contract # and Project Name (e.g. W917PM……ANA Garrison…..)
E. Route and Final Destination
F. Container Number (if applicable)
G. Truck Number (if applicable)
H. Number of Pieces
I. Description of Goods:

1) (If the goods are Vehicles/Loader/Excavators …etc) info should Include:

a) Engine #
b) Chassis #
c) Model
d) Color
e) Country of Origin
f) Type/Brand

2) For non-mobile Machines like Generators only Serial # and Brand or Type is sufficient

3. Original Invoice (Verified copy of original is not acceptable)
This document should include the following information in **English Language**:

A. Document Number
B. Date
C. Consignee: (DOS, c/o Contractor Name & Address in Afghanistan)
D. Contract # and Project Name (e.g W917PM……ANA Garrison…..)
E. Container Number (if applicable)
F. Description of Goods:

1) (if the goods are Vehicles/Loader/Excavators …etc) info should include:

a) Engine #
b) Chassis #
c) Model

d) Color
e) Country of Origin
f) Type/Brand

2) For non-mobile Machines like Generators only Serial #, Brand or Type is sufficient

G. Currency in USD Only (other currencies will not be accepted)

H. Invoice to be Signed & Stamped by Supplier

4. Packing List To specify contents of Invoice (not required if invoice lists all items)

5. Certificate of Origin (if applicable) Required only if cargo arrives in Afghanistan via Herat or Islam Qalah.

6. Exemption Form (MUAFFI NAMA) To be obtained from Ministry of Finance (MOF) Revenue Department, and completed in the Dari Language *Note: For shipments coming through Pakistan - Karachi Port, we require two copies of the full set of documents in addition to the original documents: one copy for our office record and one copy for US Consulate Karachi- Pakistan. For shipments coming through Mazar e Sharif and Herat, only one copy for our office records suffices.*

Sample Format for Letter of Introduction

TO: U. S. Embassy Kabul, Public Affairs Section
ATTN: name of POC

FROM: Prime Contractor (Authorized Person)

SUBJECT: Customs Clearance Request for U. S. Equipment Request your assistance in obtaining release of the following items, as we require their immediate shipment to Afghanistan for use in support of Operation Enduring Freedom (OEF).

Company: Full Name and Address

Sub Contractor (if applicable) Full Name and Address
Contract No & Task

Order No.: W912ER……., W917PM……..

Project Description: i.e. ANA Garrison Nangarhar, ANP Border Police Kandahar….etc

Shipping Route: i.e. Austria, Karachi - Pakistan, Torkham - Kabul or Turkey, Azerbijan, Turkmenistan, Herat …etc

Bill of Lading Details Number Date 1234…. MM DD YY

Container Number: TOLU4938862, TRLU5949846, TRLU9220744, AMCU4500861 etc…

Number of Pieces: 4 Containers

Contents: Steel Pipe, Cement, Door, Window…etc (if Vehicles or Generators, please refer to item (2-I or 3-F of Checklist**)

Final Destination: Kabul or Name of respective Province Afghanistan Invoice Details

Number Date Amount Currency 123 MM DD YY 100,000.00 USD

Authorized Employee of Company responsible for Customs Clearance:

Name of Company's Employee

Authorized Shipping Agent: Name and Address of Shipping Agent

Your cooperation in facilitating the clearance of said items from Afghan Custom's authorities and onward transportation to final destination is appreciated.

***If the contractor is importing its own equipment (e.g., vehicles, generators, etc.) for use on the contracted project, this statement is added:* "
The mentioned Equipment and Accessories are contractor-owned and are temporarily imported to Afghanistan for the contract period of _____ to _____. At the conclusion of the contract the said items will be removed from Afghanistan, or the original duties will be paid to the Afghanistan Customs Department, Ministry of Finance by the contractor.

Regards,

Name and Title of Authorized Person
Signature
Date
Stamp of Company

-- End of Section --

SECTION 01 35 15

AFGHAN CAPACITY DEVELOPMENT

PART 1 GENERAL

1.1 AFGHAN CAPACITY DEVELOPMENT

The Government requires the Offerors to promote the education and skills development of Afghan citizens, as required by Factor 5-Afghan Capacity Development. Prospective Offerors must provide a Capacity Development Manager and certify Offeror's commitment to employing a minimum set percentage of skilled Afghan workers by filling out an Afghan Capacity Development form. Upon award, the Capacity Development Manager must submit an Afghan Capacity Development Plan to the Contracting Officer Representative. The plan must include the elements specified.

This Plan must be submitted to the Contracting Officer Representative within seven (7) days of Notice to Proceed (NTP).

1.2 AFGHAN CAPACITY DEVELOPMENT PLAN

The Offeror shall provide an Afghan Capacity Development Plan. This plan must explain how this project will promote the education and skills development of Afghan citizens. Specifically, as a minimum, the plan must address the following elements below. The term "contractor" here includes subcontractors, if applicable.

a. The Afghan Capacity Development Plan must name an Afghan Capacity Development Manager. Responsibilities for this person must be clearly stated and this person's position must be shown on the company organizational chart. The plan must clearly state that the method of evaluating the performance of this individual will be based on his or her ability to meet or exceed the target percentages of Afghan employees listed on the Afghan Capacity Development form submitted with the Offeror's proposal as part of Factor 5 of the technical evaluation criteria.

b. The Capacity Development Plan must describe how the contractor (and subcontractors) will promote the education and develop skills of Afghan citizens. Specifically, the plan must demonstrate how the contractor (and subcontractors) will:

(1) Recruit, hire, train and maintain a staff of skilled Afghan workers for construction trades including, but not limited to: equipment operators, masons, reinforcing steel workers, concrete finishers, laboratory technicians, painters, and carpenters. These skilled workers must be graduates of construction trade schools, such as the Champion Trades Training Center in Jalalabad or the Afghanistan Technical Vocational Institute in Kabul. To demonstrate intent, the Afghan Capacity Development Plan must include a list of skilled trades and the percentage of each skilled trade that will be comprised of trained, skilled Afghan workers. The plan must also list the trade schools, preferably from the province where the project is being built, from which skilled Afghans will be hired. Each skilled Afghan working on the construction site must have submitted a trade school diploma to the contractor. During project execution, these diplomas must be

provided to the U.S. Government upon request.

(2) Recruit, hire and maintain a staff of Afghan journeymen or highly skilled-technical workers, including but not limited to electricians and plumbers. These highly skilled-technical workers must be graduates of technical schools, such as the Afghanistan Technical and Vocational Institute in Kabul. To demonstrate intent, the Afghan Capacity Development Plan must include a list of these highly skilled-technical trades and the percentage of each trade that will be comprised of highly skilled-technically trained Afghan workers. The plan must also list the technical schools, preferably from the province where the project is being built, from which these skilled Afghans will be hired. Each Afghan journeyman or highly skilled-technical employee working on the construction site must have submitted a technical school diploma to the contractor. During project execution, these diplomas must be provided to the U.S. Government upon request.

(3) Plan to coordinate and work with the technical and trade schools, preferably in the province where the project is being built, to use graduates from the schools and provide opportunities for the students and graduates of the schools to get on-the-job training and experience.

c. The contractor must validate capacity development performance to the U.S. Government quarterly and also upon request. Validation must include, for each applicable position, total employee numbers and percentages filled by Afghan citizens. The presentation of data must be in tabular form and address both categories of employees: skilled trades, and journeymen or highly skilled-technical. The Afghan Capacity Development Plan must include an example of how this data will be reported to the U.S. Government.

d. Failure to comply with the Afghan Capacity Development Plan may result in termination for default in accordance with FAR 52.249-10 Default (Fixed-Price Construction).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Afghan Capacity Development Plan; G

PART 2 PRODUCTSPART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites

ASME INTERNATIONAL (ASME)

ASME B30.5	(2007) Mobile and Locomotive Cranes

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2010) Standard for Portable Fire Extinguishers
NFPA 70E	(2009; Errata 2009) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

Crane Critical Lift Plan; G

Proof of qualification for Crane Operators; G

SD-06 Test Reports

Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

Accident Reports

Crane Reports

SD-07 Certificates

Certificate of Compliance (Crane)

1.3 DEFINITIONS

a. Visibility Accident. Any mishap which may generate publicity and/or high visibility.

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

c. Operating Envelope. The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers and crane walkers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

d. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

(1) Death, regardless of the time between the injury and death, or the length of the illness;

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

(3) Restricted work;

(4) Transfer to another job;

(5) Medical treatment beyond first aid;

(6) Loss of consciousness; or

(7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

e. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout,

gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.). Any mishap meeting the criteria described above shall be documented in both the Contractor Significant Incident Report (CSIR) and using the NAVFAC prescribed Navy Crane Center (NCC) form submitted within five days both as provided by the Contracting Officer.

1.4 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent addition of USACE EM 385-1-1, and Liberian laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.5 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.5.1 Personnel Qualifications

1.5.1.1 Site Safety and Health Officer (SSHO)

The Contractor shall provide a Safety oversight team that includes a minimum of one (1) Competent Person at each project site to function as the Safety and Health Officer (SSHO). The SSHO shall be at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor

The Contractor Quality Control (QC) person can be the SSHO on this project.

1.5.1.2 Crane Operators

Meet the crane operators requirements in USACE EM 385-1-1, Section 16 and Appendix I. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacitates of 50,000 pounds or greater, designate crane operators as qualified by a source that qualifies crane operators (i.e., union, a government agency, or and organization that tests and qualifies crane operators). Provide proof of current qualification.

1.5.2 Personnel Duties

1.5.2.1 Site Safety and Health Officer (SSHO)

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required reports. Maintain Accident Reports and Daily Production reports for prime and sub-contractors.

c. Maintain applicable safety reference material on the job site.

d. Attend the pre-construction conference, pre-work meetings including

preparatory inspection meeting, and periodic in-progress meetings.

e. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.

f. Ensure sub-contractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent, QC Manager, and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

g. Maintain a list of hazardous chemicals on site and their material safety data sheets.

1.5.3 Meetings

1.5.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

1.5.3.2 Safety Meetings

Conduct and document twice weekly meetings. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractors' daily production report.

1.6 ACCIDENT PREVENTION PLAN (APP)

Use a qualified person to prepare the written site-specific APP. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions

under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer, the Contractor Quality Control Manager.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34,) and the environment.

Copies of the accepted plan will be maintained at the Contracting Officer's office, resident engineer's office and at the job site.

Continuously review and amend the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

1.6.1 EM 385-1-1 Contents

In addition to the requirements outlines in Appendix A of USACE EM 385-1-1, the following is required:

a. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist at any radius of lift; lifts involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. Submit 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.H. and the following:

(1) For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.550(g).

1.7 DISPLAY OF SAFETY INFORMATION

Within 1 calendar day after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, shall be deemed as meeting the

requirement for a bulletin board. Include and maintain information on safety bulletin board.

1.8 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.9 REPORTS

1.9.1 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses and property damage accidents resulting in at least US$2,000 in damages, to establish the root cause(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Conduct an accident investigation for any weight handling equipment accident (including rigging gear accidents) to establish the root cause(s) of the accident, complete the WHE Accident Report (Crane and Rigging Gear) form and provide the report to the Contracting Officer within 15 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer . The Contracting Officer will provide a blank copy of the accident report form.

1.9.2 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix I and as specified herein with Daily Reports of Inspections.

1.9.3 Certificate of Compliance

Provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a blank certificate). State within the certificate that the crane and rigging gear meet applicable Liberian regulations (with the Contractor citing which Liberian regulations are applicable). Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. Also certify that all of its crane operators working have been trained in the proper use of all safety devices (e.g., anti-two block devices). Post certifications on the crane.

1.10 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with USACE EM 385-1-1, the APP, the AHA, Federal regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

3.2 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

3.2.1 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with USACE EM 385-1-1, Section 21.B.

3.2.2 Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings with a minimum 20 m length of scope attached etc., are required when working above or next to water .

3.3 SCAFFOLDING

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access scaffold platforms greater than 6 m maximum in height by use of a scaffold stair system. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 6 m maximum in height. The use of an adequate gate is required. Ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load. Stationary scaffolds must be attached to structural components to safeguard against tipping forward or backward. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet.

3.4 EQUIPMENT

3.4.1 Material Handling Equipment

a. Power moving equipment used for material handling shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.

c. Operators of power moving equipment or power industrial trucks shall be licensed in accordance with Liberian regulations.

3.4.2 Weight Handling Equipment

a. Equip cranes and derricks as specified in EM 385-1-1, section 16.

b. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

c. Comply with ASME B30.5 for mobile cranes.

d. Under no circumstance shall a Contractor make a lift at or above 90 percent of the cranes rated capacity in any configuration.

e. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.

f. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

g. All employees must keep clear of loads about to be lifted and of suspended loads.

h. Use cribbing when performing lifts on outriggers.

i. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

j. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

k. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

l. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by Contracting Officer personnel.

m. Certify that all crane operators have been trained in proper use of all

safety devices (e.g. anti-two block devices).

n. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. Prior to conducting lifting operations set a maximum wind speed at which a crane can be safely operated based on the equipment being used, the load being lifted, experience of operators and riggers, and hazards on the work site. This maximum wind speed determination shall be included as part of the activity hazard analysis plan for that operation.

3.4.3 Equipment and Mechanized Equipment

a. Manufacturer's specifications or owner's manual for the equipment shall be on-site and reviewed for additional safety precautions or requirements. Incorporate such additional safety precautions or requirements into the AHAs.

3.4.4 USE OF EXPLOSIVES

Explosives shall not be used or brought to the project site.

3.5 ELECTRICAL

3.5.1 Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately removed from service all damaged extension cords. Portable extension cords shall meet the requirements of NFPA 70E and OSHA electrical standards.

-- End of Section --

SECTION 01 35 30

SECURITY

PART 1 GENERAL

1.1 SPECIFIC CONTRACT SECURITY ASSESSMENT

The Government has determined that the overall risk associated with the security environment in which this work is to be performed is Low, however, the road network used to access the facility remains dangerous due to frequent attacks and must be addressed in the security plan. This rating takes into consideration the geographic location of the work, including the Government's institutional knowledge of the recent history of this area as it relates to security, and the nature of the work to be performed under this contract. As such, the approval of your plan to provide security throughout the period of performance of this contract will be carefully reviewed by the Source Selection Evaluation Board, and will be weighted appropriately for the level of risk described above. The Government is entitled to assume that the Contractor possesses the degree of knowledge that is "standard" to experienced contractors in this industry and location, and that the Contractor will gain other relevant information that is reasonably available about the contract to be performed. The Government is further entitled to assume that the Contractor understands its abilities as they relate to the work to be performed under the contract.

1.2 GENERAL BACKGROUND

Operations in Afghanistan require Armed Contractors (ACs) and Private Security Companies (PSCs) to fulfill a variety of important security functions for the Department of Defense (DOD), Department of State (DOS), and other entities operating in the Combined Joint Operations Area - Afghanistan (CJOA-A). Included in these ACs and PSCs are traditional private security companies, the Afghan security guards, and DOD contractors who are armed for personal protection. Traditional PSCs perform convoy escort, static security, and personal security details (PSDs). Afghan security guards (ASGs) provide local static security to Forward Operating Bases (FOBs), Company Operating Bases (COPs), and other infrastructure with local Afghan companies. DOD contractors may be armed either as a function of the service they provide or their operating location. These AC/PSCs are not combatants; they execute services to protect personnel, supplies and equipment, and fixed facilities. Weapons employed by AC/PSCs are for purely defensive purposes only. This section is in accordance with the "USCENTCOM Policy and Delegation of Authority for Personal Protection and Contract Security Service Arming of DOD Civilian Personnel and Contractors for Iraq and Afghanistan", 7 November 2006.

The intent of these contracted services is to "free" joint forces to conduct military operations and other inherently governmental functions. As the CJOA-A experiences both building of combat power as well as the parallel civilian uplift effort, the reliance on contracted services to include AC/PSCs is likely to increase. AC/PSC services are necessary to secure installations and other infrastructure, conduct movement support for sustainment, trains Afghan Forces to proficiency, and transport key personnel throughout the CJOA-A. The terms armed contractor, private security company, or contractor personnel, includes all personnel directly employed by the contractor at any tier of contract or subcontract. This

section applies to all armed contractors providing service on DOD contracts.

1.3 GOVERNMENT REPRESENTATIVES

USACE will have a hierarchical security organization that disseminates essential security information and provides consistent and comprehensive use of security information. The USACE Area OIC/NCOIC will serve as the Area Office security officer and the Resident OIC/NCOIC will serve as the security officer at each Resident Office. When required the Area Office will request security plan review support from the Anti-Terrorism/Force Protection (AT/FP) expertise in the District Joint Operations Center (JOC). The Contractor may request this support from the Area/Resident Office OIC.

1.3.1 Security Plan

The security officers will review and approve all current and future contractor security plans prior to submittal approval by the authorized representative of the Contracting Officer Representative. The security officer shall ensure that all contractor security plans are in accordance with the contract requirements. The security plans shall address movement of contractor labor, material, and equipment including Contractor notification requirements to Government security officers who will in-turn inform Task Force Commanders and other Coalition Forces. The security officers will lead the quality assurance program to ensure contractors are executing their approved security plans. The Government will not allow the Contractor to start work without an approved security plan.

1.3.2 Security Coordination

Contractor will be required to coordinate construction site security with Task Force or Provincial Reconstruction Team (PRT) Commanders. Afghan or Coalition Forces may be available, under certain circumstances, to assist the contractor on a case by case basis. The Government also expects the Contractor to coordinate with local Afghan Forces to the greatest extent possible. Coordination does NOT include nor imply making payments of any nature whatsoever to the local ANA/ANP or Local/Provincial Government Officials for permission or protection to construct the project. The Contractor will immediately inform the Government if asked to make any such payments, and the Government will provide further direction to the Contractor. Corruption will not be tolerated at any level, under any circumstances. Conducting business in this manner will be grounds for termination of the contract.

1.3.3 Claim for Security Delays

Following a threat or an attack on a Contractor or a Contractor claim for security delays, the security officer will validate the incident and assess the incident's impact to the contract period of performance. Within 30 days of the incident, if the Contractor submits a request for an extension of time, the Government ACO will assess the incident's impact to the construction schedule and as necessary issue a contract modification for additional non-compensable time.

1.3.4 Security Rating

Each contract/task order will be assigned a rating by the Government security officer. This rating will determine the level of approval for the security plan. Assistance from the District's JOC AT/FP expertise may be required to assess the rating. Ratings and approval levels are below:

a. Extremely High Risk: District Commander

b. High Risk: Deputy CDR, Chief of E&C, Area OIC, or J3 OIC

c. Moderate Risk: Chief of Construction, Area OIC/NCOIC, or Area Engineer

d. Low Risk: Resident OIC/NCIOC, Resident Engineer

1.3.5 Government Provided Security

Any U.S. Government provided security/escort services will be in accordance with DFAR 252.225-7040 CONTRACTOR PERSONNEL AUTHORIZED TO ACCOMPANY U.S. ARMED FORCES DEPLOYED OUTSIDE THE UNITED STATES (JUN 2006).

1.4 SITE SECURITY FOR PROJECTS OUTSIDE OF ACTIVE COALITION FORCE BASES

The Contractor shall develop a site security plan and program (IAW Security Plan Section) to provide 24 hr/7 days a week security for the project throughout the performance of the Contract. There will be armed guards manning project watch towers, the main entry gate, and roving patrols of the compound, adjacent hills, and observation posts at all times. Tower guards will maintain perimeter security to include thwarting any attempted theft, vandalism, or attacks. Roving guards will patrol vehicle staging areas making sure unauthorized personnel are not present, and prevent damage or sabotage of grounds and/or equipment. Roving patrols will also check nearby hills to prevent snipers or any other terrorist activity that might threaten the site. Facility security shall include access control to limit entry to unauthorized personnel, conduct vehicle and personnel bomb searches, report suspicious persons, question persons as required, and respond to calls for security support and assistance. The Contractor shall employ culturally appropriate means of searching personnel. Local governments, ANA/ANP units, and Coalition Forces should be coordinated with to support the large scale security of the site to the greatest extent possible; however, the contractor is ultimately responsible for providing security. Coordination does NOT include nor imply making payments of any nature whatsoever to the local ANA/ANP or Local/Provincial Government Officials for permission or protection to construct the project. The contractor will immediately inform the Government if asked to make any such payments, and the Government will provide further direction to the contractor. Corruption will not be tolerated at any level, under any circumstances. Conducting business in this manner will be grounds for termination of the contract. The Contractor is expected to perform all required actions to protect the construction site compound from theft and vandalism and personnel from physical harm. These measures are strictly for the protection and defense of the on-site people and property; contractors are not authorized to conduct any type of offensive operations. For security of road construction, transportation of supplies, and equipment convoys, see the appropriate paragraph.

1.4.1 Site Security for Projects On-Base

The Contractor shall provide general perimeter force protection security for developing the site. Security may include but is not limited to temporary fences and private security guards. Perimeter security shall prevent unauthorized site access and provide site protection to the contractor's work force and the Government personnel for the duration of

the project. Many bases in Afghanistan have multiple contractors and local Afghan security forces working on them; it is the responsibility of the Contractor to ensure the 24/7 protection of the construction site from vandalism and theft. If the security situation request measures more than the general provision specified by the Contractor, the contractor shall inform the Government immediately. The Contractor has the ultimate responsibility for all security measures. These measures are strictly for the protection and defense of the on-site people an

1.4.2 Security for Road Projects, Transportation, and Convoys

Road construction projects will maintain at least two armed traffic control points (TCPs) at 300 meters in both directions of the road, or at a distance that terrain dictates. TCP guards will thoroughly inspect vehicles, entering the compound for explosives, contraband, and unauthorized personnel. TCP guards will also check for proper identification and conduct physical searches of personnel entering and leaving the site. They will report suspicious persons, question persons as required, and respond to calls for security support assistance. The TCP must have controlling barricades to slow traffic in both directions, but not to block the road completely. The Contractor shall employ culturally appropriate means of searching personnel. The TCP must have a vehicle ready for immediate evacuation or pursuit of AAF trying to access the construction site.

1.4.2.1 Movement of Project Equipment and Supplies

The Contractor will inform the Government no later than 72 hours before any movement of project equipment and supplies outside of any Coalition Force bases in the CJOA-A. Both the Government and the Contractor must be aware of information security, using face-to-face meetings, courier mail, or other secure means of communication to discuss movements. All contractor convoys will have a minimum of two armed security details in the front and rear of the convoy. Convoys longer than three vehicles will also have a center armed security detail. The minimum security detail is a vehicle(s) with two armed security personnel, each with AK-47 or equivalent weapons. While the aforementioned is a minimum requirement, the Contractor shall have an armed security detail commiserate with the threat of the route.

The threat of attack in Afghanistan is very real, and contractors must be prepared for violent ambushes from Anti-Afghanistan Forces (AAF). Redundant communication equipment is highly recommended using cell phone, satellite phone, or other Contractor/Government supplied communication/tracking equipment.

1.4.2.2 Security Detail

The project site will also have a security detail on either side of the on-site construction. These details must be able to protect and defend from nearby buildings, hilltops, and concealed terrain while still providing immediate on-site security to the construction equipment and personnel.

1.4.2.3 Required Training

The Government recommends the contractor employ personnel that are trained in finding mines and improvised explosive devices along the construction route. Contractor personnel are prohibited from getting close, touching, or handling any explosive devices or unexploded ordinance found. The Contractor will report the location of any of these devices to the Government security

officer or local Afghan Forces immediately for disposal/removal.

1.5 SECURITY PLAN

After the award, the Contractor will receive at a minimum:

a. An estimated threat assessment of the project area and major supply routes.

b. The contact information for the DOS regional security officers, engineering/construction representatives, local Coalition Forces, and local Afghan Forces near the project site.

c. General emergency procedures and critical information required for Coalition/Afghan Force security assistance.

d. The estimated number of quality assurance (QA) site visits by the Government on a weekly/monthly basis.

e. Any special security requirements directed by the Coalition Force Commanders in the area.

1.5.1 Estimated Threat Assessment

The Contractor is expected to develop a site security plan to cover a range of security operations from low to high threat. Included in this plan will be the capability for a surge of manpower and equipment required during high threat conditions. The Contractor is expected to notify all on-site personnel of increased threats and protective action to take.

1.5.2 Security Plan Requirements

The security plan introduction must contain the following information at a minimum: MOI license number, AISA licensed (Yes/No), armed contractor and subcontractor company names, contract number/title, contracting agency, type of work, number/type of weapons authorized, POC for company with contact details, Government Contracting Officer Representative and COR with contact details, number of security personnel by type (U.S., Afghan, Other), company's country of registration/origin.

1.5.3 Personnel

The plan shall contain the names, photos, and tazkira numbers of security personnel, those personnel with access to weapons/ammo and those persons who will be handling or transporting explosives. As part of the security plan, the Contractor shall continually submit the coordinates of the Contractor's base camps, quarries, and current work locations. The Contractor shall submit, prior to the commencement of construction, a plan for security protection, with a list of the chain of command or a letter of commitment from a licensed security contractor. Perimeter security shall prevent unauthorized site access and provide safety protection to the Contractor work force and government personnel for the duration of the project. The Contractor is solely responsible for security however local police shall be coordinated with regarding security to the greatest extent possible. Coordination does NOT include nor imply making payments of any nature whatsoever to the local ANA/ANP or Local/Provincial Government Officials for permission or protection to construct the project. The contractor will immediately inform the Government if asked to make any such payments, and the Government will provide further direction to the

contractor. Corruption will not be tolerated at any level, under any circumstances. Conducting business in this way will be grounds for termination of the contract. Additionally, our new contracts are going to require that ALL security personnel are to be registered biometrically.

1.5.4 Force Protection Condition Levels

The Contractor will use at least four force protection condition levels (Extremely High, High, Moderate, Low) with corresponding levels and codes for on-site threat postures (uniforms, weapons, and vehicle movements). The Contractor will use road movement safety restriction codes (Green, Amber, Red, or Black) for frequently traveled roads in the vicinity of project site. Force protection conditions and vehicle route status will be publicized to the site population. As a guideline, here are the Coalition Force route status codes:

a. Green - Route Open; no restrictions.

b. Amber - Route Open; only mission essential travel allowed on this route; the Government Security Officer must approve all Contractor movements.

c. Red - Route Open; requires Commander's approval for travel. Forces are required to use armored vehicles; all non-essential ground site visits suspended.

d. Black - Route Closed to Coalition Forces except for emergency travel.

1.5.5 Coordination with Local Police

The Contractor will establish a threat assessment group with local police to determine local area threats and adjust force protection conditions as required. The Contractor must use language assistants/interpreters if there is a language difference between the armed security personnel, the Contractor's project manager, and other on-site personnel.

1.5.6 Security Plan Submittal Requirements

Contractors will submit security plans in accordance with contract Section 01 33 00 SUBMITTAL PROCEDURES.

1.6 ARMING LICENSES

Contractor personnel who are armed will be properly authorized to carry arms in Afghanistan by registering and obtaining a license to carry arms from the Afghanistan Ministry of the Interior through USFOR-A. Armed Contractor personnel must be properly trained and qualified on each weapon they will be authorized to use. Exceptions to proceed without a valid MOI license may be granted in rare cases at the sole discretion of the Government. Failure to obtain this license is grounds for contract termination.

All armed contractors must carry a copy of their Letter of Authorization (LOA) and their MOI license at all times. U.S. and Coalition Forces have the right to ask for this documentation at any time.

1.7 LOCAL HIRE VETTING PROGRAM

The Contractor shall maintain a local hire vetting program for all local hires required under performance of this contract, to include background checks. The Contractor will conduct interviews and review employment application information for their candidates, with results of the interview and information reviews provided to the CORs security representative for appropriate action. The Contractor will be available to accept reports of threats and intimidations, and forward these to the appropriate Government agency for resolution. The Contractor will demonstrate an awareness of cultural nuances (i.e. tribal relationships, etc.) and employ culturally sensitive measures when conducting interviews. The U.S. Government will enter all AC/PSC personnel into the nation-wide Biometrics network to verify Contractor vetting.

1.8 COMMUNICATION

The Contractor will operate a 24/7 security operations center with communication capability to each guard on duty and the ability to notify all on-site personnel of increased threats and protective actions to take. The operations center will also have 24/7 communication with the local Coalition, ANA, or ANP security forces. The Contractor shall have communication with the District JOC at all times for rapid emergency response; the Government Security Officer will give the Contractor the JOC contact information. Communication can be via cell phone, email, satellite phones, VHF, HF, CODAN, text, or other communication technologies compatible with the Government's capabilities. The Contractor will provide the Government with their contact information (names, numbers, frequencies, email addresses, transponder IDs, etc.) for the site encompassing all available communication means.

1.9 CONTRACTOR PROVIDED EQUIPMENT

The Contractor will provide the operational security equipment including but not limited to weapons, radios, uniforms, vehicles, vehicle fuel, phones, and other equipment as proposed by the Contractor to provide complete site security.

1.10 TRAINING

The Contractor will develop a training plan for each aspect of the security operations to ensure all employees receive initial and quarterly training to maintain certification, proficiency, and safety. Records of the training is an inspectable item for the COR and Security Officer. The Contractor will ensure all security personnel are trained on the required COMISAF/USFOR-A Tactical Directive, ROE/RUF, escalation of force (EOF), withdrawal/clear drills, proportionality, target discrimination, positive ID, Law of War, small unit tactics training, and general convoy drills like vehicle recovery. This training will also include but not limited to weapons qualification, vehicle operations, IED, site security, traffic/entry control points, and safety. The Contractor shall provide a sufficient number of trained personnel to meet the required security level for the project beginning on the date of mobilization.

1.11 KEY CONTROL

The Contractor shall establish and implement methods in writing to ensure that all keys issued by the Contractor are not lost or misplaced and are not used by unauthorized persons. The Contractor shall develop procedures covering key control that will be included in their quality control system

(See Section 01 45 00.00 10 QUALITY CONTROL). The project managers will keep a master log of all keys and provide a copy to the Contracting Officer Representative (COR) for verification. If a key is lost or stolen, the Contractor shall pay to have all impacted locks changed/rekeyed immediately.

1.12 SAFETY BARRICADES

Barricades shall be required whenever safe public access to paved areas such as roads, parking areas, or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night. Travel to and from the project site shall be restricted to a route approved by the Government site supervisor. As the situation dictates, one security guard will be posted at each safety barricade.

1.13 RESPONSIBILITY FOR PHYSICAL SECURITY

Prior to mobilization, the Contractor shall submit his proposed means of providing project physical security to prevent unauthorized access to equipment, facilities, materials and documents, and to safeguard them against sabotage, damage, and theft. The Contractor shall be responsible for physical security of all materials, supplies, and equipment of every description, including property which may be Government-furnished or owned, for all areas occupied jointly by the Contractor and the Government, as well as for all work performed. Security may include but is not limited to fence and private security guards. The Contractor shall provide perimeter force protection security for the developing site. The plan shall address in detail the contractors proposed procedures, and organization necessary to produce and maintain effective security within the contract limits twenty-four (24) hours a day seven (7) days a week. This document shall be referred to as part of the security plan submittal.

1.14 CRITICAL INFORMATION TO REPORT

The Government is responsible for the management and oversight of DOD Contracted AC/PSCs delivering services throughout the CJOA-A. Given the impact of either contractor misbehavior or catastrophic attacks against contractors, it is critical that information regarding AC/PSC incidents is communicated quickly and accurately to the Government for purposes of management, fact-finding, and mitigation where necessary. The Government must receive the information addressed below. The Contractor will report any of these information requirements immediately to the Government site supervisor:

a. AC/PSC Escalation of Force to include the use of weapons resulting in the death or injury of an Afghan citizen, coalition, or U.S. service member, other government official, or contractor.

b. AC/PSC accidents, traffic, or otherwise, resulting in the death or injury of an Afghan citizen, coalition, or U.S. service member, governmental official, or contractor.

c. Attacks against AC/PSC activities by Anti-Afghan Forces resulting in the death or injury of an Afghan citizen, coalition or US service member, governmental official, or contractor.

d. Reports of "lost convoys." These are AC/PSC escort or independent activities which have lost contact with their companies.

e. AC/PSC Escalation of Force, accidents, or other activities that result in significant damage to Afghan or USG vehicles, materials or facilities.

f. Anti-Afghan Force actions including small arms fires (SAF), RPG fire, indirect fire (IDF), improvised explosive devices (IEDs), and/or complex attacks against AC/PSC activities.

g. Contractor accidental or negligent discharge of a weapon.

1.15 REOCCURRING REPORTS

Every month the Contractor will report the following to the designated contract security officer:

a. The number, type, and general description of every weapons discharge by the Contractor or any tier of subcontractor on the project.

b. The name of the Contractor's security manager and the total number of armed personnel working on the project.

c. The total number by type/caliber of all weapons employed on the project.

d. The serial numbers and license plates of all armored vehicles used for the project.

e. The type of transponder/tracking system used for any moving equipment used for the project.

f. Any changes made to security personnel (new hires, employees who quit or were let go, transfers, etc.).

g. Biometric registration of all new personnel.

1.16 CONTRACTOR SECURITY PERSONNEL REQUIREMENTS

The Contractor shall submit the names of all employees who will be working in security positions prior to their performance of any such work on this contract. All security personnel will be subject to Biometrics (retinal scan) testing by representatives of the Contracting Officer Representative, at any time during performance of work on the contract. The names of security personnel and the Biometrics testing results will be vetted with the Afghanistan government, International Security Assistance Forces (ISAF), or U.S. Forces-Afghanistan to determine if any of the proposed security personnel are on the list of enemy combatants compiled by these sources. If the Contractor is notified by the Contracting Officer Representative that such security personnel are on any of these lists of enemy combatants, such employees must be immediately removed from work on this contract. Repeated incidents of hiring security personnel on any of the lists of enemy combatants will be grounds for terminating the contract for default.

1.17 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Security Plan; G

security Plan and Program; G

plan for security protection; G

Project Physical Security Plan; G

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

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Ph: 248-848-3700
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Internet: http://www.concrete.org

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Internet: http://www.transportation.org

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Chicago, IL 60601-1802
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Fax: 312-670-5403
Publications: 800-644-2400
E-mail: pubs@aisc.org
Internet: http://www.aisc.org

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191-4400
Ph: 703-295-6300 - 800-548-2723

Fax: 703-295-6222
E-mail: member@asce.org
Internet: http://www.asce.org

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E-mail: customerservice@asse.org
Internet: http://www.asse.org

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Ph: 800-926-7337
Fax: 303-347-0804
E-mail: smorrison@awwa.org
Internet: http://www.awwa.org

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org or customerservice@awspubs.com
Internet: http://www.aws.org

APA - THE ENGINEERED WOOD ASSOCIATION (APA)
7011 South 19th St.
Tacoma, WA 98466-5333
Ph: 253-565-6600
Fax: 253-565-7265
E-mail: help@apawood.org
Internet: http://www.apawood.org

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E-mail: infocentral@asme.org
Internet: http://www.asme.org

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Fax: 610-832-9555
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Internet: http://www.astm.org

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Fax: +44 (0)20 8996 7001
E-mail: cservices@bsi-global.com

Internet: http://www.bsi-global.com

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Johnston, RI 02919
Ph: 401-275-3000
Fax: 401-275-3029
E-mail: information@fmglobal.com
Internet: http://www.fmglobal.com

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Fax: 732-981-1712
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Internet: http://www.ieee.org

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5360 Workman Mill Road
Whittier, CA 90601
Ph: 562-699-0541
Fax: 562-699-9721
E-mail: webmaster@iccsafe.org
Internet: www.iccsafe.org

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)
3, rue de Varembe, P.O. Box 131
CH-1211 Geneva 20, Switzerland
Ph: 41-22-919-0211
Fax: 41-22-919-0300
E-mail: custserv@iec.ch
Internet: http://www.iec.ch

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Burnaby, BC CANADA V5C
Ph: 888-674-8937
Fax: 888-211-8708
E-mail: info@paintinfo.com
Internet: http://www.paintinfo.com/mpi

NACE INTERNATIONAL (NACE)
1440 South Creek Drive
Houston, TX 77084-4906
Ph: 281-228-6200
Fax: 281-228-6300
E-mail: firstservice@nace.org
Internet: http://www.nace.org

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-5900
E-mail: webmaster@nema.org
Internet: http://www.nema.org/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: http://www.nfpa.org

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)
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Internet: http://www.gpoaccess.gov
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5285 Port Royal Road
Springfield, VA 22161
Ph: 703-605-6585
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)
900 Spring Street
Silver Spring, MD 20910
Ph: 301-587-1400
Fax: 301-585-4219
Internet: http://www.nrmca.org

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4656
Ph: 412-281-2331
Fax: 412-281-9992
E-mail: info@sspc.org
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Obtain Military Specifications, Standards and Related Publications from:
Acquisition Streamlining and Standardization Information System (ASSIST)
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Building 4/D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Ph: 215-697-6396 - for account/password issues
Internet: http://assist.daps.dla.mil/online/start/; account registration required

Obtain Unified Facilities Criteria (UFC) from:
Whole Building Design Guide (WBDG)
National Institute of Building Sciences (NIBS)
1090 Vermont Avenue NW, Suite 700
Washington, CD 20005
Ph: 202-289-7800
Fax: 202-289-1092
Internet: http://www.wbdg.org/references/docs_refs.php

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
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PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01 45 00.00 40

QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 SUBMITTALS

USAID approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Submit the following items in accordance with paragraph entitled, "Records," of this section.

Quality Control Data

Quality Control Training

Inspection Records

Field Tests

Factory Tests

SD-07 Certificates

Submit a detailed written statement describing procedures that will be implemented to achieve quality on the project according to the paragraph entitled, "Quality Assurance (QA) Plan," of this section.

Submit the following in accordance with paragraph entitled, "Qualifications," of this section.

Contractor's Quality Representative Qualifications

1.2.1 Quality Assurance (QA) Plan

Address the following within the QA Plan:

Description of the authority, responsibilities and coordinating procedures, of on-site/off-site quality assurance personnel, including those QA personnel not under direct control of the Contractor.

List personnel designated by the Contractor to accomplish the work required by the contract.

Contractor's operational plan for accomplishing and reviewing work controls, fabrication controls, certifications, and documentation of

quality control operations, inspections, and test records, including those for subcontractors.

Include within these provisions the methods to be used during the procurement cycle (order to delivery) for those materials or equipment that require source inspections, shop fabrications, or similar operations located separately from the work site.

Description of on-site personnel training.

Nondestructive testing requirements.

Identification of independent certifying and testing laboratories.

1.2.2 Records

Include all quality control data; factory tests or manufacturer's certifications, records of quality control training, field tests and similar tests. Quality records must be available for examination by the Contracting Officer.

Furnish legible copies of the test and inspection records to the Contracting Officer.

Submit for approval, the narrative description of an inspection system which provides for compliance with the quality requirements and technical criteria of the contract within 7 calendar days after notice to proceed.

Submit a monthly performance report that summarizes the quality operations. Identify inspections made, tests performed, nonconformances, corrective actions taken, status of plans/procedures being developed, and status of open items/problems in work.

In-process inspection records and control away from the job site may be used as evidence of quality of materials/work and may reduce further inspection or testing after delivery to the job site.

1.3 QUALITY ASSURANCE

1.3.1 Qualifications

Submit Contractor's Quality Representative Qualifications to the Contracting Officer for approval.

When approval of special processes, operating personnel, and special equipment or procedures is required by the specifications, obtain necessary approvals prior to starting the work.

1.3.2 Quality Control Requirements

Provide a quality control program encompassing: selection of construction materials and sources; suppliers; subcontractors; on-site and off-site fabrication of Contractor-furnished assemblies; on-site and off-site assembly; erection; work procedures; workmanship; inspection; and testing.

Provide document systems ensuring that quality provisions of contract schedule, specifications, and drawings have been performed.

1.3.2.1 Management and Organization

Designate an individual within the on-site organization whose sole responsibility is the day-to-day on-site management and direction of the Quality Program.

The Quality Program Manager will report to the Contractor's management and have the necessary authority to discharge contractual responsibilities.

1.3.2.2 Identification and Data Retrieval

Provide an identification and data retrieval system.

Records, drawings, submittals, and equipment must be identified by referencing the Contract Number; Contract Specification Number; Contract Drawing Number; Submittal Document Number; Contract Change Number; and the Contractor's Drawing Number System.

1.3.2.3 Procurement

Contractor is responsible for controlling procurement sources and those of his subcontractors to ensure that each purchase meets quality requirements.

1.3.2.4 Receiving Inspection System

Maintain a site receiving inspection system that ensures procured materials and equipment are inspected and tested.

Receiving inspection records must accompany each procurement delivery to the construction site. Maintain records of site receiving inspections.

1.3.2.5 Nonconforming Articles and Material Control

Control nonconformances discovered by the Contractor, subcontractors, suppliers quality representatives to prevent their use and to correct deficient operations.

a. Prepare a "nonconformance" report for each instance comprising:

(1) Identification of the nonconforming article or material.

(2) A description of the nonconformance and the applicable requirement.

(3) Actions taken or recommended.

(4) Disposition of the nonconforming article or material.

b. Identify and mark each nonconforming article for removal from the work area.

c. Monitor and correct deficient operations.

1.3.2.6 Fabrication, Process, and Work Control

Ensure compliance of requirements in contract specifications and drawings with procedures and controls.

Establish in-process inspections, to ensure compliance with quality

requirements.

Special processes may include, but are not limited to, nondestructive testing, and welding.

1.3.2.7 Quality Control Records

Maintain Quality Control records at a central on-site location.

Ensure each record is identified and traceable to specific requirements in the specifications and drawings.

1.3.2.8 Drawings and Change Control

Maintain drawing-control system to provide revised drawings and ensure continuous removal of obsolete drawings from work areas. Control changes involving interface with other work areas, or affecting materials controlled by others. Integrate this system with the document requirements of the contract.

Clearly annotate and identify drawing changes and associated drawings that are to be revised accordingly. Use for fabrication and inspection drawings that have been approved, or approved as noted, by the Contracting Officer.

1.3.3 Quality Inspections

1.3.3.1 USAID Inspections

Work performed under this contract will be subject to inspection by the Contracting Officer. Changes to the specifications or drawings will not be allowed without written authorization of the Contracting Officer.

When the Contracting Officer determines that inspected work needs to be corrected, the Contracting Officer will be allowed 24 hours to complete reinspection of the corrected work.

Notify Contracting Officer in writing before backfilling or encasing any utility so that work may be inspected. Failure to notify the Contracting Officer before backfill or encasement occurs will require the work be uncovered at the Contractor's expense without additional compensation.

Contractor's program is subject to continuous evaluation and review by the Contracting Officer. Contractor will be notified in writing of any noncompliance and will be given 30 calendar days to correct identified deficiencies.

1.3.3.2 Contractor's Quality Inspections

Setup and use an inspection system that Documents quality control through records of inspections, tests, and procedures.

Include the following within the Contractor's Quality Assurance System:

a. Single Contractor's representative responsible for on-site operation of the inspection program.

b. Purchasing control system documenting project procurement to drawings, specifications, and approved submittals.

c. Receiving inspection system documenting inspections for each procurement.

d. Documentation for handling and disposing of nonconforming components and materials.

e. Inspection records for each specific section of the specification and drawings.

f. Identification of test(s) to be performed, test procedures, records, and independent organizations used.

g. Documenting and maintaining certification or re-certification of procedures.

h. Calibration of gages, tools, measuring instruments, and independent laboratories used.

Establish a system of scheduled or random audits to ensure task completion.

1.3.4 Field Services

1.3.4.1 Responsibility for Inspection and Testing

Contractor is responsible for all inspections and tests, and the accompanying documentation for each inspection and test. Contractor may utilize independent inspection and testing laboratories or services as approved by the Contracting Officer.

Contractor is also be responsible for tests of construction materials utilizing the services of an approved independent testing laboratory.

1.3.4.2 Inspection and Test Records

Provide on-site records of each inspection and test performed throughout the life of the contract including, but not be limited to, evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved, identification of operators and inspectors, result of inspections or tests, nature of defects, causes for rejection, proposed remedial action, and corrective actions taken.

Inspection records, test procedures, test results, and associated forms be verified by and provided to the Contracting Officer. Final test data must have a cover letter/sheet clearly marked with the system name, date, and the words "Final Test Data.

1.4 HANDLING AND STORAGE

Provide controls, procedures and documentation with each shipment, that meet requirements of each section of the specifications.

1.5 SEQUENCING AND SCHEDULING

Notify the Contracting Officer at least 24 hours prior to scheduled inspections and tests.

Provide 24 hour notice to the Contracting Officer of the date when the contract work will begin at the site.

When Contractor suspends work for one calendar day or longer prior to completion notify the Contracting Officer. Do not resume work without notification of the Contracting Officer.

Notify the Contracting Officer at least 24 hours in advance of backfilling or encasing any underground utility.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component of, each section of the specifications.

1.2 SUBMITTALS

USAID approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submitted the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction site plan; G

1.3 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities, including layouts and details, avenues of ingress/egress to the area and details of site security. Indicate if the use of a secondary staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Project Signs

The requirements for the signs, their content, and location as specified in Section 01 11 00 SUMMARY OF WORK. Erect signs within 15 days after receipt of the Notice to Proceed.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Haul Roads

At Contractor's expense construct access and haul roads necessary for proper access to the work area. Construct with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are be avoided. Provide necessary lighting, signs, barricades, and markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas.

2.2.3 Temporary Wiring

Provide temporary electrical supply sufficient for construction operations.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking must not interfere with existing and established parking.

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

3.2.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions.

3.2.2 Utility Services

a. If electrical or water service is available from an outside source the Contractor shall make arrangements for service connections, temporary metering and pay the cost of these utilities during construction.

b. USAID and ACSI will assist in the coordination of utility connections and will approve utility rates prior to final agreement.

3.2.3 Electricity

Provide connections, sized to provide service required for power and lighting. Locate feeder and branch wiring with area distribution boxes so that power is available throughout the project site by use of power cords. Provide lighting as required for safe and secure operations.

3.2.4 Water

Provide water supply as specified in the site adaptation plans. Make connections to existing facilities to provide water for construction purposes.

3.2.5 Sanitation

a. Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes, and remove from the site.

3.2.6 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.7 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials weekly to minimize potential hazards.

3.3 TRAFFIC PROVISIONS

3.3.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any roads or interfere in any way with traffic except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the local authorities.

3.3.2 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer.

3.4 CONTRACTOR'S TEMPORARY FACILITIES

3.4.1 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is expected, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.4.1.1 Building and Site Storm Protection

When a warning of severe winds is issued, take precautions to minimize danger to persons, and protect the work. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work.

3.5 USAID FIELD OFFICE

3.5.1 Contracting Officer's Field Office

Provide on the jobsite an office for the exclusive use of the Contracting Officer. Provide a weathertight structure with adequate lighting, ventilation, a 1200 by 2400 mm plan table, a standard size office desk and chair, computer station, and working communications facilities.

3.6 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away.

-- End of Section --

SECTION 01 58 00

PROJECT IDENTIFICATION

PART 1 GENERAL

1.1 PROJECT SIGN

Prior to initiating any work on site, provide one project identification sign at each tower location as directed by the Contracting Officer. Construct the sign in accordance with project sign detail, including graphics and colors, as provided by the Contracting Officer. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 71 13

MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.1 SUBMITTALS

USAID approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Written narrative of the mobilization process; G

Written narrative of the demobilization process; G

Copies of written agreement for use of existing facilities

Copies of legal agreements for the purchase or lease of private or public lands

SD-11 Closeout Submittals

Copies of written legal documents showing transfer of ownership rights of abandoned new facilities, if required.

1.2 MOBILIZATION

Mobilization consists of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site , Afghanistan the following:

a. Obtaining legal agreements for the purchase or lease of lands for the establishment of all field offices (Contractor's and Contracting Officer's), buildings, storage areas, housing facilities (Contractor's employees).

b. Providing sanitary facilities

c. Furnishing and setting up utility services including, but not limited to electrical generators

d. Furnishing and installing security fencing

e. Setting up on-site materials processing plants

f. Providing a potable water supply

g. Providing other facilities necessary for the work on the project and project support operations to proceed in an orderly and timely manner

The work required to provide the above facilities and services for mobilization shall be done in a safe manner and shall conform with pertinent Afghan laws, regulations and codes, and local and Provincial

regulations and codes.

Limited existing facilities may be located near the project site. If the Contractor plans to use these facilities as part of the facilities to be provided, coordinate their use with the owner. Obtain a written agreement from the owner.

The Contractor shall prepare a written narrative of the mobilization process with details of preparatory and operations work to be performed and facilities to be provided.

1.3 DEMOBILIZATION

Demobilization consists of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals from the project site , Afghanistan the following:

a. If the Contractor abandons new permanent facilities that were constructed for the project, the Contractor shall transfer ownership rights of the abandoned new permanent facilities to the land owner upon which the facilities are located.

b. Removal of temporary facilities, including trailers, owned, rented or leased by the Contractor

c. Removal of sanitary facilities

d. Removal of temporary utility services including, but not limited to, electrical generators

e. Removal and disposal of security fencing

f. Removal of on-site materials processing plants

g. Removal of temporary potable water supply

h. Removal of other facilities necessary for the work on the project and project support operations to proceed in an orderly and timely manner, or transfer of ownership rights

The work required for removal and disposal of facilities and services for demobilization shall be done in a safe manner and shall conform with pertinent Afghan laws, regulations and codes, and local and county regulations and codes, unless rights of ownership transferred.

The Contractor shall prepare a written narrative of the demobilization process with details of preparatory and operations work to be performed and facilities to be removed, and disposed where required.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

PART 1 GENERAL

1.1 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT REQUIREMENTS

The Contractor shall be responsible for removal and proper disposal of all waste including, but not limited to, construction debris, demolition debris, excess fill, trash, human waste, garbage, and other miscellaneous debris.

Management and removal of waste will be incidental to the Work. No additional payment will be made for the work required by this Section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUBMITTALS

USAID approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

As-Built Record of Equipment and Materials
Warranty Tags
Final Cleaning
Spare Parts Data

SD-08 Manufacturer's Instructions

Preventative Maintenance
Condition Monitoring (Predictive Testing)
Inspection

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

SD-11 Closeout Submittals

Record Drawings

1.2 PROJECT RECORD DOCUMENTS

1.2.1 Record Drawings

Drawings showing final as-built conditions of the project. This paragraph covers record drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working record drawings" and "final record drawings" refer to contract drawings which are revised to be used for final record drawings showing as-built conditions. The record drawings shall be CADD prepared drawings or manually prepared drawings.

a. CADD record drawings must consist of one set of electronic CADD drawing files in the specified format, one set of mylar drawings, 2 sets of black-line prints of the mylars, and one set of the approved working Record drawings.

b. Manually prepared drawings must consist of 1 set of completed final as-built original transparency drawings, 2 sets of black-line prints of the transparencies, and the approved marked working as-built prints.

1.2.1.1 Working Record and Final Record Drawings

Revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Prepare final record (as-built) drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final record (as-built) drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final record drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the record drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. Show on the working and final record drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. The location and dimensions of any changes within the building structure.

c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or modifications which result from the final inspection.

g. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.

h. Modifications (include within change order price the cost to change working and final record drawings to reflect modifications) and compliance with the following procedures.

(1) Follow directions in the modification for posting descriptive changes.

(2) Place a Modification Circle at the location of each deletion.

(3) For new details or sections which are added to a drawing, place a Modification Circle by the detail or section title.

(4) For minor changes, place a Modification Circle by the area changed on the drawing (each location).

(5) For major changes to a drawing, place a Modification Circle by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, place a Modification Circle either by the schedule heading or by the change in the schedule.

(7) The Modification Circle size shall be 13 mm diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.2.1.2 Drawing Preparation

Modify the record drawings as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints must be neat, legible and accurate. These drawings are part of the permanent records of this project and must be returned to the Contracting Officer after approval by USAID. Any drawings damaged or lost by the Contractor must be satisfactorily replaced by the Contractor at no expense to USAID.

1.2.1.3 Payment

No separate payment will be made for record drawings required under this contract, and all costs accrued in connection with such drawings are considered a subsidiary obligation of the Contractor.

1.2.2 As-Built Record of Equipment and Materials

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with USAID comments. Submit two sets of final record of equipment and materials 10 days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA

Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

1.2.3 Final Approved Shop Drawings

Furnish final approved project shop drawings 30 days after transfer of the

completed facility.

1.2.4 Real Property Equipment

Furnish a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Furnish a draft list at time of transfer. Furnish the final list 30 days after transfer of the completed facility.

1.3 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

a. Indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

b. Supply the number and type of each part for spare parts inventory as specified in the individual specification sections. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.4 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance, Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

a. Define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a signoff blank for the Contractor and Contracting Officer for each test feature; e.g., liter per second, rpm, kilopascal. Include a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventative maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize corrective maintenance and repair.

b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.5 WARRANTY MANAGEMENT

1.5.1 Performance Bond

The Contractor's Performance Bond must remain effective throughout the construction period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by USAID while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by USAID at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.5.2 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframes specified, USAID will perform the work and backcharge the construction warranty payment item established.

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Air Conditioning Systems
(2) Air conditioning leak in part of building, if causing damage.
(3) Air conditioning system not cooling properly.

Code 1-Doors
(2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors
(2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical
(1) Power failure (entire area or any building operational after 1600 hours).

Code 2-Electrical
(1) Power failure (no power to a room or part of building).
(2) Receptacle and lights (in a room or part of building).

Code 1-Plumbing
(1) Hot water heater failure.
(2) Leaking water supply pipes.

Code 2-Plumbing
(1) Flush valves not operating properly.
(2) Fixture drain, supply line to commode, or any water pipe leaking.
(3) Commode leaking at base.

Code 3 -Plumbing
Leaky faucets.

Code 3-Interior
(1) Floors damaged.
(2) Paint chipping or peeling.
(3) Casework.

Code 1-Roof Leaks
Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks
Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 2-Water (Exterior)
No water to facility.

Code 2-Water (Hot)
No hot water in portion of building listed.

Code 3-All other work not listed above.

1.5.3 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

a. Type of product/material_____.

b. Model number_____.

c. Serial number_____.

d. Contract number_____.

e. Warranty period_____from_____to_____.

f. Inspector's signature_____.

g. Construction Contractor_____.

Address_____.

Telephone number_____.

h. Warranty contact_____.

Address_____.

Telephone number_____.

i. Warranty response time priority code_____.

j. WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.

1.6 OPERATION AND MAINTENANCE MANUALS

Submit 6 copies of the project operation and maintenance manuals 30 calendar days prior to testing the system involved. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

1.6.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Bind information in manual format and grouped by technical sections. Test data must be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals must have 10 millimeter holes and be bound in 3-ring, loose-leaf binders. Organize data by separate index and tabbed sheets, in a loose-leaf binder. Binder must lie flat with printed sheets that are easy to read. Caution and warning indications must be clearly labeled.

1.7 CLEANUP

Provide final cleaning and submit two copies of the listing of completed final clean-up items. Leave premises "broom clean." Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Replace filters of operating equipment. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Promptly and legally transport and dispose of any trash. Do not burn, bury, or otherwise dispose of trash on the project site.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 1971	(2005) Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.2.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.2.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.

1.2.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2.4 Review and Approval

The Contractor shall review the commissioned systems and equipment

submittals for completeness and applicability. USAID will verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The Contractor shall communicate deficiencies to the Contracting Officer. Upon a successful review of the corrections, the Contractor shall recommend approval and acceptance of these O&M manuals to the Contracting Officer. This work shall be in addition to the normal review procedures for O&M data.

1.2.5 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.3.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.3.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.3.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.3.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.3.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.3.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.3.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system.

1.3.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.3.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.3.2.3 Cleaning Recommendations

Provide cleaning recommendations in accordance with ASTM E 1971.

1.3.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system.

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.3.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.3.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.3.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.3.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.3.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.3.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.3.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.3.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.3.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.3.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.3.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.3.5.6 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.3.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.3.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 02 21 00

TOPOGRAPHIC SURVEY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-1002	(1990) Engineering and Design - Survey Markers and Monumentation
EM 1110-1-1003	(2003) Engineering and Design - NAVSTAR Global Positioning System Surveying
EM 1110-1-1005	(2007) Engineering and Design - Control and Topographic Surveying

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Final Survey and Mapping; G

Field Books

Coordination and Elevation Booklet

Final Adjusted Survey; G

1.3 Project Description

The services described hereinafter pertain to surveying and mapping services for the Three Towers Project in Afghanistan.

1.3.1 Final Survey and Mapping

One (1) set of minimum 600 by 900mm size hard copy. All drawings shall be computer generated and provided on a CD ROM. Each sheet shall include a north arrow, legend, survey data, datum data and sheet index plan showing its relationship with the entire project area. In addition, one drawing, at a conventional scale shall show the entire survey area. The computer files shall be georeferenced.

1.3.2 Final Adjusted Survey

Diskettes or CD ROM containing digital file(s) of the final adjusted

survey, in the format specified in Attachment 2. One of the files shall contain the entire survey area, the other files shall contain the individual sectors used to create the hard copy sheets.

1.3.3 Field Books

All field books and computation sheets with sketches.

1.3.4 Coordination and Elevation Booklet

One bound booklet with adjusted coordinates and elevations. Also detailed descriptions of each concrete survey monument established on site.

PART 2 PRODUCTS

2.1 Concrete Monuments

Concrete monuments shall be manufactured and in conformance with the requirements of USACE document EM 1110-1-1002.

PART 3 EXECUTION

3.1 General

The following paragraphs describe the Scope of Work for performing the surveys and the digitization of the topographic data.

Prior to commencing any survey activities the Contractor shall meet with the Contracting Officer to establish the limits of survey required. The survey shall not be limited to the site perimeter. The survey limits shall extend beyond the site perimeter to a field determined location sufficient to ensure adequate and pertinent information is obtained to address the Contractor designed grading and drainage requirements established in Section 31 00 00 EARTHWORK. Refer to paragraph Survey Sites for additional information.

3.2 Survey Requirements

3.2.1 Horizontal and Vertical Control

3.2.1.1 Coordinate Systems

The survey shall be based on the Universal Transverse Mercator Grid Zone 38, World Geodetic System (WGS84) and the elevation should be height above ellipsoid (WGS84) and sea level (EGM96). If there has been gravitational surveys performed nearby, these shall be noted. A survey database file for all features should show both ellipsoid height and Geoid height and WGS84 latitude/longitude as well as UTM coordinates. WGS84 data shall be corrected to WGS84 (G1150) datum reference. GPS benchmarks shall be documented at ITRF2000 coordinates referenced to epoch 1997. Basic project control surveys will be performed using precise differential carrier-phase tracking Navstar GPS measurement procedures or electronic data collection total stations.

3.2.1.2 Accuracy Requirements

Differential GPS baseline vector observations will be made in strict accordance with the criteria contained in EM 1110-1-1003, except as modified or amplified herein. Conventional survey observations shall be

made in accordance with criteria contained in EM 1110-1-1005 for General Site Development, except as modified or amplified herein.

3.2.1.3 Control Systems

Install a minimum of three survey monuments on each survey site following the requirements contained in EM 1110-1-1002. A minimum of two benchmarks must be visible by line of site at each station. Monuments placed on project site shall be designed to survive proposed construction operations by use of proper location and construction techniques. The horizontal and vertical control shall be tied to the existing site control.

a. All of the control points established at the site shall be plotted at the correct coordinate point and shall be identified by name or number, and adjusted elevations.

b. All Topographic survey point sets produced with conventional survey instruments shall be referenced directly to horizontal and vertical control points by level loop and closed traverse.

3.2.1.4 Survey Sites

The location of the survey sites shall be shown to the contractor by the Contracting Officer's representative (COR). The limits of the survey and proposed location of the survey monuments shall then be identified by temporary markers and a sketch, with coordinates, of the area to be surveyed shall be submitted for approval by the COR before proceeding with the survey.

3.3 Topography Requirements

A sufficient quantity of horizontal and vertical control data shall be established to provide a detailed topographic survey with twenty five (25) centimeter contour intervals. Intermediate elevations shall be provided as necessary to show breaks in grade and changes in terrain.

3.3.1 Contours

The contours shall accurately express the relief detail and topographic shapes. In addition, 90 percent of the elevations or profiles interpolated from the contours shall be correct to within one-half of the specified contour interval and spot elevations shall be correct within plus or minus 3 centimeters.

3.3.2 Projection Grid

The projection grid (which shall be a metric rectangular coordinate system with a grid spacing of 50 meter intervals) and the control points shall be plotted correctly to the nearest 0.3 millimeter. The horizontal position of 90 percent of definitely recognizable points shall be plotted correctly with reference to the nearest control point within 0.6 millimeter.

3.3.3 Elevations

Where applicable, spot elevations and or finish floor elevations of structures or facilities shall be provided. Specifically, show all break points or control points in grades of terrain such as tops of hills, top and bottom of curbs, bottoms of ditches and gullies, high bank elevations, etc. Ground elevations shall be read to the closest 3 centimeters. Road

elevations shall be read to the closest 3 millimeters.

3.3.4 Features

All surface and known sub-surface features, buildings, structures, etc. within the area to be surveyed shall be shown, spot elevations provided and identified on the topographic maps. In addition, these features shall be located by sufficient distance ties and labeled on the topographic sheets to permit accurate scaling and identification.

3.3.5 Survey Boundaries

Manholes and sanitary lines within the survey boundaries shall be located and invert elevations obtained. Water, sanitary, fuel, electrical and mechanical utilities within the survey site shall be located and shown on the survey map. Invert elevations shall be surveyed on the bottom lip of each pipe in the manhole. The depth of the manhole shall be surveyed. Water, sanitary, fuel, electrical and mechanical utilities within the survey site shall be located and shown on the survey map and provided digitally in the database.

3.4 Digital Format/Survey Mapping

3.4.1 General Design File Requirements

The topographic data for the entire project, shall be compliant according to the A/E/C CADD Standard Manual Version 3.0, which is available at https://cadbim.usace.army.mil/. The data shall be placed into a single Microstation In-Roads V8 or AutoCAD Map 3D Version 2004 file. If the design file exceeds 10 MB, a separate design file consisting of topographic data only shall be prepared and shall be referenced to the primary file.

3.4.2 3D Design Files

Only the topographic feature data (spot elevations and contours) are required to be placed into 3D design file(s) at their proper elevation. Surface and subsurface features shall be placed in the 3-D file(s) at elevation zero (0).

3.4.3 Digital Terrain Model

A Digital Terrain Model shall be furnished compatible with Microstation In-Roads V8. A sufficient number of field acquired data points and breaklines are required to generate the contours of the mapping area. Breaklines are to be used to represent abrupt grade breaks such as road centerline, top and bottom of curb, top and bottom of ditch, etc.

3.4.4 Design File Units

Master Units: Meters (M)
Subunits: 1000 MM
Positional Units: 10

3.4.5 Angle Format

The angle format shall be degrees, minutes, and seconds to one decimal place.

3.4.6 Locks

All locks, except snap, will be off. All displays will be on except text nodes and curve fast display.

3.4.7 Topographic Data

All topographic data shall be shown in "Model" space, Any individual sheets shall be shown in "Paper" space.

3.4.8 Grid Lines

Grid lines shall be placed in the design file at 100 m intervals. Coordinates shall be placed on the grid lines for the datum specified.

3.4.9 Format

The level names, line styles, line weights, and line colors shown in Table 2 shall be used. Text shall be in capital letters and appear to be 3 mm when plotted. Include any standards sheets (abbreviations, symbols libraries, font libraries, color tables, pen tables, plot configuration files, user command files, etc.) necessary for a complete project.

3.4.10 3-D File

Each 3-D file shall be checked by viewing a front or side view to detect errors in element elevation.

3.4.11 Drawing Creation

Contractor will not scale drawings to conform to meters. All drawings must be CREATED using meters.

Table 1
Survey/Mapping Level Assignments
and Level Symbology

Layer Name	Description	Line Styles	Line Weight	Line Color
V-ANNO-DIMS	WITNESS/EXTENSION LINES, DIMENSION TERMINATORS, DIMENSION TEXT	Continuous	0	1
V-ANNO-KEYN	REFERENCE KEYNOTES WITH ASSOCIATED LEADERS	Continuous	0	2
V-ANNO-NPLT	NON-PLOTTING GRAPHIC INFO	Continuous	0	5
V-ANNO-PATT	MISCELLANEOUS PATTERNING AND HATCHING	Continuous	0	8
V-ANNO-NOTE	GENERAL NOTES AND GENERAL REMARKS	Continuous	0	2
V-ANNO-SYMB	MISCELLANEOUS SYMBOLS	Continuous	0	6
V-ANNO-TEXT	MISCELLANEOUS TEXT AND CALLOUTS WITH ASSOCIATED LEADERS	Continuous	0	2
V-ANNO-REFR	REFERENCE FILES	NA	NA	NA
SURVEY LINES				
V-SURV-DATA	SURVEY DATA (BENCHMARKS AND HORIZONTAL CONTROL POINTS OR MONUMENTS)	Continuous	0	6
V-SURV-LINE	SURVEY, BASELINE, AND CONTROL LINE	Long Dash	0	4
V-SURV-IDEN	SURVEY, BASELINE, AND CONTROL LINE ANNOTATOR	Continuous	0	6
BUILDINGS AND STRUCTURES				
V-BLDG-OTLN	BUILDINGS AND OTHER STRUCTURES	Continuous	0	7
V-BLDG-IDEN	BUILDINGS AND OTHER STRUCTURES ANNOTATOR	Continuous	0	2
SITE				
V-SITE-FENC	FENCES AND HANDRAILS	Continuous	0	6
V-SITE-FENCE-IDE	FENCE, HANDRAIL, RAMP, AND TRAIL ANNOTATION	Continuous	0	6
V-SITE-STRC	STRUCTURES (BRIDGES, SHEDS, FOUNDATION PADS, FOOTINGS, ETC)	Continuous	0	22
V-SITE-IDEN	EXISTING SITE FEATURE/STRUCTURE ANNOTATION	Continuous	0	6
V-SITE-OTLN	EXISTING SITE FEATURES (PLAY STRUCTURES, BIKE RACKS, BENCHES, RECREATIONAL EQUIPMENT)	Continuous	0	4

Table 1
Survey/Mapping Level Assignments
and Level Symbology

Layer Name	Description	Line Styles	Line Weight	Line Color
V-ANNO-DIMS	WITNESS/EXTENSION LINES, DIMENSION TERMINATORS, DIMENSION TEXT	Continuous	0	1
V-SITE-EROS	RIPRAP, REVETMENTS/STONE PROTECTION, BREAKWATERS, DIKES, JETTIES, AND DRAINS	Continuous	0	1
V-SITE-EWAT	WATER FEATURES	Continuous	0	162
V-SITE-STRS	STAIRS AND RAMPS	Continuous	0	6
V-SITE-WALK	WALKS, TRAILS, AND BICYCLE PATHS	Continuous	0	2
V-SITE-VEGE	EXISTING TREELINES AND VEGETATION	Continuous	0	82
UTILITIES				
V-UTIL-SSWR	SANITARY LINES AND MANHOLES	Continuous	0	4
V-UTIL-SSWR-IDEN	SANITARY ANNOTATION	Continuous	0	2
V-UTIL-SSWR-WATR	WATER LINES, HYDRANTS, TANKS	Continuous	0	4
V-UTIL-SSWR-WATR	WATER ANNOTATION	Continuous	0	2
V-UTIL-UTIL-NGAS	GAS LINES, FEATURES, AND VALVES	Continuous	0	4
V-UTIL-NGAS-IDEN	GAS ANNOTATION	Continuous	0	2
V-UTIL-STEM	STEAM LINES AND ANNOTATION	Continuous	0	2
V-UTIL-STRM	STORM SEWER LINES, CULVERTS, MANHOLES, AND HEADWALLS	Continuous	0	4
V-UTIL-STRM-IDEN	STORM SEWER ANNOTATION	Continuous	0	2
V-UTIL-ELEC	POWER LINES, LIGHTS, TELEPHONE POLES, COMMUNICATION LINES	Continuous	0	4
V-UTIL-ELEC-IDEN	POWER/COMMUNICATION ANNOTATION	Continuous	0	2
PAVEMENTS/TRANSPORTATION				
V-PVMT-ROAD	ROADS, PARKING LOTS, RAILROADS, AIRFIELD PAVEMENTS	Continuous	0	2
V-PVMT-IDEN	ROAD, PARKING LOT, RAILROAD, AIRFIELD PAVEMENT ANNOTATION	Continuous	0	2
V-PVMT-PATT	JOINT PATTERNS, TEXT, AND DIMENSIONS	Continuous	0	2
V-PVMT-MRKG	PAVEMENT MARKINGS AND SIGNS	Continuous	0	2
TOPOGRAPHY				
V-TOPO-DTCH	DITCHES AND SWALES	Continuous	0	3

Table 1
Survey/Mapping Level Assignments
and Level Symbology

Layer Name	Description	Line Styles	Line Weight	Line Color
V-ANNO-DIMS	WITNESS/EXTENSION LINES, DIMENSION TERMINATORS, DIMENSION TEXT	Continuous	0	1
V-TOPO-BORE	BORING LOCATIONS	Continuous	0	6
V-TOPO-COOR	COORDINATE GRID TICKS AND TEXT	Continuous	0	122
V-TOPO-MAJR-IDEN	MAJOR CONTOURS ANNOTATION	Continuous	0	2
V-TOPO-MAJR	MAJOR CONTOURS	Continuous	0	2
V-TOPO-MINR-IDEN	MINOR CONTOURS ANNOTATION	Continuous	0	3
V-TOPO-MINR	MINOR CONTOURS	Continuous	0	3
V-TOPO-SPOT	SPOT ELEVATIONS	Continuous	0	2
V-TOPO-SLOP-TOPT	TOP/TOE SLOPES	Continuous	0	6
V-TOPO-BKLN	BREAKLINES	Centerline	0	7
V-TOPO-DTMT	DTM TRIANGLES	Continuous	0	22
V-TOPO-DTMP	DTM POINTS	Continuous	0	6

-- End of Section --

SECTION 02 33 00

SCOPE OF WORK FOR GEOTECHNICAL INVESTIGATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise directed, use ASTM standards for the explorations/sampling and field and laboratory tests. Use foreign standards in cases where there are no ASTM standards assigned to a particular test. The following standards are provided for guidance and are not intended to be the only applicable standards. Note:

ASTM D 420 may be used as a guide for the selection of the various ASTM standards that are available for the investigation of soil, rock, and ground water.

ASTM INTERNATIONAL (ASTM)

ASTM C 1580	(2009) Standard Test Method for Water-Soluble Sulfate in Soil
ASTM D 1452	(1980; R 2000) Soil Investigation and Sampling by Auger Borings
ASTM D 1586	(2008a) Penetration Test and Split-Barrel Sampling of Soils
ASTM D 1587	(2008) Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
ASTM D 1883	(2007e2) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D 2113	(2008) Rock Core Drilling and Sampling of Rock for Site Investigation
ASTM D 2216	(2005) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 2487	(2006e1) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2488	(2009a) Description and Identification of Soils (Visual-Manual Procedure)
ASTM D 2974	(2007a) Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4220	(1995; R 2007) Preserving and Transporting Soil Samples

ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 5434	(2009) Field Logging of Subsurface Explorations of Soil and Rock
ASTM D 6032	(2008) Determining Rock Core Designate (RQD) of Rock Core
ASTM G 57	(2006) Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method

British Standards Institute (BSI)

BS 1377, Part 3	(1990) Methods of Test for Soils for Civil Engineering Purposes. Chemical and Electro-chemical Tests

1.2 WORK SUMMARY

Geotechnical services are required for the Three Towers Project (TTP) to be located in Afghanistan. This project consists of construction of various facilities that will make up the TTP. This scope of work (SOW) defines work required of the Contractor to complete the geotechnical investigation and obtain approval by the Contracting Officer prior to the start of construction. Work will consist of the following:

a. Perform Survey of geotechnical explorations and testing locations.
b. Perform and log field explorations and sampling.
c. Perform and report field resistivity testing.
d. Collect representative soil samples for laboratory testing.
e. Perform and report laboratory testing.
f. Provide foundation and pavement recommendations for facilities.
g. Write a detailed Geotechnical Report for the TTP. The Geotechnical Report should include but not limited to the information described in Section "Geotechnical Report".

1.3 TERMINOLOGY

For purposes of this SOW, the term "Contracting Officer" means the USAID Contracting Officer. The term "Geotechnical Engineer" means the employee or agent of the Contractor responsible for geotechnical services.

1.4 GEOTECHNICAL INVESTIGATION PLAN

The Contractor is responsible for the project's geotechnical investigation. The Contractor shall determine all necessary geotechnical conditions/parameters by appropriate field and laboratory tests and supporting calculations. The Contractor shall perform the Geotechnical Investigation in accordance with the information contained on the Drawings and as stated herein.

1.5 PROFESSIONAL QUALIFICATIONS

All geotechnical engineering design parameters shall be developed by a Geotechnical Engineer or geotechnical firm responsible to the Contractor. The Geotechnical Engineer or geotechnical firm shall be qualified by

meeting all of the following: education in geotechnical engineering (either by specific training leading to an engineering degree or through a combination of courses in geology and engineering leading to an equivalent degree); professional registration; and a minimum of ten (10) years of experience in geotechnical engineering design having worked on projects of similar size, scope and cost. Foreign education and registration will be accepted if they provide equivalent level of knowledge and competency as that required by US standards.

1.6 SYSTEM DESCRIPTION

The Contractor shall provide the data to determine the type, nature, and characteristics of subsurface materials and the extent and conditions of the various materials as they exist to the depths and at the locations specified. This is to be accomplished by means of exploratory borings and test pits.

1.6.1 Survey Requirements

All boring, test pit and field testing locations shall be surveyed. Vertical and horizontal control shall be correct to the nearest 10 centimeters. Horizontal and vertical control shall comply with the Topographic Survey requirements specified in Section 02 21 00 TOPOGRAPHIC SURVEY.

1.6.2 Field Explorations

The following test methods are provided as minimums. The Contractor should consider additional test methods as may be necessary to obtain sufficient information to characterize the site.

1.6.2.1 Exploration Log Preparation

Prepare logs of all borings and test pits in accordance with ASTM D 653, and ASTM D 5434. All soils shall be field classified in accordance with ASTM D 2488. Finalized logs ready for publication shall be prepared from the field logs and adjusted to reflect the results of the laboratory testing.

1.6.2.2 Borings

Drilling operations shall consist of drilling, sampling, and logging the soil and rock strata. Borings shall be in accordance with ASTM D 1452, ASTM D 1586, ASTM D 6032, ASTM D 1587, ASTM D 2113, and ASTM D 2488. Standard Penetration Test (SPT) shall be taken in each boring at one-meter intervals beginning at ground surface and continued when in soil to the bottom of boring or refusal. The depths of these explorations shall be in accordance with paragraph Sequencing and Scheduling. Keep in mind that final grade and existing grade may not be the same. The Contractor is responsible for developing the site grading requirements. The proposed bearing depth below final grade will dictate the zone of influence for each foundation system. Locations may be moved to avoid obstructions or to ensure safety. All soil samples shall be collected in sufficient size, quantity and quality to perform the required laboratory tests identified herein. Backfill all borings before demobilizing.

1.6.2.3 Test Pits

Excavate test pits for the purpose of sampling, logging and obtaining

materials for laboratory testing. Test pits shall be in accordance with ASTM D 2488 and ASTM D 5434. All soil samples shall be collected in sufficient size, quantity and quality to perform the required laboratory test.

1.6.2.4 Test Pit Excavation and Sampling

Excavate test pits in soil, hardpan, decomposed rock, or other unconsolidated or partially consolidated overburden materials with an open cross-sectional area large enough to permit efficient excavation and shoring/lining, engineering and geological inspection and photographing of the subsurface soils and manual undisturbed sampling from within the test pit. All test pits shall be excavated, dewatered (if necessary), shored/lined and protected from surface water drainage in accordance with all applicable local, USAID, and OSHA safety regulations.

1.7 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Driller's Logs; G

The Contractor shall submit complete, legible copies of DRILLING LOG, ENG FORM 1836 and 1836A and records to the Contracting Officer upon completion of the work or at such other time or times as he may be directed. Copies of logs and forms are available from the Contracting Officer.

SD-03 Product Data

Permits, Certifications, and Licenses

Copies of all permits, certifications, and licenses prior to starting work.

Schedule of Drilling, Sampling, Test Pits and Testing; G

Prior to starting work, the Contractor shall submit a plan for drilling, sampling, testing, and safety. The plan shall include, but shall not be limited to, the proposed method of drilling and sampling including a description of the equipment and sampling tools that will be used, a listing of any subcontractors to include a description of how the subcontractors will be used and a description of all methods and procedures that will be utilized to insure a safe operation and to protect the environment. No work shall be performed until this plan has been approved and no deviation from the approved plan will be permitted without prior approval by the Contracting Officer.

1.8 CARE AND DELIVERY OF SAMPLES

1.8.1 General

The Contractor shall be solely responsible for preserving all samples in good condition. Samples shall be kept from freezing and from undue exposure to the weather, and shall keep all descriptive labels and designations on sample bags clean and legible. All samples shall be collected in sufficient size, quantity and quality to perform the laboratory tests.

1.8.1.1 Sampling of Soil

Collect, label, store and transport soil sample in accordance with ASTM D 1452, ASTM D 1586, ASTM D 1587, and ASTM D 4220. As a minimum, provide project title/location, exploration number, date of sample, driller's name and any other pertinent information deemed necessary to identify and track the sample chain of custody and disturbance history.

1.9 PROJECT/SITE CONDITIONS

1.9.1 Field Measurements

The locations of exploratory borings and test pits will be established in the field by the Contractor and reviewed by the Contracting Officer prior to the start of work. The elevations of the established locations will be provided by the Contractor and in accordance with the Contractor's grading design drawings. The elevations will be reviewed by the Contracting Officer prior to the commencement of any work activity. The Contractor will provide access to the locations as necessary for the prosecution of the work.

1.10 SEQUENCING AND SCHEDULING

1.10.1 Schedule of Drilling, Sampling, Test Pits and Testing

The Contractor shall submit to the Contracting Officer a schedule of Drilling, Sampling, Test Pits and Testing in accordance with the following table for approval prior to the commencement of Work.

The schedule shall have, as a minimum for structures, three (3) borings within the building footprint of any major structure and three (3) test pits within the building footprint of any minor structure. The depths of these explorations shall be sufficient to determine the subsurface conditions within the influence of the structure foundation system. For purposes of this paragraph, a major structure is any structure that meets any of the following criterion: a) reinforced concrete framed structures with a building footprint in excess of 1,000 sq. m., b)steel framed structures with a building footprint in excess of 3,000 sq. m., c)a structure that has a height equal to or greater than one and half stores, d) steel or concrete tanks in excess of 350 cubic meters. A minor structure is any structure that does not meet any of the four major structure criteria above. As a minimum for pavements, the Contractor shall perform borings in accordance with UFC 3-260-02.

BUILDING/ STRUCTURE	BORINGS	DEPTH (m)	TOTAL (m)	TEST PITS	FIELD RESISTIVITY
LABORATORY INVESTIGATION					
TESTS					
Gradation-ASTM D422					
Atterberg Limits-ASTM D4318					
Moisture Content-ASTM D2216					
Maximum Dry Density-ASTM D1557 or D 648					
Sulfate Content-BS1337, Part 3 CL 5, 7, and 9					
Gypsum Content-BS 1337					
Organic Content-BS 1337, Part 3, CL 3					
Totals					

1.11 Permits, Certifications, and Licenses

All permits, certifications and licenses required to complete this work shall be procured prior to commencement of construction.

PART 2 PRODUCTS

2.1 CONTAINERS

The Contractor shall furnish sample bags that meet the following requirements. All such containers will become the property of the Government and the cost thereof shall be included in the contract price for the work performed.

2.1.1 Sample Bags

Sample bags shall be 1.0 L capacity, heavy gage, zip-lock resealable plastic bags.

2.1.2 Bulk Sample Bags

Bulk sample bags shall be heavy gauge plastic or fabric capable of holding 25 kg of material

2.1.3 Shipping Boxes

Boxes for shipping samples shall be plastic or wooden boxes as approved by the Contracting Officer that have strength to contain and protect the bags and their contents under ordinary handling and environmental conditions.

2.2 LABELS

2.2.1 Sample Bags

The following information shall be hand written in indelible ink on each bag:

DATE _____
PROJECT _____ LOCATION _____
(Such as Table Rock Dam) (Such as Borrow Area B)

HOLE NO. _____ STATION _____

SAMPLE NO. _____

SPT 'N' COUNT _____ DEPTH OF SAMPLE _____

DESCRIPTION OF MATERIAL _____
(Such as Moist, silty, medium sand)

2.2.2 Shipping Box Labels

Each box of samples shall be identified with weatherproof and wear-proof labels indicating the following:

PROJECT: _____

LOCATION: _____

SAMPLES FROM HOLE OR HOLES: _____

2.3 Geotechnical Report

The Contractor shall submit a draft and final geotechnical report. The Contractor shall produce a detailed geotechnical report containing the field exploration and testing results, laboratory testing results, survey information, evaluations, recommendations, calculations and descriptive supporting text. Information in the report shall include, but not be limited to: existing geotechnical (e.g., surface and subsurface) conditions, location of subsurface explorations, field tests and samples, exploration logs, laboratory data, site development recommendations, foundations recommendations: type of foundation system, for shallow foundation to include minimum depth, bearing capacity, settlement analysis, liquefaction potential, chemical analyses and discussion of corrosion potential, cut and cover guidance, ground water levels, pavement design criteria (CBR and k values), compaction requirements, drainage and/or excavation problems and/or requirements, lateral earth pressure coefficients (K0, Ka, Kp) and construction material recommendations (e.g., concrete, cement, asphalt and aggregates).

The Contractor shall submit 2 hard copies and 1 soft copy (PDF format) of the draft Geotechnical Report to the Contracting Officer no later than 30 days after completion of field work. The Contracting Officer will provide comments on the draft report within 7 days after receiving draft report. The Contractor shall address the Contracting Officer's comments and submit 10 hard copies and 2 soft copies (PDF Format) of the final report and annotated comments within 10 days after receipt of Contracting Officer's comments on the draft report. The final report shall be stamped by a professional engineer, professional geologist, or equivalent, indicating the report has been developed consistent with the site-specific geotechnical conditions.

PART 3 EXECUTION

3.1 General Scope and Description

The work will consist of advancing Standard Penetration Test (SPT) borings, excavating test pits, performing field resistivity tests and supporting laboratory analyses of collected samples as specified herein. Representative of the materials encountered will be obtained. Drilling operations and test pit excavation will be accomplished by a local drilling company and observed by A Geotechncial Engineer or Engineering Geologist.

3.2 MOBILIZATION AND DEMOBILIZATION

3.2.1 Mobilization

Mobilization shall consist of the delivery to the site of all plant, equipment, materials and supplies to be furnished by the Contractor, the complete assembly in satisfactory working order of all such plant and equipment at the jobsite and the satisfactory storage at the site of all such materials and supplies.

3.2.2 Demobilization

Demobilization shall consist of the removal from the site of all plant, equipment, materials and supplies after completion of the work and also includes, at the direction of the Contracting Officer, the cleanup and removal of all scrap, waste backfill material, waste drilling fluid, soil contaminated with engine/hydraulic oil, backfilling all sumps or

excavations resulting from the operations and, in general, returning the site as close to its original condition as possible.

3.3 EXPLORATORY BORING AND SAMPLING

3.3.1 Equipment

The equipment to be furnished by the Contractor for making borings shall be capable of advancing a hole, not less than 100 mm in diameter unless otherwise approved. The Contractor shall be completely equipped with all the accessories necessary for boring and sampling of overburden materials using split barrel, ring lined barrel and thin-walled tube samplers to the depths and diameters specified or shown on the drawings.

3.3.2 Sampling

Samples shall be labeled in accordance with paragraph IDENTIFYING SAMPLES. Samples shall be obtained for each change of overburden material and at maximum vertical intervals of 1.5 m. In order to retain the natural moisture content of the material to the fullest extent possible, all samples shall be placed in the sample bags as soon as possible after they are taken from the hole. All sample bags shall be labeled. In general, no sample shall remain on the site of boring for more than 1 week after being taken from the boring and placed in a bag. Samples will be shipped to a local laboratory or to a Middle East regional laboratory if special testing is required.

3.3.3 Boring Procedures

a. The locations of the borings will be surveyed prior to commencement of the geotechnical investigation.

b. Boreholes will be advanced at locations shown on the Drawings.

c. The boreholes will be advanced using a machine powered drill to a maximum of 6 meters.

d. Material encountered within the borings will be sampled at 1.5 meter intervals using a Standard Penetration Test (SPT) sampler in accordance with ASTM D 1586.

e. The material sampled will be retained for laboratory tests to characterize the physical and engineering properties of the soil.

f. Groundwater levels within the borings will be measured as required.

g. When the borings are completed and the required samples taken and approved by the Geotechnical Engineer, it will be backfilled and compacted in accordance with the paragraph BACKFILLING so as not to cause a hazardous condition. Borings will not be left open overnight without prior approval.

3.4 IDENTIFYING SAMPLES

Sample bags, shipping boxes, and labels shall comply with paragraph CONTAINERS and paragraph LABELS. The Contractor shall take all precautions required to insure that the shipping boxes are not subjected to rough handling or damaging environmental conditions, and complies with paragraph CARE AND DELIVERY OF SAMPLES.

3.5 TEST PIT EXCAVATION AND SAMPLING

3.5.1 Excavation

The test pits shall be excavated as identified in paragraph Schedule of Drilling, Sampling, Test Pits and Testing. Before excavating pits, the Contractor shall thoroughly familiarize himself with work site and with all available subsurface data, particularly groundwater conditions. Regardless of the method of excavation employed, the pits shall be excavated, dewatered (if required) and shored/lined in conformance with all applicable safety regulations.

Selection of the test pit excavation, shoring/lining and dewatering (if necessary) methods and equipment shall be at the Contractor's discretion but must be approved by the Contracting Officer. Accessories to be supplied by the Contractor shall include, but not be limited to, heavy gage 1 liter capacity zip-lock, resealable plastic bags for collecting samples and bulk sample bags. The Contractor shall also provide all materials required for shoring/lining to comply with all applicable safety regulations. The Contractor may salvage and re-use this shoring/lining material in successive test pits upon inspection and approval by the Contracting Officer.

3.5.2 Test Pit Procedures

a. The locations of the test pits will be surveyed prior to commencement of the geotechnical investigation.

b. Test pits will be excavated by hand or power machine at locations shown on the location plan to a depth of 2.0 meters.

c. Dimensions of the test pits will be such that a 25 kg sample of all representative materials encountered can be obtained at depths specified by the Engineering Geologist.

d. The material sampled will be retained for laboratory tests to characterize the physical and engineering properties of the soil.

e. When the test pit is completed and the required samples taken and approved by the Geotechnical Engineer, it will be backfilled and compacted in accordance with the paragraph BACKFILLING so as not to cause a hazardous condition. Test pits will not be left open overnight without prior approval.

3.5.3 Sampling

Soil samples shall be obtained from each pit at depths determined by the Contracting Officer in accordance with paragraph Test Pit Procedures. The number of samples required will be as indicated in paragraph Schedule of Drilling, Sampling, Test Pits and Testing.

3.5.4 Disposition of Samples

Samples shall be packed as approved by the Contracting Officer and shipped in sturdy wooden or plastic boxes of strength and construction sufficient to guarantee against damage during shipment. All sample boxes shall be marked FRAGILE-HANDLE WITH CARE and shall be identified by labels, similar to those as specified in paragraph IDENTIFYING SAMPLES, attached to the

outside of each box. Extreme care shall be taken to indicate the top and bottom of each sample. The Contractor shall avoid exposing sealed and crated samples to precipitation and extremes of temperature. Prior to shipment, each sealed and boxed sample shall be checked for correct labeling. Samples will be shipped to a local laboratory certified by USAID or USACE or to a USAID or USACE certified Middle East regional laboratory if special testing is required.

3.6 FIELD RESISTIVITY TESTS

Conduct tests using a 4 point Wenner Array or approved equal at locations listed in paragraph SEQUENCING AND SCHEDULING.

3.7 BACKFILLING

3.7.1 Exploratory Borings

Unless otherwise noted in these specifications or directed by the Contracting Officer, all bore holes shall be backfilled and abandoned in a timely manner. The Contractor shall preserve all holes in good condition until final measurement and until the records and samples have been accepted. The hole shall be backfilled with local soil and tamped. All backfilling operations shall be performed in the presence of the Contracting Officer. No separate payment will be made for backfilling drill holes. The cost of this work shall be included in the drilling costs.

3.7.2 Test Pits

The Contractor shall backfill all test pits with local soil compacted to original densities as directed by the Contracting Officer. No separate payment will be made for backfilling test pits. The cost of this work shall be included in the test pit excavation costs.

3.8 RECORDS

The Contractor shall keep accurate Driller's Logs and records of all work accomplished under this contract and shall deliver complete, legible copies of these logs and records to the Contracting Officer upon completion of the work or at such other time or times as he may be directed. All such records shall be recorded during the actual performance of the work and shall be preserved in good condition and order by the Contractor until they are delivered and accepted. The Contracting Officer shall have the right to examine and review all such records at any time prior to their delivery to him and shall have the right to request changes to the record keeping procedure. The following information shall be included on the logs or in the records for each hole and test pit:

a. Exploratory boring/Test Pit number or designation and elevation of top of hole/test pit.

b. Driller's name and Geologist's name.

c. Make, size, and manufacturer's model designation of drilling,sampling, and test-pit excavating equipment.

d. Type of drilling, and sampling operation by depth.

e. Hole diameter.

f. Dates and time by depths when test-pit excavation, drilling, and sampling operations were performed.

g. Depths at which samples were recovered or attempts made to sample.

h. Classification or description by depths of the materials sampled, using the Unified Soil Classification System (ASTM D 2487) and including a description of moisture conditions, consistency and other appropriate descriptive information. This classification or description shall be made immediately after the samples or cores are retrieved.

i. Depth at which groundwater is encountered initially and when stabilized.

j. Depth of bottom of hole.

3.9 LABORATORY TESTING

All laboratory testing will be performed by a laboratory certified by USAID or USACE and in accordance with ASTM, BSI, or other recognized standards and procedures as approved by the Contracting Officer in cases where there are no ASTM standards assigned to a particular test. Test requirements will include the following:

a. Gradation - ASTM D 422

b. Atterberg Limits - ASTM D 4318

c. Moisture Content - ASTM D 2216

d. CBR - ASTM D 1883

e. Sulfate - ASTM C 1580

f. Gypsum Content - BS 1377, Part 3

g. Organic Content - ASTM D 2974

h. Maximum Dry Density - ASTM D 1883

i. Field Resistivity Survey - ASTM G 57

-- End of Section --

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008) Safety and Health Requirements Manual

1.2 PROJECT DESCRIPTION

1.2.1 Demolition Plan

Prepare a Demolition Plan and submit proposed demolition, and removal procedures for approval by Contracting Officer before work is started. Include in the plan procedures for coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Coordinate with Waste Management Plan of the Contract Documents. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by Contracting Officer prior to work beginning.

1.2.2 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations. The work includes demolition of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place or to be reused. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

1.3.2 Trees

Protect trees within the project site which might be damaged during demolition and which are indicated to be left in place, by a 1.8 m high fence. Erect and secure fence a minimum of 1.5 m from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.3.3 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Contracting Officer and disconnected and sealed by the Contractor.

1.3.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Ensure that no elements determined to be unstable are left unsupported, and place secured bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.4 BURNING

Where burning is permitted, adhere to local regulations.

1.5 SUBMITTALS

Contractor shall submit the following using procedures as specified in the Contract Documents.

SD-01 Preconstruction Submittals

Existing Conditions

SD-07 Certificates

Demolition Plan
Notification

1.6 QUALITY ASSURANCE

Furnish timely notification of demolition projects to Federal, and local

authorities.

1.7 PROTECTION

1.7.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

1.8 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 100 mm will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures.

b. Fill material shall conform to the definition of satisfactory soil material as defined in Sections defining construction to be completed in the locations where demolition takes place.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Structures

a. Remove sidewalks, curbs, gutters and street light bases as indicated on contract documents.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer.

3.1.2.2 Disconnecting Existing Utilities

When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 7 m lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs as indicated in contract documents. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs not to be used in this project shall be removed from the site at Contractor's expense.

3.1.5 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated in contract documents, and shall include:

a. Concrete and Masonry: Completely fill holes and depressions, left as a result of removals in existing masonry, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

All materials removed shall become the property of the Contractor and shall be removed from the site. Title to materials resulting from demolition is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Contracting Officer will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3 DISPOSAL OF REMOVED MATERIALS

3.3.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable local regulations as contractually specified.

-- End of Section --

SECTION 03 11 13.00 10

STRUCTURAL CONCRETE FORMWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 347	(2004) Guide to Formwork for Concrete

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA PS 1	(1995) Voluntary Product Standard for Construction and Industrial Plywood

ASTM INTERNATIONAL (ASTM)

ASTM C 1077	(2009b) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 39/C 39M	(2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

1.2 SYSTEM DESCRIPTION

The design, engineering, and construction of the formwork is the responsibility of the Contractor. Design formwork in accordance with methodology of ACI 347 for anticipated loads, lateral pressures, and stresses, and capable of withstanding the pressures resulting from placement and vibration of concrete. Comply with the tolerances specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph CONSTRUCTION TOLERANCES. Design the formwork as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. Monitor the adequacy of formwork design and construction prior to and during concrete placement as part of the Contractor's approved Quality Control Plan.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in

accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Formwork; G

Drawings showing details of formwork, joints, supports, studding and shoring, and sequence of form and shoring removal. At least 14 days either before fabrication on site or before delivery of prefabricated forms.

SD-03 Product Data

Design

Design analysis and calculations for form design and methodology used in the design. At least 14 days either before fabrication on site or before delivery of prefabricated forms.

Form Materials

Manufacturer's data including literature describing form materials, accessories, and form releasing agents.

Form Releasing Agents

Manufacturer's recommendation on method and rate of application of form releasing agents.

SD-06 Test Reports

Inspection

Field inspection reports for concrete forms and embedded items.

Formwork Not Supporting Weight of Concrete; G.

If forms are to be removed in less than 24 hours on formwork not supporting the weight of concrete, the evaluation and results of the control cylinder tests shall be submitted to and approved before the forms are removed.

PART 2 PRODUCTS

2.1 FORM MATERIALS

2.1.1 Forms For Class B Finish

This class of finish shall apply to all surfaces except those specified to receive Class D. Forms for Class B finished surfaces shall be plywood panels conforming to APA PS 1, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels. Forms for round columns shall be the prefabricated seamless type. Steel lining on wood sheathing will not be permitted.

2.1.2 Forms For Class D Finish

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.1.3 Form Ties

Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Provide solid backing for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 6 mm nor more than 25 mm deep and not more than 25 mm in diameter. Terminate the embedded portion of metal ties not less that 50 mm from any concrete surface exposed to water. Removable tie rods shall be not more than 38 mm in diameter. Plastic snap ties may be used in locations where the surface will not be exposed to view.

2.1.4 Form Releasing Agents

Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. If special form liners are to be used, the Contractor shall follow the recommendation of the form coating manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Forms shall be constructed true to the structural design and required alignment. Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE and conforming to construction tolerance given in TABLE 1. Continuously monitor the alignment and stability of the forms during all phases to assure the finished product will meet the required surface class or classes specified. Failure of any supporting surface either due to surface texture, deflection or form collapse shall be the responsibility of the Contractor as will the replacement or correction of unsatisfactory surfaces. When forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of defects which would impair the quality of the resulting concrete surface. All surfaces of used forms shall be cleaned of mortar and any other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker.

3.2 CHAMFERING

All exposed joints, edges and external corners shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with

concrete surfaces. Chamfered joints shall be terminated 300 mm outside the limit of the earth or rockfill so that the end of the chamfers will be clearly visible.

3.3 COATING

Forms for Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4 FORM REMOVAL

Forms shall not be removed without approval. The minimal time required for concrete to reach a strength adequate for removal of formwork without risking the safety of workers or the quality of the concrete depends on a number of factors including, but not limited to, ambient temperature, concrete lift heights, type and amount of concrete admixture, and type and amount of cementitious material in the concrete. It is the responsibility of the Contractor to consider all applicable factors and leave the forms in place until it is safe to remove them. In any case forms shall not be removed unless the minimum time, minimum ambient temperature, and minimum compressive strength requirements below are met, except as otherwise directed or specifically authorized. When conditions are such as to justify the requirement, forms will be required to remain in place for a longer period. All removal shall be accomplished in a manner which will prevent damage to the concrete and ensure the complete safety of the structure. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements. Form removal shall be scheduled so that all necessary repairs can be performed as specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph 3.10 Finishing Formed Surfaces. Evidence that concrete has gained sufficient strength to permit removal of forms shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24 hours. All control cylinders shall be prepared and tested in accordance with ASTM C 31/C 31M and ASTM C 39/C 39M at the expense of the Contractor by an independent laboratory that complies with ASTM C 1077 and shall be tested within 4 hours after removal from the site.

3.4.1 Formwork Not Supporting Weight of Concrete

Formwork for walls, columns, sides of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed.

3.4.2 Formwork Supporting Weight of Concrete

Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected. As a minimum, forms

shall be left in place until control concrete test cylinders indicate evidence the concrete has attained at least 75 percent of the compressive strength required for the structure in accordance with the quality and location requirements.

3.5 INSPECTION

Forms and embedded items shall be inspected in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

TABLE 1 TOLERANCES FOR FORMED SURFACES	
1. Variations from the plumb:	
a. In the lines and surfaces of piers	6 mm in any 3 m of length Maximum for entire length -- 25 mm
2. Variation for the level or from the grades indicated on the drawings:	
a. Pedestals	6 mm in any 3 m of length 10 mm in any bay or in any 6 m of length Maximum for entire length -- 20 mm
7. Footings:	
a. Variation of dimensions in plan	Minus 13 mm, plus 50 mm when formed or plus 75 mm when placed against unformed excavation
b. Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than 50 mm
c. Reduction in thickness	Minus 5 percent of the specified thickness

-- End of Section --

SECTION 03 20 01.00 10

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318M	(2008; Errata 2008; Errata 2009) Metric Building Code Requirements for Structural Concrete and Commentary

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2005; Errata 2005) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 615/A 615M	(2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706/A 706M	(2009) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2001; 27Ed) Manual of Standard Practice

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement; G

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-07 Certificates

Reinforcing Steel

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

1.3 DELIVERY, STORAGE, AND HANDLING

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 REINFORCING STEEL

Dowels for footing connection to rock will be furnished under this Section.

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, grades and sizes as indicated.

2.2 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.3 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 10MSP and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 100 by 100 mm when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 13 mm of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 Reinforcement

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318M. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318M at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as

indicated or as required by ACI 318M. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318M and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than 35 mm diameter unless otherwise indicated. Welding shall conform to AWS D1.4/D1.4M. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 150 mm. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

-- End of Section --

SECTION 03 31 00.00 10

CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117	(2006) Standard Specifications for Tolerances for Concrete Construction and Materials
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214R	(2002) Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1999; Errata 2006) Hot Weather Concreting
ACI 318M	(2008; Errata 2008; Errata 2009) Metric Building Code Requirements for Structural Concrete and Commentary

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM C 1017/C 1017M	(2007) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059/C 1059M	(1999; R 2008) Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 1077	(2009b) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(2009) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 150/C 150M	(2009) Standard Specification for Portland Cement
ASTM C 1567	(2008) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	(2008) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(2007) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 39/C 39M	(2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42/C 42M	(2004) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 494/C 494M	(2008a) Standard Specification for Chemical Admixtures for Concrete

ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 78	(2009) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 881/C 881M	(2002) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete
ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(2007) NIST Handbook 44: Specifications, Tolerances, and other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(2000) Concrete Plant Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 94	(1995) Specification for Surface Retarders

1.2 SYSTEM DESCRIPTION

Provide concrete composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.2.1 Proportioning Studies-Normal Weight Concrete

Trial design batches, mixture proportions studies, and testing requirements for various classes and types of concrete specified are the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39/C 39M.

a. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and be

accompanied by the manufacturer's or producer's test reports indicating compliance with these specifications.

b. Make trial mixtures having proportions, consistencies, and air content suitable for the work based on methodology described in ACI 211.1, using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project.

c. The maximum water-cement ratios required in subparagraph Water-Cement Ratio below will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent.

d. Design laboratory trial mixtures for maximum permitted slump and air content. Make separate sets of trial mixture studies for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations.

e. Report the temperature of concrete in each trial batch. For each water-cement ratio, at least three test cylinders for each test age shall be made, cured in accordance withASTM C 192/C 192M and tested at 7 and 28 days in accordance with ASTM C 39/C 39M. From these test results, plot a curve showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, a curve shall be plotted showing the relationship between 7 day and 28 day strengths. Design each mixture to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

1.2.2 Average Compressive Strength

The mixture proportions selected during mixture design studies shall produce a required average compressive strength (f'cr) exceeding the specified compressive strength (f'c) by the amount indicated below. This required average compressive strength, f'cr, will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below f'cr during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day f'cr, adjust the mixture, as approved, to bring the daily average back up to f'cr. During production, the required f'cr shall be adjusted, as appropriate, based on the standard deviation being attained on the job.

1.2.3 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and

application practices shall be in accordance with ACI 117.

1.2.4 Strength Requirements

Specified compressive strength (f'c) shall be 27.8 or 28 MPa at 28 days.

Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C 39/C 39M.

a. Evaluation of Concrete Compressive Strength. Fabricate compressive strength specimens (152 by 305 mm cylinders), laboratory cure them in accordance with ASTM C 31/C 31M and test them in accordance with ASTM C 39/C 39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 3.5 MPa. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

b. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 3.5 MPa or if tests of field-cured cylinders indicate deficiencies in protection and curing, take steps to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42/C 42M. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. Perform the coring and repair the holes; cores will be tested by the Government.

c. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318M. Concrete work evaluated by structural analysis or by results of a load test as being understrength shall be corrected in a manner satisfactory to the Contracting Officer. All investigations, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and approved by the Contracting Officer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

1.2.5 Water-Cement Ratio

Maximum water-cement ratio (w/c) for normal weight concrete shall not exceed 0.45.

These w/c's may cause higher strengths than that required above for compressive or flexural strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan by the weight equivalency method as described in ACI 211.1.

1.2.6 Air Entrainment

All normal weight concrete shall be air entrained to contain between 3.5 and 4.5 percent total air, except that when the nominal maximum size coarse aggregate is 19 mm or smaller it shall be between 4 and 5 percent. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C 231.

1.2.7 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143/C 143M.

Structural Element	Slump Minimum	Slump Maximum
Foundation walls, substructure walls, footings, slabs	25 mm	75 mm
Any structural concrete approved for placement by pumping:		
At pump	50 mm	150 mm
At discharge of line	25 mm	100 mm

When use of a plasticizing admixture conforming to ASTM C 1017/C 1017M or when a Type F or G high range water reducing admixture conforming to ASTM C 494/C 494M is permitted to increase the slump of concrete, concrete shall have a slump of 50 to 100 mm before the admixture is added and a maximum slump of 200 mm at the point of delivery after the admixture is added.

1.2.8 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 32 degrees C. When the ambient temperature during placing is 5 degrees C or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 12 and 25 degrees C.

1.2.9 Size of Coarse Aggregate

Use the largest feasible nominal maximum size aggregate (NMSA), specified in paragraph AGGREGATES PART 2, in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of

the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Curing Materials; G
Portland Cement; G
Latex Bonding Agent; G
Chemical Admixtures; G
Epoxy-Resin; G

Manufacturer's product data, indicating VOC content. Manufacturer's catalog data for the items above, including printed instructions. Products included in other referenced Section (Ex: 03 20 01.00 10 CONCRETE REINFORCEMENT) shall follow the submittals requirements for that Section.

SD-04 Samples

Surface Retarder

Sample of surface retarder material with manufacturer's instructions for application in conjunction with air-water cutting.

SD-05 Design Data

Mixture Proportions; G

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of each strength or class of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. Accompany the statement with test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

SD-06 Test Reports

Testing and Inspection for CQC; G

Certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use

on this project.

SD-07 Certificates

Qualifications

Written documentation for Contractor Quality Control personnel.

1.4 QUALITY ASSURANCE

Submit qualifications for Contractor Quality Control personnel assigned to concrete construction as American Concrete Institute (ACI) Certified Workmen,or local equivalent for, in one of the following grades or show written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade I
Concrete Laboratory Testing Technician, Grade I or II
Concrete Construction Inspector, Level II

Concrete Transportation Construction Inspector or
Reinforced Concrete Special Inspector

1.4.1 Pre-installation Meeting

A pre-installation meeting with the Contracting Officer will be required at least 10 days prior to start of construction. The Contractor is responsible for calling the meeting; the Project Superintendent and active installation personnel shall be present.

1.4.2 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.4.3 Government Assurance Inspection and Testing

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any CQC responsibilities.

1.4.3.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. Provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75/D 75M. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.4.3.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172

and tested in accordance with these specifications, as considered necessary.

1.4.3.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.4.3.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

1.5 DELIVERY, STORAGE, AND HANDLING

Store cement and other cementitious materials in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Store reinforcing bars and accessories above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious Materials shall be portland cement in combination with pozzolan, silica fume conforming to appropriate specifications listed below. Restrict usage of cementitious materials in concrete that will have surfaces exposed in the completed structure so there is no change in color, source, or type of cementitious material.

2.1.1 Portland Cement

ASTM C 150/C 150M, Type I or II.

2.1.2 Pozzolan (Fly Ash)

Pozzolan shall conform to ASTM C 618, Class C or F, including low alkali and moderate sulfate resistance requirements in Table 3 of ASTM C 618. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

2.2 AGGREGATES

Fine and coarse aggregates shall "be tested and evaluated for alkali-aggregate reactivity in accordance with ASTM C 1260. The fine and coarse aggregates shall be evaluated separately and in combination, which matches the Contractor's proposed mix design proportioning. All results of the separate and combination testing shall have a measured expansion less than 0.10 (0.08) percent at 16 days after casting. Should the test data

indicate an expansion of 0.10 (0.08) percent or greater, the aggregate(s) shall be rejected or additional testing using ASTM C 1260 and ASTM C 1567 shall be performed. The additional testing using ASTM C 1260 and ASTM C 1567 shall be performed using the low alkali portland cement in combination with Class F fly ash. Class F fly ash shall be used in the range of 25 to 40 percent of the total cementitious material by mass."

2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33/C 33M.

2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33/C 33M, Class 5S.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494/C 494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494/C 494M, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

2.3.4 High-Range Water Reducer

ASTM C 494/C 494M, Type F or G, except that the 6-month and 1-year strength requirements are waived.

2.3.5 Surface Retarder

COE CRD-C 94.

2.3.6 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017/C 1017M, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional,

except, that polyethylene sheet shall not be used.

2.4.2 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107/C 1107M, and shall be a commercial formulation suitable for the proposed application.

2.7 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059/C 1059M.

2.8 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881/C 881M, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

2.9 EMBEDDED ITEMS

Embedded items shall be of the size and type indicated or as needed for the application. Dovetail slots shall be galvanized steel. Inserts for shelf angles and bolt hangers shall be of malleable iron or cast or wrought steel.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, perform the following: Surfaces to receive concrete shall be clean and free from mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03 11 13.00 10 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03 20 01.00 10 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Preparation of Rock

Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as specified below for Previously Placed Concrete. Keep rock surfaces continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Place concrete before the mortar stiffens.

3.1.1.2 Excavated Surfaces in Lieu of Forms

Concrete for footings may be placed directly against the soil provided the earth or rock has been carefully trimmed, is uniform and stable, and meets the compaction requirements of Section 31 00 00 EARTHWORK. Place the concrete without becoming contaminated by loose material, and outlined within the specified tolerances.

3.1.2 Previously Placed Concrete

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Prepare concrete at the side of vertical construction joints as approved by the Contracting Officer. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. Keep the surface of horizontal construction joints continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete. The surface shall be washed completely clean as the last operation prior to placing the next lift. For heavy duty floors and two-course floors, a thin coat of neat cement grout of about the consistency of thick cream shall be thoroughly scrubbed into the existing surface immediately ahead of the topping placing. The grout shall be a 1:1 mixture of portland cement and sand passing the 2.36 mm sieve. The topping concrete shall be deposited before the grout coat has had time to stiffen.

3.1.2.1 Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Remove laitance and loose particles. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

3.1.3 Embedded Items

Before placement of concrete, determine that all embedded items are firmly

and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 300 mm of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

3.2 CONCRETE PRODUCTION

3.2.1 General Requirements

Concrete shall either be batched and mixed onsite.

3.2.2 Batching Plant

Locate the batching plant offsite close to the project. The batching, mixing and placing system shall have a capacity to meet the demands of the project construction schedule and quantity. The batching plant shall conform to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required.

3.2.3 Batching Equipment

The batching controls shall be semiautomatic or automatic, as defined in NRMCA CPMB 100. Provide a semiautomatic batching system with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. Equip the batching system with accurate recorder or recorders that meet the requirements of NRMCA CPMB 100. Record the weight of water and admixtures if batched by weight. Provide separate bins or compartments for each size group of aggregate and type of cementitious material, to prevent intermingling at any time. Aggregates shall be weighed either in separate weigh batchers with individual scales or, provided the smallest size is batched first, cumulatively in one weigh batcher on one scale. Aggregate shall not be weighed in the same batcher with cementitious material. If both portland cement and other cementitious material are used, they may be batched cumulatively, provided that the portland cement is batched first, except that silica fume shall always be batched separately. Water may be measured by weight or volume. Water shall not be weighed or measured cumulatively with another ingredient. Filling and discharging valves for the water metering or batching system shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. Piping for water and for admixtures shall be free from leaks and shall be properly valved to prevent backflow or siphoning. Furnish admixtures as a liquid of suitable concentration for easy control of dispensing. Provide an adjustable, accurate, mechanical device for measuring and dispensing each admixture. Each admixture dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and individually discharged automatically in a manner to obtain uniform distribution throughout the water as it is added to the batch in the specified mixing period. When use of truck mixers makes this requirement impractical, the admixture dispensers shall be interlocked with the sand batchers. Different admixtures shall not be combined prior to introduction in water and shall not be allowed to intermingle until in contact with the cement. Admixture dispensers shall have suitable devices to detect and indicate flow during dispensing or have a means for visual

observation. Arrange the plant so as to facilitate the inspection of all operations at all times. Provide suitable facilities for obtaining representative samples of aggregates from each bin or compartment, and for sampling and calibrating the dispensing of cementitious material, water, and admixtures. Filling ports for cementitious materials bins or silos shall be clearly marked with a permanent sign stating the contents.

3.2.4 Scales

The weighing equipment shall conform to the applicable requirements of CPMB Concrete Plant Standard, and of NIST HB 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. Provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. Perform the tests at the specified frequency in the presence of a Government inspector. Arrange the weighing equipment so that the plant operator can conveniently observe all dials or indicators.

3.2.5 Batching Tolerances

(A) Tolerances with Weighing Equipment

MATERIAL	PERCENT OF REQUIRED WEIGHT
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

(B) Tolerances with Volumetric Equipment

For volumetric batching equipment used for water and admixtures, the following tolerances shall apply to the required volume of material being batched:

MATERIAL	PERCENT OF REQUIRED MATERIAL
Water:	plus or minus 1 percent
Chemical admixtures:	0 to plus 6 percent

3.2.6 Moisture Control

Provide a plant capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched.

3.2.7 Concrete Mixers

Mixers shall be stationary mixers or truck mixers capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. Operate the mixers at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

3.2.8 Stationary Mixers

Concrete plant mixers shall be drum-type mixers of tilting, nontilting, horizontal-shaft, or vertical-shaft type, or pug mill type provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the requirements in ASTM C 94/C 94M applicable to central-mixed concrete.

3.2.9 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94/C 94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Water shall not be added at the placing site unless specifically approved; and in no case shall it exceed the specified w/c. Any such water shall be injected at the base of the mixer, not at the discharge end.

3.3 CONVEYING CONCRETE ONSITE

Convey concrete from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.3.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 0.2 square meters. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 1.5 cubic meters shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.3.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. Equip the transfer hopper with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.3.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Use nonagitating equipment only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.3.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. Use a discharge deflector when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.3.5 Belt Conveyors

Design and operate belt conveyors to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and provided with positive means, such as discharge baffle or hopper , for preventing segregation of the concrete at the transfer points and the point of placing. Construct belt conveyors such that the idler spacing does not exceed 900 mm. The belt speed shall be a minimum of 90 meters per minute and a maximum of 225 meters per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.3.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 100 mm. Aluminum pipe shall not be used.

3.4 PLACING CONCRETE

Discharge mixed concrete within 1.5 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 30 degrees C, reduce the time to 45 minutes. Place concrete within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Provide adequate scaffolding, ramps and walkways so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities prevent proper consolidation, finishing and curing. Provide sufficient placing capacity so that concrete can be kept free of cold joints.

3.4.1 Depositing Concrete

Deposit concrete as close as possible to its final position in the forms, and with no vertical drop greater than 1.5 meters except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 300 mm thick. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has

hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary.

3.4.2 Consolidation

Immediately after placing, consolidate each layer of concrete by internal vibrators. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; keep a spare vibrator at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.6 mm, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Insert vibrators vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 150 mm into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.4.3 Cold Weather Requirements

Use special protection measures, approved by the Contracting Officer, if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 5 degrees C. The temperature of the concrete when placed shall be not less than 10 degrees C nor more than 25 degrees C. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494/C 494M, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not be used.

3.4.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 30 degrees C, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 49 degrees C. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	33 C
40-60	30 C
Less than 40	27 C

3.4.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Take particular care if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.4.6 Placing Concrete in Congested Areas

Use special care to ensure complete filling of the forms, elimination of all voids, and complete consolidation of the concrete when placing concrete in areas congested with reinforcing bars, embedded items, waterstops and other tight spacing. An appropriate concrete mixture shall be used, and the nominal maximum size of aggregate (NMSA) shall meet the specified criteria when evaluated for the congested area. Vibrators with heads of a size appropriate for the clearances available shall be used, and the consolidation operation shall be closely supervised to ensure complete and thorough consolidation at all points. Where necessary, splices of reinforcing bars shall be alternated to reduce congestion. Where two mats of closely spaced reinforcing are required, the bars in each mat shall be placed in matching alignment to reduce congestion.

3.5 JOINTS

Locate and construct joints as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. Contractor shall coordinate joint locations with the Contracting Officer's authorized representative. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 50 mm clear from each joint. Joints to be sealed shall be cleaned and sealed.

3.5.1 Construction Joints

Locate construction joints so that the unit of operation does not exceed 18 meters. Concrete shall be placed continuously so that each unit is

monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Locate construction joints as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer's authorized representative. Extend reinforcing steel through construction joints. Where horizontal construction joints in walls or columns are required, a strip of 25 mm square-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Place concrete to a point 25 mm above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete above.

3.5.2 Dowels and Tie Bars

Install dowels and tie bars at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03 20 01.00 10 CONCRETE REINFORCEMENT and herein. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.6 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03 11 13.00 10 STRUCTURAL CONCRETE FORMWORK. Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, maintain uniform color of the concrete by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class B finish. Except for major defects, as defined hereinafter, repair surface defects as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair below. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects below. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.6.1 Class B Finish

Class B finish is required for all exposed vertical faces. Remove fins, ravelings, and loose material, all surface defects over 12 mm in diameter or more than 12 mm deep, shall be repaired and, except as otherwise indicated or as specified in Section 03 11 13.00 10 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Defects more than 12 mm in diameter shall be cut back to sound concrete, but in all cases at least 25 mm deep.

3.6.2 Class D Finish

Class D finish is allowed for foundations below grade. Fins, raveling's, and loose material shall be removed, and, except as otherwise indicated or as specified in Section 03 11 13.00 10 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Honeycomb and other defects more than 12 mm deep or more than 50 mm in diameter shall be repaired. Defects more than 50 mm in diameter shall be cut back to sound concrete, but in all cases at least 25 mm deep.

3.7 REPAIRS

3.7.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects, whose depth is at least as great as their surface diameter but not over 100 mm, shall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the 1.18 mm sieve, and minimum amount of water. Use only sufficient water to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer and hardwood block. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through to the outside face. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

3.7.2 Repair of Major Defects

Major defects will be considered to be those more than 12 mm deep or, for Class A and B finishes, more than 12 mm in diameter and, for Class C and D finishes, more than 50 mm in diameter. Also included are any defects of any kind whose depth is over 100 mm or whose surface diameter is greater than their depth. Repair major defects as specified below.

3.7.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Use approved equipment and procedures which will not cause cracking or microcracking of the sound concrete. If reinforcement is encountered, remove concrete so as to expose the reinforcement for at least 50 mm on all sides. All such defective areas greater than 7800 square mm shall be outlined by saw cuts at least 25 mm deep. Defective areas less than 7800 square mm shall be outlined by a 25 mm

deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Keep surfaces continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, as an option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, test each repair area for drumminess by firm tapping with a hammer and inspecting for cracks, both in the presence of the Contracting Officer, immediately before completion of the contract, and replacing any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Keep burlap continually wet.

3.8 FINISHING UNFORMED SURFACES

The finish of all unformed surfaces shall meet the requirements of paragraph Tolerances in PART 1, when tested as specified herein.

3.8.1 General

In hot weather all requirements of paragraphs Hot Weather Requirements and Prevention of Plastic Shrinkage Cracking above shall be met. Unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, with additional finishing as specified below, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings, properly consolidated, and left true and regular. Unless otherwise shown on the drawings, exterior surfaces shall be sloped for drainage, as directed. Where drains are provided, interior floors shall be evenly sloped to the drains. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or "jitterbugs" shall not be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing shall not be permitted. If bleedwater is present prior to finishing, the excess water shall be carefully dragged off or removed by absorption with porous materials such as burlap. During finishing operations, extreme care shall be taken to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Any slabs with surfaces which exhibit significant crazing shall be removed and replaced. During finishing operations, surfaces shall be checked with a 10 foot straightedge, applied in both directions at regular

intervals while the concrete is still plastic, to detect high or low areas.

3.8.2 Troweled Finish

All exposed horizontal surfaces shall be given a trowel finish. After floating is complete and after the surface moisture has disappeared, unformed surfaces shall be steel-troweled to a smooth, even, dense finish, free from blemishes including trowel marks. Additional trowelings shall be performede until the surface has been troweled 3 times, with waiting period between each. Care shall be taken to prevent blistering and if such occurs, troweling shall immediately be stopped and operations and surfaces corrected. A final hard steel troweling shall be done by hand, with the trowel tipped, and using hard pressure, when the surface is at a point that the trowel will produce a ringing sound. The finished surface shall be thoroughly consolidated and shall be essentially free of trowel marks and be uniform in texture and appearance. The concrete mixture used for troweled finished areas shall be adjusted, if necessary, in order to provide sufficient fines (cementitious material and fine sand) to finish properly.

3.9 CURING AND PROTECTION

3.9.1 General

Concrete shall be cured by an approved method for the period of time given below:

All concrete	7 days

Immediately after placement, protect concrete from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Moist curing shall be provided for any areas to which other concrete is to be bonded. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.9.2 Moist Curing

Maintain concrete, to be moist-cured, continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. Provide an approved work system to ensure that moist curing is continuous 24 hours per day.

3.9.3 Impervious Sheeting

Except for plastic coated burlap, impervious sheeting alone shall not be used for curing. Use impervious-sheet curing only on horizontal or nearly horizontal surfaces. Surfaces shall be thoroughly wetted and be completely covered with the sheeting. Sheeting shall be at least 450 mm wider than the concrete surface to be covered. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 300 mm and securely weighted down or shall be lapped not less than 100 mm and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

3.9.4 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 0 degrees C maintain the temperature of the concrete above 5 degrees C for the first seven days after placing. During the period of protection removal, control the air temperature adjacent to the concrete surfaces so that concrete near the surface will not be subjected to a temperature differential of more than 13 degrees C as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 50 mm inside the surface of the concrete. Perform the installation of the thermometers as directed.

3.10 SETTING BASE PLATES AND BEARING PLATES

3.10.1 Nonshrink Grout

Nonshrink grout shall be a ready-mixed material requiring only the addition of water. Water content shall be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

3.10.1.1 Mixing and Placing of Nonshrink Grout

Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified therein. Ingredients shall be thoroughly dry-mixed before adding water. After adding water, mix the batch for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Discard grout not used within 30 minutes after mixing. The space between the top of the concrete or machinery-bearing surface and the plate shall be filled solid with the grout. Forms shall be of wood or other equally suitable material for completely retaining the grout on all sides and on top and shall be removed after the grout has set. The placed grout shall be carefully worked by rodding or other means to eliminate voids; however, overworking and breakdown of the initial set shall be avoided. Grout shall not be retempered or subjected to vibration from any source. Where clearances are unusually small, placement shall be under pressure with a grout pump. Temperature of the grout, and of surfaces receiving the grout, shall be maintained at 18 to 30 degrees C until after setting.

3.11 TESTING AND INSPECTION FOR CQC

Perform the inspection and tests described below and, based upon the

results of these inspections and tests, take the action required and submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, cease concrete placement and correct the operation. The laboratory performing the tests shall be onsite and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per month thereafter for conformance with ASTM C 1077.

3.11.1 Grading and Corrective Action

3.11.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.11.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.11.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, perform all tests for aggregate quality required by ASTM C 33/C 33M. In addition, after the start of concrete placement, perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.11.3 Scales, Batching and Recording

Check the accuracy of the scales by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.11.4 Batch-Plant Control

Continuously control the measurement of concrete materials, including cementitious materials, each size of aggregate, water, and admixtures. Adjust the aggregate weights and amount of added water as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. Prepare a report indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic meter amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic meter for each class of concrete batched during each day's plant operation.

3.11.5 Concrete Mixture

a. Air Content Testing. Perform air content tests when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Perform additional tests when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete and ASTM C 173/C 173M for lightweight concrete. Plot test results on control charts which shall at all times be readily available to the Government and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, perform a second test immediately. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment in PART 1. Set an upper warning limit and a lower warning limit line 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action

limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.

b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

c. Slump Testing. In addition to slump tests which are made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143/C 143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Plot test results on control charts which shall at all times be readily available to the Government and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, immediately perform a second test. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Set limits on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 12.5 mm below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 50 mm. Take samples for slump at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, take correlation samples at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.

d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, make an adjustment immediately in the batch weights of water and fine aggregate. The

adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, halt the concreting operation immediately, and take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.

e. Temperature. Measure the temperature of the concrete when compressive strength specimens are fabricated in accordance with ASTM C 1064/C 1064M. Report the temperature along with the compressive strength data.

f. Strength Specimens. Perform at least one set of test specimens, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 380 cubic meters or portion thereof of that concrete mixture placed each day. Perform additional sets of test specimens, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. Develop a truly random (not haphazard) sampling plan for approval by the Contracting Officer prior to the start of construction. The plan shall ensure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214R.

3.11.6 Inspection Before Placing

Inspect foundations, construction joints, forms, and embedded items in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. Report the results of each inspection in writing.

3.11.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified

that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.11.8 Vibrators

Determine the frequency and amplitude of each vibrator in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Perform additional tests as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. Determine the amplitude with the head vibrating in air. Take two measurements, one near the tip and another near the upper end of the vibrator head, and these results averaged. Report the make, model, type, and size of the vibrator and frequency and amplitude results in writing. Any vibrator not meeting the requirements of paragraph Consolidation above, shall be immediately removed from service and repaired or replaced.

3.11.9 Curing Inspection

a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.

c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, compute the rate of coverage in square meters/L, and note whether or not coverage is uniform.

d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

3.11.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.11.11 Mixer Uniformity

a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 60,000 cubic meters of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M.

b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M. Select the truck mixers randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.11.12 Reports

Report all results of tests or inspections conducted, informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

-- End of Section --

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 201	(2006) AISC Certification Program for Structural Steel Fabricators
AISC 303	(2005) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2005) Steel Construction Manual
AISC 326	(2009) Detailing for Steel Construction
ANSI/AISC 341	(2005; Suppl No. 1 2005) Seismic Provisions for Structural Steel Buildings
ANSI/AISC 360	(2005) Specification for Structural Steel Buildings, with Commentary

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2007) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2008; Errata 2008) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B46.1	(2002) Surface Texture, Surface Roughness, Waviness and Lay

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 143/A 143M	(2007) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 325M	(2009a) Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric)
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 490M	(2009a) Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 500/A 500M	(2009) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 563	(2007a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A 563M	(2007) Standard Specification for Carbon and Alloy Steel Nuts (Metric)
ASTM A 6/A 6M	(2009) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 780/A 780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM B 695	(2004; R 2009) Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 827	(2001a; R 2005) Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
ASTM F 1554	(2007a) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F 436M	(2009) Hardened Steel Washers (Metric)
ASTM F 844	(2007a) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 959M	(2007) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners (Metric)

1.2 SYSTEM DESCRIPTION

Provide the structural steel system, including galvanizing, complete and

ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with ANSI/AISC 360 and ANSI/AISC 341 except as modified in this contract.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Erection Plan, including description of temporary supports; G

Fabrication drawings including description of connections; G

SD-03 Product Data

Welding electrodes and rods

Load indicator washers

Non-Shrink Grout

SD-06 Test Reports

Bolts, nuts, and washers

Supply the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

SD-07 Certificates

Steel

Bolts, nuts, and washers

Galvanizing

AISC Quality Certification

Welding procedures and qualifications

1.4 AISC QUALITY CERTIFICATION

Work shall be fabricated in an AISC certified Category Sbd fabrication plant.

1.5 SEISMIC PROVISIONS

The structural steel system shall be provided in accordance with ANSI/AISC 341.

1.6 QUALITY ASSURANCE

1.6.1 Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326 and AISC 325. Fabrication drawings shall not be reproductions of contract drawings. Sign and seal fabrication drawings by a registered professional engineer. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Double connections that require an erection seat to comply with OSHA 1926.756(c)(1) shall be shown on the shop drawings, reviewed and approved by the structural engineer of record. Use AWS A2.4 standard welding symbols. Shoring and temporary bracing shall be designed and sealed by a registered professional engineer and submitted for record purposes, with calculations, as part of the drawings. Member substitutions of details shown on the contract drawings shall be clearly highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

1.6.2 Certifications

1.6.2.1 Erection Plan

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing.

1.6.2.2 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate shall be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in AWS D1.1/D1.1M.

PART 2 PRODUCTS

2.1 STEEL

2.1.1 Structural Steel and Cap Plates

ASTM A 36/A 36M.

2.1.2 Structural Steel Tubing and Connection Plates

ASTM A 500/A 500M, Grade C.

2.2 BOLTS, NUTS, AND WASHERS

Provide the following unless indicated otherwise.

2.2.1 Structural Steel

2.2.1.1 Bolts

ASTM A 325M, Type 1. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2.2.1.2 Nuts

ASTM A 563M, Grade A, heavy hex style, except nuts under M36 may be provided in hex style.

2.2.1.3 Washers

ASTM F 436M washers for ASTM A 325M bolts.

2.2.2 Structural Steel Tubing

2.2.2.1 Bolts

ASTM A 325M, Type 1.

2.2.2.2 Nuts

ASTM A 563M, Grade and Style as specified in the applicable ASTM bolt standard.

2.2.2.3 Washers

ASTM F 436M, plain carbon steel.

2.2.3 Foundation Anchorage

2.2.3.1 Anchor Bolts

ASTM F 1554.

2.2.3.2 Anchor Nuts

ASTM A 563, Grade A, hex style.

2.2.3.3 Anchor Washers

ASTM F 844.

2.2.3.4 Anchor Plate Washers

ASTM A 36/A 36M

2.2.4 Load Indicator Washers

ASTM F 959M. Provide ASTM B 695, Class 50, Type 1 galvanizing.

2.3 STRUCTURAL STEEL ACCESSORIES

2.3.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

2.3.2 Non-Shrink Grout

ASTM C 1107/C 1107M, with no ASTM C 827 shrinkage. Grout shall be nonmetallic.

2.4 GALVANIZING

ASTM A 123/A 123M or ASTM A 153/A 153M, as applicable, unless specified otherwise galvanize after fabrication where practicable.

2.5 FABRICATION

2.5.1 Markings

Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded . Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC 325. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC 201.

Compression joints depending on contact bearing shall have a surface roughness not in excess of 13 micrometer as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M.

Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, and contact surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with AISC 303, Certification appropriate to the facility required.

Shop splices of members between field splices will be permitted only where indicated on the Contract Drawings. Splices not indicated require the approval of the Contracting Officer.

3.2 ERECTION

a. Erection of structural steel, shall be in accordance with the applicable provisions of AISC 325. Erection plan shall be reviewed, stamped and sealed by a licensed structural engineer.

Provide for drainage in structural steel. After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.2.1 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

3.3 CONNECTIONS

Except as modified in this section, connections not detailed shall be designed in accordance with ANSI/AISC 360. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member. Holes shall not be cut or enlarged by burning. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

3.3.1 High-Strength Bolts

ASTM A 325M bolts shall be fully tensioned to 70 percent of their minimum tensile strength. Provide load indicator washers in all ASTM A 325M bolted connections. Direct tension indicator tightening, shall be the only acceptable tightening methods. Use only direct tension indicator tightening for slip critical connections. Bolts shall be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts shall then be fully tensioned, progressing from the most rigid part of a connection to the free edges.

3.3.1.1 Installation of Load Indicator Washers (LIW)

ASTM F 959M . Where possible, the LIW shall be installed under the bolt head and the nut shall be tightened. If the LIW is installed adjacent to the turned element, provide a flat ASTM F 436M washer between the LIW and nut when the nut is turned for tightening, and between the LIW and bolt head when the bolt head is turned for tightening. In addition to the LIW, provide flat ASTM F 436M washers under both the bolt head and nut when ASTM A 490M bolts are used.

3.4 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

3.5 WELDING

AWS D1.1/D1.1M. Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

The Contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

3.5.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

3.6 GALVANIZING REPAIR

Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using ASTM A 780/A 780M zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. The Contracting Officer shall be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of weld inspection.

3.7.1 Welds

3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

3.7.1.2 Nondestructive Testing

AWS D1.1/D1.1M. Test locations shall be selected by the Contracting Officer. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested by radiographic or ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

Testing frequency: Provide the following types and number of tests:

Test Type	Number of Tests
Ultrasonic	As required by the Contracting Officer
Magnetic Particle	20 percent of the length of each fillet weld. Acceptance based on AWS D1.1, Table 6.2.

3.7.2 Load Indicator Washers

3.7.2.1 Load Indicator Washer Compression

Load indicator washers shall be tested in place to verify that they have been compressed sufficiently to provide the 0.38 mm gap when the load indicator washer is placed under the bolt head and the nut is tightened, and to provide the 0.13 mm gap when the load indicator washer is placed under the turned element, as required by ASTM F 959M.

3.7.2.2 Load Indicator Gaps

In addition to the above testing, an independent testing agency as approved

by the Contracting Officer, shall test in place the load indicator gaps on 20 percent of the installed load indicator washers to verify that the ASTM F 959M load indicator gaps have been achieved. If more than 10 percent of the load indicators tested have not been compressed sufficiently to provide the average gaps required by ASTM F 959M, then all in place load indicator washers shall be tested to verify that the ASTM F 959M load indicator gaps have been achieved. Test locations shall be selected by the Contracting Officer.

3.7.3 High-Strength Bolts

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in ANSI/AISC 360, depending on bolt size and grade. The bolt tension shall be developed by tightening the nut. A representative of the manufacturer or supplier shall be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements.

3.7.3.2 Inspection

Inspection procedures shall be in accordance with ANSI/AISC 360. Confirm and report to the Contracting Officer that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

Inspection by the Government will include proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use; and calibration of torque wrenches for high-strength bolts.

The Contractor shall inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use; and calibration of torque wrenches for high-strength bolts.

3.7.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations shall be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, shall be tested. Retest new bolts after installation.

3.7.4 Testing for Embrittlement

ASTM A 143/A 143M for steel products hot-dip galvanized after fabrication.

3.8 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS

Special inspections and testing for seismic-resisting systems and components shall be done in accordance with Section 01 45 35 SPECIAL INSPECTION FOR SEISMIC-RESISTING SYSTEMS.

-- End of Section --

SECTION 05 51 33

METAL LADDERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2008; Errata 2008) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 47/A 47M	(1999; R 2009) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 500/A 500M	(2009) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 53/A 53M	(2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780/A 780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 924/A 924M	(2009a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM D 1187	(1997; R 2002e1) Asphalt-Base Emulsions

for Use as Protective Coatings for Metal

MASTER PAINTERS INSTITUTE (MPI)

MPI 79 (Oct 2009) Alkyd Anti-Corrosive Metal Primer

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.27 Fixed Ladders

29 CFR 1910.66 Powered Platforms for Building Maintenance

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Ladders, installation drawings

Cable type fall protection device

Personal fall arrest systems

SD-03 Product Data

Ladders

Cable type fall protection device

Personal fall arrest systems

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A 36/A 36M.

2.1.2 Structural Tubing

ASTM A 500/A 500M.

2.1.3 Steel Pipe

ASTM A 53/A 53M, Type E or S, Grade B.

2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A 47/A 47M.

2.2 FABRICATION FINISHES

2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A 123/A 123M, ASTM A 153/A 153M, ASTM A 653/A 653M or ASTM A 924/A 924M, Z275, as applicable.

2.2.2 Galvanize

Anchor bolts, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A 780/A 780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.2.4 Shop Cleaning and Painting

2.2.4.1 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 0.03 mm. Tint additional prime coat with a small amount of tinting pigment.

2.3 LADDERS

Fabricate vertical ladders conforming to Section 7 of 29 CFR 1910.27. Use 65 by 10 mm steel flats for stringers and 20 mm diameter steel rods for rungs. Rungs to be not less than 400 mm wide, spaced 300 mm apart, plug welded or shouldered and headed into stringers. Install ladders so that the distance from the rungs to the finished wall surface will not be less than 175 mm. Provide heavy clip angles riveted or bolted to the stringer and drilled as indicated. Provide intermediate clip angles not over 1200 mm on centers.

Provide cable type fall protection device for fall height of ladder designed for a live load of 3560 N or 4 workers, with a safety factor of at least 2.0.

a. Cable system and personal equipment shall all be from a single

manufacturer.

b. Cable sleeve shall be operable with one hand and prevent upside down installation with no pins, chains, or external parts.

c. Intermediate cable guides shall allow cable sleeve to pass through uninterrupted.

d. Cable sleeve shall be made of corrosion resistant aluminum and stainless steel.

e. Contractor shall provide a minimum of two personal fall arrest systems meeting 29 CFR 1910.66, Appendix C.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Provide Exposed fastenings of compatible materials, generally matching in color and finish, and harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners will be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports must provide strength and stiffness. Formed joints exposed to the weather to exclude water. Items listed below require additional procedures.

3.2 WORKMANSHIP

Metalwork must be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching must produce clean true lines and surfaces. Continuously weld along the entire area of contact. Do not tack weld exposed connections of work in place. Grid smooth exposed welds. Provide smooth finish on exposed surfaces of work in place, unless otherwise approved. Where tight fits are required, mill joints. Cope or miter corner joints, well formed, and in true alignment. Install in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion anchors,and powder-actuated fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine bolts, carriage bolts and powder-actuated threaded studs for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.5 FINISHES

3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D 1187, asphalt-base emulsion.

3.6 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. Install intermediate clip angles not over 1200 mm on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete. Ends of ladders must not rest upon the ground.

-- End of Section --

SECTION 09 97 13.25

COATING OF TALL ANTENNA TOWERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2005) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2005) Steel Construction Manual
AISC 348	(2004) Specification for Structural Joints Using ASTM A325 or A490 Bolts
ANSI/AISC 360	(2005) Specification for Structural Steel Buildings, with Commentary

ASTM INTERNATIONAL (ASTM)

ASTM D 1200	(1994; R 2005) Viscosity by Ford Viscosity Cup
ASTM D 1640	(2003; R 2009) Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
ASTM D 3335	(1985a; R 2009) Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D 3718	(1985a; R 2005) Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy
ASTM D 3925	(2002) Sampling Liquid Paints and Related Pigmented Coatings
ASTM D 4285	(1983; R 2006) Indicating Oil or Water in Compressed Air

NACE INTERNATIONAL (NACE)

NACE RP0288	(2004) Inspection of Linings on Steel and Concrete

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Guide 12	(1998; E 2004) Guide for Illumination of Industrial Painting Projects

SSPC PA 1	(2000; E 2004) Shop, Field, and Maintenance Painting of Steel
SSPC PA 2	(2004) Measurement of Dry Coating Thickness With Magnetic Gages
SSPC QP 3	(2006; E 2004) Standard Procedure for Evaluating Qualifications of Shop Painting Applicators
SSPC SP 1	(1982; E 2004) Solvent Cleaning
SSPC SP 10	(2007) Near-White Blast Cleaning
SSPC SP COM	(2004) Surface Preparation Commentary for Steel and Concrete Substrates

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-DTL-24441	(2009; Rev D) Paint, Epoxy-Polyamide, General Specification for
MIL-DTL-24441/31	(2009; Rev B) Paint, Epoxy-Polyamide, White, Formula 152, Type IV
MIL-PRF-85285	(2009; Rev D; Am 3) Coating: Polyurethane Aircraft and Support Equipment

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	(Rev C) Colors Used in Government Procurement

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants
29 CFR 1910.134	Respiratory Protection
29 CFR 1926.1127	Cadmium
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead

1.2 MODIFICATIONS TO REFERENCES

In AISC 325, ANSI/AISC 360, AISC 303, and AISC 348, except as modified in this section, shall be considered a part of AISC 325 and is referred to in this section as AISC 325.

1.3 DESCRIPTION OF WORK

Apply coatings to tower members.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Coatings

Daily inspection checklist

Coating Sample Testing

SD-07 Certificates

Coating System

Coating System Compatibility

Work plan

Qualifications of Testing Laboratory for Coatings

Qualifications of Coating Contractors

Qualifications of Painting Shop

SD-08 Manufacturer's Instructions

Coating system

1.5 SAFETY

The Contractor shall submit an Accident Prevention Plan as per Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

1.6 DELIVERY, STORAGE AND HANDLING

1.6.1 Coating Materials

Ship, store and handle materials in accordance with SSPC PA 1. Maintain temperature in storage spaces between 5 and 24 degrees C. Maintain ambient air temperature more than 3 degrees C above the dew-point at all times. During mixing of polyurethane materials, maintain relative humidity below 90 percent.

1.7 COATING HAZARDS

Ensure that employees are trained in all aspects of the safety plan. Specified coatings may have potential health hazards if ingested or improperly handled. The coatings manufacturer's written safety precautions shall be followed throughout the mixing, application, and curing of the coatings. During tank cleaning, cleanup, surface preparation, and paint application phases, ensure that employees are adequately protected from toxic and hazardous chemical agents which exceed the concentrations in OSHA 29 CFR 1910.1000, 29 CFR 1926.1127 and OSHA 29 CFR 1926.62. Comply with respiratory protection requirements in OSHA 29 CFR 1910.134. Obtain the services of a certified industrial hygienist to review and approve the operations as to correctness of work procedures and personal protective

equipment.

1.8 JOB SITE REFERENCES

Make available to the Contracting Officer at least one copy each of ASTM D 3925, ASTM D 4285, NACE RP0288, SSPC SP COM, SSPC SP 1 and SSPC PA 2 at the job site.

1.9 PRE-APPLICATION MEETING

Prior to any surface preparation or coating operations, Contractor representatives, including at a minimum, project superintendent and QC manager, paint foreman, Contracting Officer representatives, coating inspector shall have a pre-application tank coating preparatory meeting. This meeting shall be in addition to the pre-construction conference. Specific items to be addressed shall include: the work plan, the safety plan, inspection standards, inspector qualifications and tools, test procedures, environmental control system, safety plan, and test logs. Notify the Contracting Officer 10 days prior to meeting.

1.10 QUALITY ASSURANCE

1.10.1 Design Data: Coating System

Submit manufacturer's printed instructions including detailed mixing and application procedures, number and types of coats required, minimum and maximum application temperatures, and curing procedures. Include materials safety data sheets (MSDS) for materials to be used at the job site in accordance with 29 CFR 1926.59.

1.10.2 Certificates

1.10.2.1 Work Plan

A specific written plan describing in detail all phases of coating operations. For coating work, address work sequencing, surface preparation, coating application, recoat and cure time projections, as well as how each step will be controlled, tested, and evaluated. Address safety measures, work scheduling around weather, and record keeping.

1.10.2.2 Qualifications of Testing Laboratory for Coatings

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of the coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that persons performing analyses are qualified.

1.10.2.3 Qualifications of Coating Contractors

Submit the name, address, telephone number, FAX number, and e-mail address of the agency that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on industrial steel structures on a minimum of three separate projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility
Employer (if other than the Contractor)
Name of facility owner
Mailing address, telephone number, and telex number (if non-US) of facility owner
Name of individual in facility owner's organization who can be contacted as a reference
Location, size and description of structure
Dates work was carried out
Description of work carried out on structure

1.10.2.4 Qualifications of Painting Shop

SSPC QP 3 (enclosed shop)

1.10.2.5 Coating System Compatibility

Provide certification from each manufacturer of components of the coating system, epoxy primer, epoxy intermediate, and polyurethane topcoat, that the supplied coating material is suitable for use in the specified coating system. Each manufacturer shall identify the specific products, including manufacturer's name, which their product may be used with. The certification shall provide the name of the manufacturer that will provide technical support for the entire system. When all coating materials are manufactured by one manufacturer, this certification is not required.

1.10.3 Test Reports

1.10.3.1 Coatings

Submit test results from independent laboratory of representative samples of each coating material. Samples must have been tested within the last three years. Submit results for epoxy materials as required in article entitled "QUALIFICATION INSPECTION" of MIL-DTL-24441, and as revised by article entitled "COATING SYSTEM" herein. Submit results for polyurethane materials as required in article entitled "QUALIFICATION INSPECTION" of MIL-PRF-85285, and as revised by article entitled "COATING SYSTEM" herein. Note that requirement for "QUALIFICATION INSPECTION" is a pre-qualification requirement, and involves the same testing required for listing in the Qualified Products List of the respective material. See appropriate Military Specification for specific test requirements.

1.10.3.2 Daily Inspection Checklist

Submit one copy of daily inspection checklist, completed each day when performing work under this section, to the Contracting Officer. Submit within 24 hours of date recorded on the checklist.

PART 2 PRODUCTS

2.1 COATING SYSTEM

Alternate systems or products will not be considered.

2.1.1 Epoxy Intermediate Coat

Epoxy polyamide, MIL-DTL-24441/31 (Formula 152, Type IV, White (Tinted)). Tint to approximately FED-STD-595 color number 27778 parchment using pigment dispersions prepared for epoxy paint tinting. Manufacturer shall tint material and appropriately label. Modify requirements to include maximum allowable lead content of 0.06 percent by wt. as tested by ASTM D 3335, maximum Cadmium content of 0.06 percent by wt. as tested by ASTM D 3335, and maximum allowable Chromium content of 0.00 percent by wt. as tested by ASTM D 3718. All other requirements of this Military Specification apply.

2.1.2 Polyurethane Topcoat

Polyurethane coating topcoat of MIL-PRF-85285, Type II, White FED-STD-595 color number 17875, and Orange color number 12197.

Modify paragraph 3.6.4 of MIL-PRF-85285, Viscosity and Pot Life, as follows:

The viscosity of the admixed coating, when tested in accordance with ASTM D 1200 through a No. 4 Ford cup, shall be as follows:

Time from mix (minimum)	Maximum time through a No. 4 Ford cup
Initially	30 seconds
2 hours	60 seconds
4 hours	No gel

Modify paragraph 3.7.1 of MIL-PRF-85285, Drying Time, as follows:

When applied by spray techniques and when tested in accordance with ASTM D 1640, the coating shall be set-to-touch within four hours and dry-hard within eight hours (see 4.6 and table I).

All other requirements of this Military Specification apply.

2.2 SOLUBLE SALTS TEST KITS

2.2.1 Test Kit for Measuring Chlorides on Steel Surfaces

Provide test kits called CHLOR*TEST, as manufactured by CHLOR*RID International Inc. of Chandler, Arizona (www.chlor-rid.com) or equal. To be considered for approval as an "equal" test kit, each proposed test kit shall:

a. Be a completely self-contained test kit with all materials, supplies, tools and instructions to take tests and identity results;

b. Use identifiable, consistent, factory pre-measured test extract solution;

c. Provide for testing of any steel surface, regardless of orientation;

d. Provide for testing flat, curved, smooth, pitted and rough surfaces;

e. Provide for taking direct measurements of the chloride ion in micrograms per square centimeter without using conversion charts or tables;

f. Be environmentally friendly and not contain any forms of mercury;

g. Provide all new components for extraction and titration for each test;

h. Provide an encapsulated environment while extracting chlorides;

i. Provide a factory sealed titration device for each test;

j. Use the extract sampling container as the titration container.

2.2.2 Test Kit for Measuring Chlorides in Abrasives

Provide test kits called CHLOR*TEST-A, as manufactured by CHLOR*RID International Inc. of Chandler, Arizona (www.chlor-rid.com), or equal. To be considered for approval as an "equal" test kit, each proposed test kit shall:

a. Be a completely self-contained test kit with all materials, supplies, tools and instructions to take tests and identify results;

b. Use identifiable, consistent, factory pre-measured test extract solution;

c. Provide for testing equal volumes of abrasive and test solution;

d. Provide for taking direct measurements of the chloride ion in parts per million (PPM), without using conversion charts or tables;

e. Provide all new components for extraction and titration for each test;

f. Provide a factory sealed titration device for each test;

g. Use the extract sampling container as the titration container.

PART 3 EXECUTION

3.1 COATING SAMPLING AND FIELD TESTING

3.1.1 Coating Sample Collection

Notify Contracting Officer three days in advance of sampling. The Contracting Officer and either the QC Manager or NACE Coating Inspector shall witness all sampling. Obtain a one liter sample of each batch of each base material, and proportional samples of each activator based on mix ratio, by random selection from sealed containers in accordance with ASTM D 3925. Prior to sampling, mix contents of sealed container to ensure uniformity. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Identify samples by designated name, specification number, batch number, project contract number, sample date, intended use, and quantity involved. Ship samples to an approved laboratory for testing as required by paragraph entitled "Testing of Coating Samples."

3.1.2 Coating Sample Testing

Test samples of all primer, intermediate, and topcoat materials for compliance with requirements of Table I. Reject samples that fail tests, reselect, and retest samples.

3.2 SURFACES TO BE COATED

Coat all exposed surfaces, including ladders, railings, and other exterior appurtenances.

3.3 ACCEPTABLE INSTALLERS

Contractors qualified in accordance with this section shall perform all surface preparation and coating application.

3.4 LIGHTING

Provide lighting for all work areas as prescribed in SSPC Guide 12.

3.5 SURFACE PREPARATION

3.5.1 Pre-Application Testing For Surface Contamination

3.5.1.1 Pre-Application Testing for Oil and Grease Contamination

Ensure surfaces are oil-free by visual examination. Check questionable areas and random areas for beading of water misted onto surface. Clean contaminated surfaces in accordance with SSPC SP 1 and recheck for contamination until surfaces are oil-free. Reblast tested and cleaned areas as required.

3.6 MIXING AND APPLICATION OF COATING SYSTEM

3.6.1 Preparation of Coating Materials for Application

Each of the epoxy and polyurethane products, intermediate, and topcoat, is a two-component coating supplied in separate containers.

3.6.1.1 Mixing Intermediate, and Topcoat Materials

Mix in accordance with manufacturer's instructions, which may differ for each product. Do not mix partial kits or alter mix ratios. Mix all coating materials in same temperature and humidity conditions specified in article entitled "DELIVERY AND STORAGE." Allow epoxy material to stand for required induction time based on its temperature. Keep coating material containers covered at all times after mixing and during application to prevent contamination. The polyurethane coating material is moisture sensitive and any introduction of moisture or water into the material during mixing or application will shorten usable pot life.

3.6.1.2 Pot Life

Apply mixed products within stated pot life for each product. Stop applying when material becomes difficult to apply in a smooth, uniform wet film. Do not add solvent to extend pot life. Add all required solvent at time of mixing. Pot life is based on standard conditions at 21 degrees C and 50 percent relative humidity. For every 10 degrees C rise in temperature, pot life is reduced by approximately half, and for every 10 degrees C drop it is approximately doubled. Other factors such as the shape of the container and volume of mixed material may also affect pot life. Precooling or exterior icing of components for at least 24 hours to a minimum of 10 degrees C in hot climates will extend pot life. High humidity at time of mixing and application shortens pot life of the 21 degrees C:opcoat material. Following are approximate pot life times at

Epoxy materials	4 hours
Polyurethane materials	2 hours.

3.6.1.3 Application Conditions and Recoat Windows

The overcoating requirements for the coating system are very time and temperature sensitive. If ambient conditions do not allow for orderly application of primer, stripe coat, intermediate coat and topcoat, use appropriate means of controlling surface temperatures, as required. Partial or total enclosures may be required, as well as other measures, to control conditions to allow for orderly application of all required coats.

Apply coating only when ambient air and steel temperatures are between 16 and 38 degrees C, and steel surface temperature is more than 3 degrees C above the dew-point of the ambient air during application and the first four hours for epoxy and the first eight hours for polyurethane. Do not apply coatings above 38 degrees C or below 16 degrees C.

Use Table entitled "RECOAT WINDOWS" to determine appropriate recoat windows for each coat after the initial coat. Apply each coating during appropriate RECOAT WINDOW.

If coating is not applied during RECOAT WINDOW, apply during EXTENDED RECOAT WINDOW. Application of any epoxy coat within the EXTENDED RECOAT WINDOW requires application of a TACK COAT prior to applying any full coat. Perform cure test immediately prior to application of TACK COAT to determine condition of applied coating. If CURE TEST indicates that surface is fully cured, provide GLOSS REMOVAL prior to application of TACK COAT.

If coating is not applied during EXTENDED RECOAT WINDOW, wash surface with water and detergent, rinse clean with fresh water and allow surface to dry thoroughly, provide GLOSS REMOVAL, apply TACK COAT, where applicable, within 24 hours, and apply next full coat within TACK COAT RECOAT WINDOW.

RECOAT WINDOWS

EPOXY OVER EPOXY

Temperature degrees C	16-21	22-27	28-32	33-38	39-43	44-49
RECOAT WINDOW (Hrs.)	24-72	18-60	16-48	12-36	8-18	4-6
EXTENDED RECOAT WINDOW (Hrs.)	72-168	60-140	48-120	36-96	18-36	6-12
TACK COAT RECOAT WINDOW (Hrs.)	6-72	4-60	4-48	3-36	2-18	1-6

POLYURETHANE OVER EPOXY

Temperature degrees C	16-21	22-27	28-32	33-38	39-43	44-49
RECOAT WINDOW (Hrs.)	24-72	18-60	16-48	12-36	8-18	4-6
RECOAT WINDOW (Hrs.)	24-96	24-72	16-48	12-36	10-24	8-16
EXTENDED RECOAT WINDOW (Hrs.)	96-168	72-144	48-120	36-96	24-48	16-24
TACK COAT RECOAT WINDOW (Hrs.)	24-96	24-72	16-48	12-36	10-24	8-16

POLYURETHANE OVER POLYURETHANE

RECOAT WINDOWS

Temperature degrees C	16-21	22-27	28-32	33-38	39-43	44-49
RECOAT WINDOW (Hrs.)	8-48	6-48	4-36	3-24	2-12	1-2
EXTENDED RECOAT WINDOW (Hrs.)	NONE ----------					
TACK COAT RECOAT WINDOW (Hrs.)	NO TACK COAT USED ----------					

The temperature ranges shown in the table above are for determining recoat windows. Choose recoat window based on the highest surface temperature that was sustained for one or more hours between coats. This applies to the entire time between coats. Measure and record air and surface temperatures on hourly basis to determine appropriate recoat windows. If surface temperature goes above 38 degrees C, measure and record temperatures every half hour.

CURE TEST - Where indicated, test surface for cure using high-flash aromatic Naphtha only (cas #64742-95-6). Do not use aliphatic VMP Naphtha. Wipe surface with rag saturated with Naphtha, and check for surface tackiness, loss of gloss, or other indications that solvent has softened surface. If softening is found on 95 percent of test sites, this is indication that coating has not fully cured, and GLOSS REMOVAL is not required if TACK COAT is applied within three hours and full coat is applied within the TACK COAT RECOAT WINDOW. Test surfaces at rate of three tests for the first 100 square meters plus one test for each additional 300 square meters or part thereof.

TACK COAT - Where indicated, apply coat of intermediate coat epoxy, at 25 to 50 microns WFT, then apply next specified full coat within TACK COAT RECOAT WINDOW. Thin TACK COAT material approximately 25 percent by volume, using appropriate epoxy thinner.

3.6.2 Application of Coating System

Apply coatings in accordance with SSPC PA 1 and as specified herein. Apply coatings to surfaces that meet all stated surface preparation requirements.

After application of primer coat and prior to application of each subsequent coat, perform testing prescribed in article entitled "Pre-Application Testing For Surface Contamination," as necessary, to ensure minimal intercoat contamination. This testing may be reduced to one half of the prescribed rate for bare steel if the testing indicates no contamination when sampling is evenly distributed over surfaces being tested. If contamination is found between coats, revert to the specified testing rate. Generally, oil and grease contamination and soluble salts contamination are not encountered if subsequent coats are applied within specified recoat windows and unusual atmospheric events do not occur. Such atmospheric events as a coastal storm blowing onshore can bring unusual chloride contamination. Concern for intercoat contamination should be continually prevalent, and spot testing should be accomplished to verify satisfactory conditions. Where visual examination or spot testing indicates contamination, perform sufficient testing to verify non-contamination, or to define extent of contamination for appropriate treatment.

Apply each coat in a consistent wet film, at 90 degrees to previous coat. Ensure that primer and intermediate coat "cold joints" are no less than 150 mm from welds. Apply stripe coat by brush. Apply all other coats by spray application. Use appropriate controls to prevent airborne coating fog from drifting beyond three meters. Cover or protect all surfaces that will not be coated. The cleanliness, temperature, recoat windows, and airborne paint containment requirements may necessitate the use of enclosures, portable shelters, or other appropriate controls.

3.6.2.1 Application of Stripe Coat

Apply a stripe coat of succeeding coat epoxy material within RECOAT WINDOW of primer coat. Apply by brush, working material into corners, crevices, angles, and welds, and onto outside corners and angles.

3.6.2.2 Application of Intermediate Coat

Apply intermediate coat within RECOAT WINDOW of primer coat. Apply intermediate coat 75 to 125 microns DFT. Check coating thickness prior to application of topcoat. If additional coating film is required, use intermediate coating material to provide desired thickness, then apply topcoat.

3.6.2.3 Application of Topcoat

Make all required repairs to primer and intermediate coats as specified in paragraph entitled "Procedure for Making Spot Repairs" prior to applying topcoat. Apply topcoat within RECOAT WINDOW of intermediate coat. Apply polyurethane topcoat 40 to 60 microns DFT. Total system of primer, intermediate, and topcoat shall not be less than 225 microns DFT. Apply additional topcoat, if necessary, to obtain required minimum total system thickness..

3.6.2.4 Procedure for Making Spot Repairs

Use this procedure only with written approval from the Contracting Officer. Observe all requirements for soluble salts contamination and cleanliness between coats. Apply each coat within RECOAT WINDOW of preceeding coat. Prepare defective area in accordance with SSPC SP 10, and feather coating as required to leave 100 mm of each succeeding coat feathered and abraded. Protect adjacent areas from damage and overspray. Remove dust and solvent wipe the prepared area plus an additional 75 mm beyond the prepared area with clean denatured alcohol. Within four hours of preparation, apply zinc-rich primer to prepared steel and feather onto prepared primer. Apply intermediate coat to primed area and feather to prepared intermediate area. Apply topcoat by spray to intermediate coat and feather to prepared topcoat. Apply each repair coat to approximate thickness of surrounding coating system.

3.7 FIELD TESTS AND INSPECTION

3.7.1 Hold Points for Quality Control Inspections

Provide appropriate QC inspections at the following hold-points:

Step	Action

After cleaning of structure and prior to surface preparation	Safety inspection, removal of dirt, trash, debris, and any hindrance to specified work.
Initiation of abrasive blasting, and at each work stoppage	1.) Confirm environmental conditions are suitable for abrasive blasting and for holding the blast. 2.) Surface inspection to insure all aspects of surface preparation are properly addressed, as specified in article entitled "SURFACE PREPARATION", including visual cleanliness, surface profile, and soluble salt contamination. 3.) Test compressor air for oil and water contamination 4.) Surface inspection to insure all aspects of surface preparation are properly addressed, as specified in article entitled "SURFACE PREPARATION", including visual cleanliness, surface profile, and soluble salt contamination.
Immediately prior to coating application - provide for each coating application evolution	1.) Confirm environmental conditions are suitable for coating application per article entitled "WEATHER CONDITIONS" 2.) Surface inspection to insure all aspects of surface preparation are properly addressed, as specified in article entitled "SURFACE PREPARATION", including visual cleanliness, surface profile, and soluble salt contamination. 3.) Confirm that testing equipment for monitoring for hazardous conditions during coating application are working properly and are prepared for use as outlined in contractor's Safety Plan
During and after coating application.	Coating application inspection per paragraphs entitled "Application of Coating System" and "Field Tests and Inspection".
After final cleanup	Clean-up inspection specified in the paragraph entitled "Final Cleanup."

3.8 FINAL CLEANUP

Following completion of the work, remove debris, equipment, and materials from the site. Remove temporary connections to Government or Contractor furnished water and electrical services. Restore existing facilities in and around the work areas to their original condition.

Table I - Intermediate Epoxy Coat MIL-DTL-24441/31 Formula 152 Type IV White

Test	Component A		Component B		Mixed	
	Min.	Max.	Min.	Max.	Min.	Max.
Pigment content, percent	44.0	49.0	33.0	38.0	---	---
Volatiles, percent	29.0	35.0	16.0	21.0	---	---
Non-volatile vehicle, percent	17.5	23.5	44.0	49.0	---	---
Coarse particles, percent	---	0.3	---	0.3	---	---
Consistency, grams	180	320	300	470	---	---
Weight, Kilograms/liter	1.39	1.45	1.29	1.35	---	---
Pounds per gallon	11.6	12.1	10.8	11.3	---	---
Set to touch, hours at 23 degrees C, 73 degrees F	---	---	---	---	---	3
Dry-hard time, hours at 23 degrees C, 73 degrees F	---	---	---	---	---	8
Fineness of grind, Hegman	4	---	4	---	---	---
Flashpoint, Degrees C	35.5	---	37.8	---	---	---
Degrees F	96	---	100	---	---	---
Titanium dioxide, percent of pigment	91	---	---	---	---	---
Pot life, hours at 23 degrees C, 73 degrees F	---	---	---	---	4	---
Contrast ratio, 3 mils DFT	---	---	---	---	0.98	---
Sag resistance, Micrometers	---	---	---	---	300	---
Mils	---	---	---	---	12	---
Color of dry film to approximate color of standard color chip	---	---	---	---	Conform	
VOC, Grams/liter	---	---	---	---	---	340
Pounds/gallon	---	---	---	---	---	2.8
Lead,* percent, ASTM D 3335	---	---	---	---	---	0.06
Cadmium* percent, ASTM D 3335	---	---	---	---	---	0.06
Chromium* percent ASTM D 3718	---	---	---	---	---	0.00

GENERAL NOTES:
Test methods as specified in MIL-DTL-24441, except those marked with "*".
Where "Conform" is indicated, refer to specific requirements of MIL-DTL-24441.

Table I - Polyurethane Topcoat MIL-PRF-85285 Type II

Test	Component A Min.	Component A Max.	Component B Min.	Component B Max.	Mixed Min.	Mixed Max.
Moisture content, percent	---	1	---	---	---	---
Coarse particles, percent	---	---	---	---	---	.5
Viscosity	---	---	---	---	See Note 1	
Fineness of grind, Hegman	---	---	---	---	7	---
Drying to touch (See Note 2)	---	---	---	---	---	4
Dry hard (See Note 2)	---	---	---	---	---	8
VOC, grams per liter	---	---	---	---	---	340
Color (See Note 3)	---	---	---	---	delta E=1.0	
Gloss 60 degree specular gloss					(See Note 3)	
Gloss	---	---	---	---	---	90
Semi-gloss	---	---	---	---	15	45
Opacity	---	---	---	---	0.95	---
Flexibility	---	---	---	---	Conform	
Fluid resistance	---	---	---	---	Conform	
Heat resistance (cure)	---	---	---	---	Conform	
Solvent resistance (cure)	---	---	---	---	Conform	
Condition in container	---	---	---	---	Conform	
Odor	---	---	---	---	Conform	
Lead percent	---	---	---	---	---	0.06
Cadmium percent	---	---	---	---	---	0.06
Chromium percent	---	---	---	---	---	0.00

NOTES:
(1) Modify paragraph 3.6.4 Viscosity and Pot Life, of MIL-PRF-85285 as follows:

The viscosity of the admixed coating, when tested in accordance with ASTM D1200 through a No. 4 Ford cup, shall be as follows:

Time from mix (minimum)	Maximum time through a No. 4 Ford cup
Initially	30 seconds
2 hours	60 seconds
4 hours	No gel

(2) Modify paragraph 3.7.1 Drying Time, of MIL-PRF-85285

When applied by spray techniques and when tested in accordance with ASTM-D1640, the coating shall be set-to-touch within four hours and dry-hard within eight hours (see 4.6 and table I).

GENERAL NOTES:
- Test methods as specified in MIL-PRF-85285.
- Where "Conform" is indicated, refer to specific requirements of MIL-PRF-85285.

DAILY INSPECTION CHECKLIST

ITEM			REPORT #
SPECIFIC LOCATION	SAT	UNSAT	COMMENTS
I. PRE-SURFACE PREPARATION 1. Condition of Edges, Welds, etc.			
2. Grease/Oil			
3. Visible Moisture			
4. Protective Coverings			
5. Clean Dry Abrasive			
6. Recycled Abrasive Test			
7. Nozzle Air Pressure (Record)			
8. Compressed Air Cleanliness (Record)			
9. Ambient Conditions (Record)			Time of day:
II. SURFACE PREPARATION 10. Ambient Conditions (Record)			Wet Bulb: Humidity Dry Bulb: Dew Pt.: Amb. Air: Surf Temp:
11. Degree of Cleanliness (Record)			
12. Profile (Record)			
13. Type and Size Abrasive (Record)			
14. Dust and Abrasive Removal			
15. Time of Surface Acceptance			
III. MIXING 16. Product Name/Mfg/Batch Numbers (Records)			Product Name: Mfg: Batch Number:
17. Clean Equipment			
18. Material Temperature/Potlife (Record)			
19. Thinner/Type and Amount (Record)			
20. Time of Mix (Record)			

DAILY INSPECTION CHECKLIST

ITEM		REPORT #
SPECIFIC LOCATION	SAT / UNSAT	COMMENTS
IV. APPLICATION 21. Ambient Conditions (Record) Time of Day:		Wet Bulb: Humidity: Dry Bulb: Dew Pt.: Amb. Air: Surf Temp:
22. Applicator's Name (Record)		
23. Surface Prep. to Application (Record Time)		
24. Compressed Air Cleanliness		
25. Protective Coverings		
26. Time Application Began & Surf. Temp. (Record)		
27. Surrounding Air Cleanliness		
28. Recoat Times Observed		
29. Intercoat Cleanliness		
30. Proper Pot Agitation		
31. Type of Application Equip. & Tip Size (Record)		
32. Time Application Complete & Surf. Temp (Record)		
V. INSPECTION 33. Visual Appearance		
34. Dry Film Thickness (Record		
35. Holiday Test		
36. Cure Test		

NOTES: (use additional sheets as necessary)

NACE INSPECTOR _____ NACE NUMBER _____ DATE _____

QC Manager _____ DATE _____

-- End of Section --

SECTION 26 11 18

GROUNDING/BONDING SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B 8	(2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 80	(2000) Guide for Safety in AC Substation Grounding
IEEE 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

UNDERWRITERS LABORATORIES (UL)

UL 467	(2007) Grounding and Bonding Equipment

1.2 WORK SUMMARY

A grounding/bonding system will be required to support the installation of the telecommunications towers at each specified location in Afghanistan. This project consists of design work and construction services for the three telecommunications site locations. This Scope of Work (SOW) defines the work required of the Contractor to design and install the tower grounding/bonding system and obtain approval of the Contracting Officer prior to the start of construction. The ground/bonding system will be installed for each of the telecommunications tower sites. Two of the three sites will require a soil resistivity test to verify that the grounding/bonding design contained on the prototype drawings will comply with the grounding resistivity specification of 0.5 ohms. Grounding/bonding design and construction work scope will consist of the following:

a. Perform a soil resistivity test at the specified locations for the Price and Qalat telecommunications tower locations.

b. Analyze the ground loop design and verify that the design will comply within the 0.5 ohm or less overall ground resistivity requirement.

c. Develop a Grounding/Bonding Resistivity Report summarizing findings and analysis conducted from soil resistivity measurements

and verification of the ground loop design

d. Install ground/bonding loop at each telecommunications tower location as specified in the supplied drawing package.

e. Conduct overall ground resistance testing of the installed ground loop system using the fall of potential method as defined in IEEE 81.

1.2.1 As-Built Drawings

The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full sized set of prints marked to reflect all deviations, modifications, and changes. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. Correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor.

1.3 TERMINOLOGY

For purposes of this SOW, the term "Contracting Officer" means the USAID Contracting Officer.

1.4 PROFESSIONAL QUALIFICATIONS

All grounding/bonding design parameters shall be developed by a Registered Professional Electrical Engineer or Electrical firm responsible to the Contractor. The Electrical Engineer or Electrical firm shall be qualified by meeting all of the following: education in electrical engineering (either by specific training leading to an engineering degree or through a combination of courses in electrical engineering leading to an equivalent degree); professional registration; and a minimum of 10 years of experience in electrical engineering having worked on projects of similar scope and cost. Foreign education and registration will be accepted if they provide equivalent level of knowledge and competency as that required by US standards.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

As-Built Drawings

As-built drawings prepared as a record of the construction as installed. Include in the drawings all the information shown on

the contract drawings as well as all deviations, modifications, and changes from the contract drawings, however minor.

SD-03 Product Data

Materials and Equipment

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

Data composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the Contract Documents.

SD-06 Test Reports

Grounding/Bonding Testing; G

A detailed description of the Contractor's proposed procedures for onsite tests submitted 14 days prior to testing the installed system. No field test will be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Grounding/Bonding Resistivity Report; G

Grounding/Bonding Testing Reports; G

Six copies of the information described below in 215.9 by 279.4 mm binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

a. A list of all equipment used, with calibration certifications.

b. A copy of all measurements taken.

c. The dates of testing.

d. The equipment and values verified.

e. The condition specified for the test.

f. The test results, signed and dated.

g. A description of all adjustments made.

h. Final position of controls, and device settings.

SD-07 Certificates

Materials and Equipment

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories, Inc., (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), submit proof that the items provided under this section of the specifications conform to such requirements. The label of, or listing by, UL will be acceptable evidence that the items conform thereto. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable evidence that the item conforms thereto. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable evidence that the item conforms thereto. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide materials and equipment which are the standard product of a manufacturer regularly engaged in the manufacture of the product and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.2 GROUNDING AND BONDING

2.2.1 Driven Ground Rods

Ground rods shall be copper-clad steel conforming to UL 467 not less than 19.05 mm in diameter by 3.1 m in length.

2.2.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

PART 3 EXECUTION

3.1 GROUNDING

A grounding grid, consisting of the indicated configuration of bare copper conductors and driven ground rods shall be installed as shown on the drawings. Grounding grid shall comply with IEEE 80. Equipment frames of metal-enclosed equipment, medium-voltage cable terminations, chain-link

fencing, metal-structures, and other noncurrent-carrying metal items shall be connected to the ground grid as shown. At least two connections shall be provided from the side electrical distribution source grounding bus to the ground grid. Fences shall be grounded at each fixed gate post, each corner post, and at intermediate posts as indicated. Each gate section shall be bonded to its gate posts with a 3.2 by 25.4 mm flexible braided copper strap and ground post clamps. Fence ground clamps shall be of a type that inhibits corrosion between metal parts. Outriggers shall be grounded as shown.

3.1.1 Grounding Electrodes

Grounding electrodes shall be as follows:

a. Driven rod electrodes - Unless otherwise indicated, ground rods shall be driven into the earth until the tops of the rods are approximately 0.3 m below finished grade.

b. Loop grounding electrodes - A grid grounding electrode shall be installed as shown consisting of bare copper conductors installed as indicated on the Drawings. Loop conductors shall be bonded to rod electrodes. Grid conductors shall be sized as shown on the Drawings.

3.1.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors, in compliance with UL 467, and those below grade shall be made by the fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.1.3 Grounding and Bonding Conductors

Grounding and bonding conductors include all conductors used to bond transformer enclosures, equipment frames and structural members to the grounding grid. Grounding and bonding conductors shall be sized as shown. After being located to provide maximum physical protection, exposed grounding conductors shall be securely attached to structural supports at not more than 0.6 m intervals with suitable fasteners. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete should be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

3.1.4 Surge Arrester Grounding

Surge arresters and neutrals shall be bonded directly to the transformer enclosure and then to the grounding grid with a bare copper conductor, minimum size 95 mm^2. Lead lengths shall be kept as short as practicable with no kinks or sharp bends.

3.2 GROUNDING/BONDING TESTING

3.2.1 Safety

Provide and use safety devices such as rubber gloves, protective barriers,

and danger signs to protect and warn personnel in the test vicinity. Replace any devices or equipment which are damaged due to improper test procedures or handling.

3.2.2 Ground-Resistance Tests

The resistance of the grounding grid shall be measured using the fall-of-potential method defined in IEEE 81. Soil resistivity in the area of the grid shall be measured concurrently with the grid measurements. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

a. Ground Loop Electrode System: Less Than 5 Ohms

3.2.3 Ground-Grid Connection Inspection

All below-grade ground-grid connections will be visually inspected by the Contracting Officer before backfilling. Notify the Contracting Officer 48 hours before the site is ready for inspection.

-- End of Section --

SECTION 26 56 21

TELECOMMUNICATIONS TOWER OBSTRUCTION LIGHTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM D 709	(2001; R 2007) Laminated Thermosetting Materials

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/CC_host/pages/public/custom

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2007; TIA 2007-1; TIA 2007-2; TIA 2007-3; TIA 2007-4; TIA 2007-5) National Electrical Safety Code

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 60228	(2004) Conductors of Insulated Cables

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C119.1	(2006) Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts
NEMA RN 1	(2005) Standard for Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2008; AMD 1 2008) National Electrical Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 150/5345-26	(2008; Rev D) FAA Specification for L-823 Plug and Receptacle, Cable Connectors
FAA AC 150/5345-43	(2006; Rev F) Specification for Obstruction Lighting Equipment
FAA AC 70/7460-1	(2007; Rev K) Obstruction Marking and Lighting

UNDERWRITERS LABORATORIES (UL)

UL 1242	(2006; R 2001 thru 2007) Standard for Electrical Intermediate Metal Conduit -- Steel
UL 360	(2009; R 2009) Standard for Liquid-Tight Flexible Steel Conduit
UL 486A-486B	(2003; R 2004 thru 2009) Standard for Wire Connectors
UL 510	(2005; R 2008) Standard for Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 6	(2007) Electrical Rigid Metal Conduit-Steel
UL 854	(2004; R 2007 thru 2008) Standard for Service-Entrance Cables
UL Electrical Constructn	(2009) Electrical Construction Equipment Directory

1.2 SYSTEM DESCRIPTION

a. Provide communications tower obstruction lights powered from a DC battery source with a solar powered charging system.

b. Luminaires fabricated from ferrous metals, unless hot-dip galvanized or of porcelain enamel finish, shall be factory finished with a weather-resistant finish.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

As-Built Drawings

Drawings, as specified.

SD-03 Product Data

Materials and Equipment

1) A complete itemized listing of equipment and materials proposed for incorporation into the work. Each itemization shall include an item number, the quantity of items proposed, and the name of the manufacturer.

2) Data composed of catalog cuts, brochures, circulars, specifications and product data, and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents shall be included.

Training

Special Tools

List of special tools and test equipment required for maintenance and testing of the products supplied by the Contractor.

List of Parts

A list of parts and components for the system by manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair necessary to ensure continued operation with minimal delays.

Maintenance and Repair

Instructions necessary to check out, troubleshoot, repair, and replace components of the systems, as specified.

Posted Instructions; G

Proposed diagrams, instructions, and other sheets shall be submitted prior to posting.

SD-06 Test Reports

Field Quality Control

Performance test reports, upon completion and testing of the installed system, in booklet form showing all field tests performed to adjust each component and all field tests performed to provide compliance with the specified performance criteria. Each test shall indicate the final position of controls.

SD-07 Certificates

Materials and Equipment

When equipment or materials are specified to conform to the standards or publications and requirements of AASHTO, ANSI, ASTM, AEIC, FM, IEEE, IES, NEMA, NFPA, or UL, or to an FAA, FS, or MS, proof that the items furnished under this section conform to the specified requirements shall be included. The label or listing in UL Electrical Constructn or in FM APP GUIDE or the manufacturer's certification or published catalog specification data statement that the items comply with applicable specifications, standards,

or publications and with the manufacturer's standards will be acceptable evidence of such compliance. Certificates shall be prepared by the manufacturer when the manufacturer's published data or drawings do not indicate conformance with other requirements of these specifications.

SD-10 Operation and Maintenance Data

Operation and Maintenance Procedures

Six copies of operation and six copies of maintenance manuals for the equipment furnished. One complete set shall be furnished prior to performance testing and the remainder shall be furnished upon acceptance. Operating manuals shall detail the step-by-step procedures required for system startup, operation, and shutdown. Operating manuals shall include the manufacturer's name, model number, parts list, and brief description of all equipment and their basic operating features. Maintenance manuals shall list routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. Maintenance manuals shall include conduit and equipment layout and simplified wiring and control diagrams of the system as installed.

1.4 QUALITY ASSURANCE

1.4.1 Code Compliance

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2 and local codes where required.

1.4.2 Prevention of Corrosion

1.4.2.1 Metallic Materials

Protect metallic materials against corrosion as specified. Aluminum shall not be used in contact with earth or concrete. Where aluminum conductors are connected to dissimilar metal, use fittings conforming to UL 486A-486B.

1.4.2.2 Ferrous Metal Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 123/A 123M and ASTM A 153/A 153M.

1.4.3 As-Built Drawings

Submit as-built drawings that provide current factual information including deviations from, and amendments to the drawings and changes in the work, concealed and visible, as instructed. The as-built drawings shall show installations with respect to fixed installations not associated with the systems specified herein. Cable and wire shall be accurately identified as to direct-burial or in conduit and shall locate the connection and routing to and away from bases, housings, and boxes.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide materials and equipment which are the standard product of a manufacturer regularly engaged in the manufacture of the product and that

essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.2 NAMEPLATES

Each major component of equipment shall have as a minimum the manufacturer's name, address, and catalog or style number on a nameplate securely attached to the item of equipment. Laminated plastic nameplates shall be provided for equipment, controls, and devices to identify function, and where applicable, position. Nameplates shall be 3.2 mm thick laminated cellulose paper base phenolic resin plastic conforming to ASTM D 709 sheet type, grade ES-3, white with black center core. Surface shall be a matte finish with square corners. Lettering shall be engraved into the black core. Size of nameplates shall be 25.4 by 63.5 mm minimum with minimum 6.4 mm high normal block lettering. Nameplates provided as indicated. Nameplates shall be fastened to the device with a minimum of two sheet metal screws or two rivets.

2.3 ADDITIONAL REQUIREMENTS

Equipment and materials shall be new unless indicated or specified otherwise. Materials and equipment shall be labeled when approved by Underwriters Laboratories (UL) or Factory Mutual (FM) System.

2.3.1 Electrical Tape

Electrical tape shall be UL 510 plastic insulating tape.

2.3.2 Conduit, Conduit Fittings, and Boxes

2.3.2.1 Rigid Steel Fittings

The metal conduit and fittings shall be UL 6 and UL 1242, respectively, coated with a polyvinylchloride (PVC) sheath bonded to the galvanized exterior surface, nominal 1.0 mm thick, conforming to NEMA RN 1.

2.3.2.2 Liquidtite Flexible Metal Conduit

UL 360liquid-tight flexible metal conduit shall be used in wet locations.

2.3.3 Wire and Cable

Conductors shall be copper except as otherwise indicated.

2.3.3.1 Conductor Sizes

Conductor size shall conform to IEC 60228. Conductor sizes larger than 6 mm ^{2} shall be stranded. Six mm^2 and smaller may be solid or stranded unless otherwise indicated.

2.3.3.2 Low Voltage Wire and Cable

UL 854, Type USE, 600 volts shall be used for underground low voltage power cables.

2.3.3.3 Cable Tags

Install cable tags for each cable or wire. Cable tags shall be permanently

marked or stamped with letters not less than 6.4 mm in height as indicated. Two-color laminated plastic is acceptable. Plastic tags shall be dark colored with markings of light color to provide contrast so that identification can be easily read. Fastening material shall be of a type that will not deteriorate when exposed to water with a high saline content and to petroleum products.

2.3.4 Grounding

The solar power control panel and associated electronics shall be grounded to the tower grounding/bonding loop system to provide for personnel and equipment protection.

2.3.5 Ground Rods

Ground rods shall be copper-clad steel with diameter adequate to permit driving to full length of the rod, but not less than 19.05 mm in diameter and not more than 3.048 m long, unless indicated otherwise.

2.3.6 Cable Connectors and Splices

Cable connectors in accordance with FAA AC 150/5345-26, Item L-823 shall be used for connections and splices appropriate for the type of cable. Other types of cable connectors and splices shall be of copper alloys for copper conductors, aluminum alloys for aluminum-composition conductors and a type designed to minimize galvanic corrosion for copper to aluminum-composition conductors. For FAA Type L-824 lighting cable, connectors shall be FAA AC 150/5345-26, Type L-823.

2.4 OBSTRUCTION LIGHTING

The communications tower shall be lighted as shown on the contract drawings. Obstruction marker light shall be a medium intensity white obstruction light. The light fixture, shall be FAA AC 150/5345-43, Type L-864/L-865. Obstruction marker lights shall be single-unit type as shown in the contract drawings. The obstruction light shall be energized from series circuits as shown on the contract drawings.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

3.2 CABLES, GENERAL REQUIREMENTS

The type of installation, size and number of cables shall be as indicated. Conductors larger than 6 mm^2 shall be stranded. Loads shall be divided as evenly as practicable on the various phases of the system. Compounds and tapes shall be electrical grade suitable for the cable insulation provided and shall use design materials and techniques recommended by the manufacturer. Maximum length of cable pull and cable pulling tensions shall not exceed the cable manufacturer's recommendations.

3.2.1 Cable Installation

Bend radius of any cable shall be not less than 10 times the diameter of

the cable. In no case shall cables be left under longitudinal tension.

3.3 LOW-VOLTAGE CABLES

Cable shall be rated, DC voltage cables, 300 volts. Other parts of cable systems such as splices and terminations shall be rated at not less than 600 volts. Splices in wires 4 mm^2 and smaller shall be made with an insulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A-486B. Splices in single conductor cable shall be made with FAA AC 150/5345-26 Type L-823 connectors. Splices in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.

3.4 LIGHTING OF AIRWAY OBSTRUCTIONS

Towers, poles, smokestacks, buildings of certain shapes and sizes, and other obstructions shall be lighted in accordance with FAA AC 70/7460-1 and as indicated on the Drawings.

3.4.1 Obstruction Marker Lights

An obstruction marker light shall be installed on the telecommunication tower and shall be installed in accordance with equipment manufacturer's recommendations.

3.4.2 Power Supply and Wiring

Install solar powered control panel as indicated on the Drawings. Provide separately protected circuits for obstruction light. Install cabinet as indicated on the Drawings. Conduit riser shall be installed on tower in a corner angle and not near ladder.

3.5 FIELD QUALITY CONTROL

Notify the Contracting Officer five working days prior to each test. Deficiencies found shall be corrected and tests repeated. Field test reports shall be written, signed and provided as each circuit or installation item is completed. Field tests shall include resistance-to-ground and resistance between conductors, and continuity measurements for each circuit. For each series circuit the input voltage and output current of the constant current regulator at each intensity shall be measured. For multiple circuits the input and output voltage of the transformer for each intensity setting shall be measured. A visual inspection of the lights operation, or of the markings appearance, or of the installation of fixtures or units installed shall be reported.

3.5.1 Operating Test

Test each completed circuit installation for operation. Equipment shall be demonstrated to operate in accordance with the requirements of this Section. One day and one night test shall be conducted for the Contracting Officer.

3.6 TRAINING

Provide training on the proper operation and maintenance procedures for the system. Submit information describing training to be provided, training

aids to be used, samples of training materials, and schedules. Training shall include a list of special tools and test equipment required for maintenance and testing of the products supplied by the Contractor; a list of parts and components for the system by manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair necessary to ensure continued operation with minimal delays; instructions necessary to checkout, troubleshoot, repair, and replace components of the systems, including integrated electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting after acceptance of the system.

3.7 POSTED INSTRUCTIONS

Submit a typed copy of the proposed posted instructions showing wiring, control diagrams, complete layout and operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system.

-- End of Section --

SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600	(2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM D 1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 1883	(2007e2) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D 2487	(2006e1) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2937	(2004) Density of Soil in Place by the Drive-Cylinder Method

ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6938	(2008a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-79/020	(1983) Methods for Chemical Analysis of Water and Wastes
EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, ML, CL-ML, CH, MH. Satisfactory materials for grading comprise stones less than 200 mm, except for fill material for pavements which comprise stones less than 75 mm in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory

maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 19.0 mm sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 19.0 mm sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.

1.2.5 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 25 mm in any dimension. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.6 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 0.375 cubic meter in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.7 Unstable Material

Unstable materials are too wet to properly support the appurtenant structure.

1.2.8 Select Granular Material

1.2.8.1 General Requirements

Select granular material consists of materials classified as GW, GP, SW, SP by ASTM D 2487 where indicated. The liquid limit of such material must not exceed 35 percent when tested in accordance with ASTM D 4318. The plasticity index must not be greater than 12 percent when tested in accordance with ASTM D 4318, and not more than 25 percent by weight may be finer than 75 micrometers sieve when tested in accordance with ASTM D 1140.

1.2.8.2 California Bearing Ratio Values

Bearing Ratio: At 2.5 mm penetration, provide a bearing ratio of 40 percent at 95 percent ASTM D 1557 maximum density as determined in accordance with ASTM D 1883 for a laboratory soaking period of not less than 4 days. Conform the combined material to the following sieve analysis:

Sieve Size	Percent Passing by Weight
63 mm	100
4.75 mm	40 - 85
2.00 mm	20 - 80

Sieve Size	Percent Passing by Weight
425 micrometers	10 - 60
75 micrometers	5 - 25

1.2.9 Initial Backfill Material

Initial backfill consists of select granular material or satisfactory materials free from rocks 25 mm or larger in any dimension.

1.2.10 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 30 when tested in accordance with ASTM D 4318.

1.2.11 Nonfrost Susceptible (NFS) Material

Nonfrost susceptible material are a uniformly graded washed sand with a maximum particle size of 4.75 mm and less than 5 percent passing the 0.075 mm size sieve, and with not more than 3 percent by weight finer than 0.02 mm grain size.

1.2.12 Pile Supported Structure

As used herein, a structure where both the foundation and floor slab are pile supported.

1.3 SYSTEM DESCRIPTION

Subsurface soil boring logs are shown on the drawings or appended to the SPECIAL CONTRACT REQUIREMENTS. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.3.1 Classification of Excavation

Finish the specified excavation on a classified basis, in accordance with the following designations and classifications.

1.3.1.1 Common Excavation

Include common excavation with the satisfactory removal and disposal of all materials not classified as rock excavation.

1.3.1.2 Rock Excavation

Include rock excavation with blasting, excavating, grading, disposing of material classified as rock, and the satisfactory removal and disposal of boulders 1/2 cubic meter or more in volume; solid rock; rock material that is in ledges, bedded deposits, and unstratified masses, which cannot be removed without systematic drilling and blasting; firmly cemented conglomerate deposits possessing the characteristics of solid rock impossible to remove without systematic drilling and blasting; and hard materials (see Definitions). Include the removal of any concrete or masonry structures, except pavements, exceeding 1/2 cubic meter in volume that may be encountered in the work in this classification. If at any time during excavation, including excavation from borrow areas, the Contractor

encounters material that may be classified as rock excavation, uncover such material and notify the Contracting Officer. Do not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation and has taken cross sections as required. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for the areas of work in which such deposits occur.

1.3.2 Dewatering Work Plan

Submit procedures for accomplishing dewatering work.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring; G

Dewatering Work Plan; G

Submit 15 days prior to starting work.

SD-03 Product Data

Utilization of Excavated Materials
Rock Excavation
Opening of any Excavation or Borrow Pit

Procedure and location for disposal of unused satisfactory material. Proposed source of borrow material. Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas.

SD-06 Test Reports

Testing
Borrow Site Testing

Within 24 hours of conclusion of physical tests, 3 copies of test results, including calibration curves and results of calibration tests. Results of testing at the borrow site.

SD-07 Certificates

Testing

Qualifications of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

Test offsite soils brought in for use as backfill for Total Petroleum Hydrocarbons (TPH) and metals (lead, chromium, arsenic, cadmium, nickel, zinc, copper, mercury, silver and selenium and full Toxicity Characteristic Leaching Procedure (TCLP) including ignitability, corrosivity and reactivity. Backfill shall contain a maximum of 100 parts per million (ppm) of total petroleum hydrocarbons (TPH). Determine TPH concentrations by using EPA 600/4-79/020 Method 418.1. Determine total metals concentrations by using EPA SW-846.3-3 Method 5030/8020. Perform TCLP in accordance with EPA SW-846.3-3 Method 1311. Provide Borrow Site Testing for TPH, total metals and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Do not bring material onsite until tests have been approved by the Contracting Officer.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Provide acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 75 mm minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air

2.2.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.08 mm and a minimum strength of 10.3 MPa lengthwise, and 8.6 MPa crosswise, with a maximum 350 percent elongation.

2.2.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.10 mm, and a minimum strength of 10.3 MPa lengthwise and 8.6 MPa crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 920 mm deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3 CAPILLARY WATER BARRIER

Provide capillary water barrier of clean, poorly graded crushed rock,

crushed gravel, or uncrushed gravel placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below. Conform to ASTM C 33/C 33M for fine aggregate grading with a maximum of 3 percent by weight passing ASTM D 1140, 75 micrometers sieve, or coarse aggregate Size 57, 67, or 77.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

All topsoil within the project site shall be stripped and excavated. Excavated topsoil shall be removed from the site.

3.2 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the grading limits from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown on the Drawings. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material be deposited a maximum 1 meter from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed. Where pile foundations are to be used, stop the excavation of each pit at an elevation 300 mm above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, remove loose and

displaced material and complete excavation, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.2.3 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.4 Dewatering

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Do not permit French drains, sumps, ditches or trenches within 0.9 m of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Take control measures by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, maintain the water level continuously, at least 2 m below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system. Relieve hydrostatic head in previous zones below subgrade elevation in layered soils to prevent uplift.

3.2.5 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls more than 1.5 meters high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in. Shore vertical trench walls more than 1.5 meters high. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 600 mm plus pipe outside diameter (O.D.) for pipes of less than 600 mm inside diameter, and do not exceed 900 mm plus pipe outside diameter for sizes larger than 600 mm inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.2.5.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 75 mm or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.2.5.2 Removal of Unyielding Material

Where overdepth is not indicated and unyielding material is encountered in the bottom of the trench, remove such material 150 mm below the required grade and replace with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.2.5.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.2.5.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Specify removal of unstable material. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.2.6 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement. Excavate to bottom of pile cap prior to placing or driving piles, unless authorized otherwise by the Contracting Officer. Backfill and compact over excavations and changes in grade due to pile driving operations to 95 percent of ASTM D 698 maximum density.

3.3 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Unless otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. Consider necessary clearing,

grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon related operations to the borrow excavation.

3.4 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

Notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, excavate borrow pits and other excavation areas providing adequate drainage. Transport overburden and other spoil material to designated spoil areas or otherwise dispose of as directed. Provide neatly trimmed and drained borrow pits after the excavation is completed. Ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.5 SHORING

3.5.1 General Requirements

Submit a Shoring and Sheeting plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Finish shoring, including sheet piling, and install as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove shoring, bracing, and sheeting as excavations are backfilled, in a manner to prevent caving.

3.5.2 Geotechnical Engineer

Hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer is responsible for updating the excavation, sheeting and dewatering plans as construction progresses to reflect changing conditions and submit an updated plan if necessary. Submit a monthly written report, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems. The Contracting Officer is responsible for arranging meetings with the Geotechnical Engineer at any time throughout the contract duration.

3.6 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory and unsatisfactory as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.7 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. For pile foundations, stop the excavation at an elevation of from 150 to 300 mm above the bottom of the footing before driving piles. After pile driving has been completed, complete the remainder of the excavation to the elevations shown. Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.8 GROUND SURFACE PREPARATION

3.8.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 150 mm before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 150 mm, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 300 mm and compact it as specified for the adjacent fill.

3.8.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

3.9 UTILIZATION OF EXCAVATED MATERIALS

Dispose unsatisfactory materials removed from excavations into designated waste disposal or spoil areas. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Do not waste any satisfactory excavated material without specific written authorization. Dispose of satisfactory material, authorized to be wasted, in designated areas approved for surplus material storage or designated waste areas as directed. Clear and grub newly designated waste areas on Government-controlled land before disposal of waste material thereon. Stockpile and use coarse rock from excavations for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. Do not dispose excavated material to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.10 BURIED TAPE AND DETECTION WIRE

3.10.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 300 mm below finished grade; under pavements and slabs, bury tape 150 mm below top of subgrade.

3.10.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 300 mm above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 0.9 m of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over it's entire length. Install wires at manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, terminate the wire in the valve pit at the pump station end of the pipe.

3.11 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed as specified in paragraph GROUND SURFACE PREPARATION. Provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.11.1 Trench Backfill

Backfill trenches to the grade shown. Do not backfill the trench until all specified tests are performed.

3.11.1.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with select granular material or initial backfill material.

3.11.1.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with select granular material placed in layers not exceeding 150 mm loose thickness.

3.11.1.3 Bedding and Initial Backfill

Place initial backfill material and compact it with approved tampers to a height of at least 300 mm above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to top of pipe to 95 percent of ASTM D 698 maximum density. Provide plastic piping with bedding to

spring line of pipe. Provide materials as follows:

a. Class I: Angular, 6 to 40 mm, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

b. Class II: Coarse sands and gravels with maximum particle size of 40 mm, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

c. Clean, coarse-grained sand classified as SP by ASTM D 2487 for bedding and backfill.

3.11.1.4 Final Backfill

Fill the remainder of the trench, except for special materials for roadways, railroads and airfields, with satisfactory material. Place backfill material and compact as follows:

a. Roadways and Parking Areas: Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction.

b. Miscellaneous Areas: Deposit backfill in layers of a maximum of 300 mm loose thickness, and compact it to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils.

3.11.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure in accordance with the time period identified in 03 31 00.00 10 CAST-IN-PLACE CONCRETE, place backfill in such a manner that the structure is not damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.12 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.12.1 Water Lines

Excavate trenches to a depth that provides a minimum cover of 0.8 meters from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.12.2 Electrical Distribution Systems

Provide a minimum cover of 600 mm from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated

3.13 EMBANKMENTS

3.13.1 Earth Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 75 mm. Place the material in successive horizontal layers of loose material not more than 300 mm in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise brake up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.14 SUBGRADE PREPARATION

3.14.1 Proof Rolling

Finish proof rolling on an exposed subgrade free of surface water which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade with six passes of a dump truck loaded with 6 cubic meters of soil or 13.6 metric tons, roller. Operate the roller or truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 4 to 5.5 km/hour. When proof rolling, provide one-half of the passes made with the roller in a direction perpendicular to the other passes. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Perform proof rolling in the presence of the Contracting Officer. Undercut rutting or pumping of material as directed by the Contracting Officer and replace with select material.

3.14.2 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 150 mm below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. After rolling, do not show deviations for the surface of the subgrade for roadways greater than 13 mm when tested with a 4 m straightedge applied both parallel and at right angles to the centerline of the area.

3.14.3 Compaction

Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas and railroads, compact each layer of the embankment to at least 95 percent of laboratory maximum density.

3.14.3.1 Subgrade for Pavements

Compact subgrade for pavements to at least 95 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, thoroughly blend, reshape, and compact the top 300 mm of subgrade.

3.15 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 30 mm of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.15.1 Subgrade and Embankments

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until ballast, subbase or base is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course or ballast until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, or frozen subgrade.

3.15.2 Capillary Water Barrier

Place a capillary water barrier under concrete floor and area-way slabs grade directly on the subgrade and compact with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.15.3 Grading Around Structures

Construct areas within 1.5 m outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.16 TESTING

Perform testing by a Corps validated commercial testing laboratory or the Contractor's validated testing facility. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected, Corps validated and approved by the Contracting Officer. Determine field in-place density in accordance with ASTM D 1556 or ASTM D 6938. When ASTM D 6938 is used, check the calibration curves and adjust using only the sand cone method as described in ASTM D 1556. ASTM D 6938 results in a wet unit weight of soil in determining the moisture content of the soil when using this method. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D 6938; check the calibration of both the density and moisture gauges at the beginning of a

job on each different type of material encountered and at intervals as directed by the Contracting Officer. ASTM D 2937, use the Drive Cylinder Method only for soft, fine-grained, cohesive soils. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompacted areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.16.1 Fill and Backfill Material Gradation

One test per 100 cubic meters stockpiled or in-place source material. Determine gradation of fill and backfill material in accordance with ASTM C 136, ASTM D 422, and ASTM D 1140.

3.16.2 In-Place Densities

If more than 20 percent of the field density test yield unsatisfactory results, the testing frequency shall be subdivided and tested at a frequency of one test per 230 square meters.

a. Structural Fill Areas: One test per 230 square meters, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. Non-Structural Fill Areas: One test per 460 square meters, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

3.16.3 Moisture Contents

In the stockpile, excavation, or borrow areas, perform a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, perform tests as dictated by local conditions and approved by the Contracting Officer.

3.16.4 Optimum Moisture and Laboratory Maximum Density

Perform tests for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 500 cubic meters of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.16.5 Tolerance Tests for Subgrades

Perform continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION during construction of the subgrades.

3.16.6 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted, inspect the pipe to determine whether significant displacement has occurred. Conduct this inspection in the presence of the Contracting

Officer. Inspect pipe sizes larger than 900 mm, while inspecting smaller diameter pipe by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgment of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, replace or repair the defects as directed at no additional cost to the Government.

3.17 DISPOSITION OF SURPLUS MATERIAL

Provide surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber shall be removed from the project site as directed by the Contracting Officer.

-- End of Section --

SECTION 32 11 23

GRADED-CRUSHED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(2007) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2007a) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2006)Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 88	(2005) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)

ASTM D 2167	(2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2006e1) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 5821	(2001: R 2006) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D 6938	(2008a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates
ASTM E 11	(2009) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Graded-Crushed Aggregate Base Course

Graded-crushed aggregate (GCA) base course is well graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 19.0 mm sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 19.0 mm sieve are expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.3 SYSTEM DESCRIPTION

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Provide adequate equipment having the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools

SD-06 Test Reports

Sampling and Testing; G
Field Density Tests; G

1.5 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor and performed by a testing laboratory approved in accordance with Section 01 45 00.00 10 QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements; perform testing at the specified frequency. The Contracting Officer may specify the time and location of the tests. Furnish copies of test results to the Contracting Officer within 24 hours of completion of the tests.

1.5.1 Sampling

Take samples for laboratory testing in conformance with ASTM D 75/D 75M. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

Perform the following tests in conformance with the applicable standards listed.

1.5.2.1 Sieve Analysis

Make sieve analysis in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.5.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D 4318.

1.5.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture content in accordance with ASTM D 1557.

1.5.2.4 Field Density Tests

Measure field density in accordance with ASTM D 1556, ASTM D 2167 or ASTM D 6938.

Submit certified copies of test results for approval not less than 30 days before material is required for the work.

1.5.2.5 Wear Test

Perform wear tests on GCA course material in conformance with ASTM C 131.

1.5.2.6 Soundness

Perform soundness tests on GCA in accordance with ASTM C 88.

1.5.3 Testing Frequency

1.5.3.1 Initial Tests

Perform one of each of the following tests, on the proposed material prior to commencing construction, to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Soundness.

1.5.3.2 In Place Tests

Perform each of the following tests on samples taken from the placed and compacted GCA. Samples shall be taken and tested at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 250 square meters or portion thereof, of completed area.

b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 500 square meters, or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

d. Measure the total thickness of the base course at intervals, in such a manner as to ensure one measurement for each 500 square meters of base course, or portion thereof. Measurements shall be made in 75 mm diameter test holes penetrating the base course.

1.5.4 Approval of Material

Select the source of the material 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the material will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

1.6 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 2 degrees C. When the temperature falls below 2 degrees C, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 AGGREGATES

Provide GCA consisting of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, angular sand, or other approved material. GCA shall be free of silt and clay as defined by ASTM D 2487, organic matter, and other objectionable materials or coatings. The portion retained on the 4.75 mm sieve is known as coarse aggregate; that portion passing the 4.75 mm sieve is known as fine aggregate.

2.1.1 Coarse Aggregate

Provide coarse aggregates with angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.

2.1.1.1 Graded-Crushed Aggregate Base Course

GCA coarse aggregate shall not show more than 40 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. GCA coarse aggregate shall not exhibit a loss greater than 18 percent weighted average, at five cycles, when tested for soundness in magnesium sulfate, or 12 percent weighted average, at five cycles, when tested, in sodium sulfate, in accordance with ASTM C 88. The amount of flat and elongated particles shall not exceed 20 percent for the fraction retained on the 12.5 mm sieve nor 20 percent for the fraction passing the 12.5 mm sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregate shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D 5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 90 percent of which by weight are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.2.2 Graded-Crushed Aggregate Base Course

Provide GCA fine aggregate consisting of angular particles produced by crushing stone, or gravel that meets the requirements for wear and soundness specified for GCA coarse aggregate. Fine aggregate shall be produced by crushing only particles larger than 4.75 mm sieve in size. The fine aggregate shall contain at least 90 percent by weight of particles having two or more freshly fractured faces in the portion passing the 4.75 mm sieve and retained on the 2 mm sieve, and in the portion passing the 2 mm sieve and retained on the 0.425 mm sieve.

2.1.3 Gradation Requirements

Apply the specified gradation requirements to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE 1. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2	No. 3
50.0 mm	100	----	----
37.5 mm	70-100	100	----
25.0 mm	45-80	60-100	100
12.5 mm	30-60	30-65	40-70
4.75 mm	20-50	20-50	20-50
2.00 mm	15-40	15-40	15-40
0.425 mm	5-25	5-25	5-25
0.075 mm	0-8	0-8	0-8

NOTE 1: Particles having diameters less than 0.02 mm shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Apply liquid limit and plasticity index requirements to the completed course and to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the 0.425 mm sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the GCA is constructed in more than one layer, clean the previously constructed layer of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area. Provide line and grade stakes as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified time limit. Upon completion of the work, the aggregate sources on Government property shall be conditioned to drain readily and shall be left in a satisfactory condition. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.3 STOCKPILING MATERIAL

Clear and level storage sites prior to stockpiling of material. Stockpile all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course, the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 31 00 00 EARTHWORK. Ruts or soft yielding spots in the underlying course(s), areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course. Stabilization shall be accomplished by mixing GCA into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the base course is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

Mix the coarse and fine aggregates in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. Make adjustments in mixing procedures or in equipment, as directed, to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification.

3.5.2 Placing

Place the mixed material on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 150 mm or less in thickness is required, place the material in a single layer. When a compacted layer in excess of 150 mm is required, place the material in layers of equal thickness. No layer shall be thicker than 150 mm or thinner than 75 mm when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.5.3 Grade Control

The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The base course(s) shall be placed so that the completed section will be a minimum of 600 mm wider, on all sides, than the next layer that will be placed above it. Additionally, place approved fill material along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 600 mm width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of base course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Compact each layer of the base course, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed

of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Continue compaction until each layer has a degree of compaction that is at least 100 percent of laboratory maximum density through the full depth of the layer. Make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Construct the compacted thickness of the base course as indicated. No individual layer shall be thicker than 150 mm nor be thinner than 75 mm in compacted thickness. The total compacted thickness of the base course shall be within 13 mm of the thickness indicated. Where the measured thickness is more than 13 mm deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 13 mm thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 6 mm of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square meters of base course, or portion thereof. Measurements shall be made in 75 mm diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 13 mm or more below grade, then the top layer should be scarified to a depth of at least 75 mm and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 10 mm when tested with a 3.66 meter straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 15 meter intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 MAINTENANCE

Maintain the base course in a satisfactory condition. Maintenance shall include immediate repairs to any defects and shall be repeated as often as

necessary to keep the area intact. The base course, prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.7 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of as directed. No additional payments will be made for materials that must be replaced.

-- End of Section --

SECTION 32 31 13.53

HIGH-SECURITY CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 121	(2007) Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 176	(1999; R 2009) Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
ASTM A 392	(2007) Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 478	(1997; R 2008) Standard Specification for Chromium-Nickel Stainless Steel Weaving and Knitting Wire
ASTM A 702	(1989; R 2006) Standard Specification for Steel Fence Posts and Assemblies, Hot Wrought
ASTM A 780/A 780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 824	(2001; R 2007) Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM C 94/C 94M	(2009a) Standard Specification for Ready-Mixed Concrete
ASTM F 1043	(2008) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
ASTM F 1083	(2008) Standard Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(2005) Industrial and Commercial Horizontal Slide Gates

ASTM F 567	(2007) Standard Practice for Installation of Chain Link Fence
ASTM F 626	(2008) Standard Specification for Fence Fittings
ASTM F 900	(2005) Industrial and Commercial Swing Gates

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS RR-F-191/4	(Rev D) Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The Contract shall submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fence Installation
Installation Drawings
Location of gate, corner, end, and pull posts
Gate Assembly
Gate Hardware and Accessories

SD-03 Product Data

Fence Installation
Gate Assembly
Gate Hardware and Accessories
Gate Posts
Posts
Barbed Wire Supporting Arms
Post Caps
Tension Wire
Wire Ties
Barbed Wire

Manufacturer's descriptive data and installation instructions.

SD-06 Test Reports

Weight in grams for zinc coating

SD-07 Certificates

Chain Link Fence

Submit reports, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

Zinc Coating
Fabric
Barbed Wire
Barbed Tape
Stretcher Bars
Gate Hardware and Accessories
Concrete

SD-08 Manufacturer's Instructions

Submit Manufacturer's instructions for the following items:

Fence Installation
Gate Assembly
Hardware Assembly
Accessories

1.3 QUALITY ASSURANCE

1.3.1 Assembly and Installation Drawings

Submit complete Fence Installation Drawings and test reports for review and approval by the Contracting Officer prior to shipment. Drawing details shall include, but are not limited to: Fence Installation, Location of gate, corner, end, and pull posts, Gate Assembly, and Gate Hardware and Accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 PRODUCTS

2.1 FENCE FABRIC

2.1.1 General

Provide ASTM A 392, Class 1, zinc-coated steel wire with minimum zinc coating weight of 370 grams of zinc per square meter of coated surface. Fabricate fence fabric of 9 gauge wire woven in 50 mm mesh conforming to ASTM A 392. Set fabric height at 2.1 m. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage. Secure fabric to posts using stretcher bars or ties spaced 375 mm on center, or by integrally weaving to integral fastening loops of end, corner, pull, and gate posts for full length of each post. Install fabric on opposite side of posts from area being secured.

2.2 POSTS

2.2.1 Metal Posts for Chain Link Fence

a. Provide posts conforming to ASTM F 1083, zinc-coated. Group IA, with external coating Type A steel pipe; Group IC steel pipe, zinc-coated with external coating Type A or Type B; or Group II, roll-formed steel sections; meeting the strength and coating requirements of ASTM F 1043 and ASTM A 702. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Provide sizes as shown on the

drawings. Line posts and terminal posts selected shall be of the same designation throughout the fence. Provide gate post for the gate type specified subject to the limitation specified in ASTM F 900 and/or ASTM F 1184. Post spacing shall conform to the recommended guidelines as set forth in the CLFMI "Wind Load Guide for the Selection of Line Post Spacing and Size" unless specified to exceed those guidelines.

2.2.2 Accessories

a. Provide accessories conforming to ASTM F 626. Ferrous accessories shall be zinc coated.

b. Furnish truss rods for each terminal post. Provide truss rods with turnbuckles or other equivalent provisions for adjustment.

c. Provide Barbed wire supporting arms of the single 45 degree outward angle 3-strand arm type and of the design required for the post furnished. Secure arms by top tension wire.

d. Furnish post caps in accordance with manufacturer's standard accessories.

e. Provide 9 gauge steel tie wire for attaching fabric to rails, braces, and posts and match the coating of the fence fabric. Tie wires for attaching fabric to tension wire on high security fences shall be 1.6 mm stainless steel. Provide double loop tie wires 165 mm in length. Miscellaneous hardware coatings shall conform to ASTM A 153/A 153M unless modified.

2.3 WIRE

2.3.1 Wire Ties

FS RR-F-191/4. Provide wire ties constructed of the same material as the fencing fabric.

2.3.2 Barbed Wire

Provide barbed wire conforming to ASTM A 121 zinc-coated, Type Z, Class 3, or aluminum-coated, Type A, with 12.5 gauge wire with 14 gauge, round, 4-point barbs spaced no more than 125 mm apart.

2.3.3 Tension Wire

Provide Type I or Type II tension wire, Class 4 coating, in accordance with ASTM A 824.

2.4 BARBED TAPE

Provide reinforced barbed tape, single coil, for fence toppings fabricated from 430 series stainless steel with a hardness range of Rockwell (30N) 37-45 conforming to the requirements of ASTM A 176. Provide stainless steel strip 0.6 mm thick by 25 mm wide before fabrication. Each barb shall be a minimum of 30.5 mm in length, in groups of 4, spaced on 102 mm centers. The stainless steel core wire shall have a 2.5 mm diameter with a minimum tensile strength of 9.68 MPa and be in accordance with ASTM A 478. The stainless steel strip shall be 0.6 mm thick by 31 mm wide before fabrication. Each barb shall be a minimum of 30.5 mm in length, in groups of 4, spaced on 102 mm centers. Use sixteen gauge stainless steel

twistable wire ties for attaching the barbed tape to the barbed wire.

2.5 CONCRETE

ASTM C 94/C 94M, using 19 mm maximum size aggregate, and having minimum compressive strength of 21 MPa at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.6 GATES

2.6.1 Gate Assembly

Provide gate assembly conforming to ASTM F 900 and/or ASTM F 1184 of the type and swing shown. Provide gate frames conforming to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Provide gate frames conforming to strength and coating requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A or Type B, nominal pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain link fabric.

2.6.2 Gate Leaves

For gate leaves, more than 2.44 m wide, provide either intermediate members and diagonal truss rods or tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 2.44 m wide shall have truss rods or intermediate braces. Attach fabric to the gate frame by method standard with the manufacturer except that welding will not be permitted.

2.6.3 Gate Hardware and Accessories

Furnish and install latches, hinges, stops, keepers, rollers, and other hardware items as required for the operation of the gate. Arrange latches for padlocking so that the padlock will be accessible from both sides of the gate. Provide stops for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

PART 3 EXECUTION

3.1 FENCE INSTALLATION

Perform complete installation conforming to ASTM F 567.

3.1.1 Line and Grade

Install fence to the lines and grades indicated. Clear the area on either side of the fence line to the extent indicated. Space line posts equidistant at intervals not exceeding 3 m. Terminal posts shall be set at abrupt changes in vertical and horizontal alignment. Provide fabric continuous between terminal posts; however, runs between terminal posts shall not exceed 152.4 m. Repair any damage to galvanized surfaces, including welding, with paint containing zinc dust in accordance with ASTM A 780/A 780M.

3.1.2 Excavation

Clear all post holes of loose material. Spread waste material where directed. Eliminate ground surface irregularities along the fence line to the extent necessary to maintain a 25 mm clearance between the bottom of the fabric and finish grade.

3.2 POST INSTALLATION

3.2.1 Earth and Bedrock

a. Set posts plumb and in alignment. Except where solid rock is encountered, set posts in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, set posts to a minimum depth of 457 mm in rock. Where solid rock is covered with an overburden of soil or loose rock, set posts to the minimum depth indicated on the drawing unless a penetration of 457 mm in solid rock is achieved before reaching the indicated depth, in which case terminate depth of penetration. Grout all portions of posts set in rock.

b. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Make diameters of holes in solid rock at least 25 mm greater than the largest cross section of the post. Thoroughly consolidate concrete and grout around each post, free of voids and finished to form a dome. Allow concrete and grout to cure for 72 hours prior to attachment of any item to the posts. Set driven posts to a minimum depth of 914 mm and protect with drive caps when setting.

Test fence post rigidity by applying a 222.4 newtons force on the post, perpendicular to the fabric, at 1.52 m above ground. Post movement measured at the point where the force is applied shall be less than or equal to 19 mm from the relaxed position. Test every tenth post for rigidity. When a post fails this test, make further tests on the next four posts on both sides of the failed post. All failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.3 RAILS

Bolt bottom rail to double rail ends and securely fasten double rail ends to the posts. Peen bolts to prevent easy removal. Install bottom rail before chain link fabric.

3.4 FABRIC INSTALLATION

a. Install chain link fabric on the side of the post indicated. Attach fabric to terminal posts with stretcher bars and tension bands. Space bands at approximately 381 mm intervals. Install fabric and pull taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fasten fabric to line posts at approximately 381 mm intervals and fastened to all rails and tension wires at approximately 305 mm intervals.

b. Cut fabric by untwisting and removing pickets. Accomplish splicing by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 25 mm plus or minus 13 mm

above the ground.

c. After the fabric installation is complete, exercise the fabric by applying a 222 newtons push-pull force at the center of the fabric between posts; the use of a 133 newtons pull at the center of the panel shall cause fabric deflection of not more than 63.5 mm when pulling fabric from the post side of the fence; every second fence panel shall meet this requirement; resecure and retest all failed panels at the Contractor's expense.

3.5 SUPPORTING ARMS

Install barbed wire supporting arms and barbed wire as indicated on the drawings and as recommended by the manufacturer. Anchor supporting arms to the posts in a manner to prevent easy removal with hand tools.

3.6 BARBED TAPE INSTALLATION

Install stainless steel reinforced barbed tape as detailed on the drawings. Stretch out barbed tape to its manufacturer's recommended length, set on top of the barbed wire and "V" shaped support arms, then secure it to the barbed wire. Secure the barbed tape to the barbed wire at the two points and at every spiral turn of both coils as shown on the drawings.

3.7 GATE INSTALLATION

a. Install gates at the locations shown. Mount gates to swing as indicated. Install latches, stops, and keepers as required. Install gates as recommended by the manufacturer.

b. Weld or otherwise secure hinge pins, and hardware assembly to prevent removal.

3.8 GROUNDING

a. Ground fencing as indicated on drawings and specified.

b. Ground fences on each side of all gates, at each corner, at the closest approach to each building located within 15 m of the fence, and where the fence alignment changes more than 15 degrees. Grounding locations shall not exceed 198 m. Bond each gate panel with a flexible bond strap to its gate post. Ground fences crossed by powerlines of 600 volts or more at or near the point of crossing and at distances not exceeding 45 m on each side of crossing.

c. Provide ground conductor consisting of No. 8 AWG solid copper wire. Grounding electrodes shall be 19 mm by 3.05 m long copper-clad steel rod. Drive electrodes into the earth so that the top of the electrode is at least 152 mm below the grade. Where driving is impracticable, electrodes shall be buried a minimum of 305 mm deep and radially from the fence. The top of the electrode shall not be less than 610 mm or more than 2.4 m from the fence. Clamp ground conductor to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. Total resistance of the fence to ground shall not be greater than 25 ohms.

3.9 SECURITY

Install new security fencing, remove existing security fencing, and perform related work to provide continuous security for facility. Schedule and fully coordinate work with Contracting Officer and cognizant Security Officer.

3.10 CLEANUP

Remove waste fencing materials and other debris from the work site each workday.

-- End of Section --