CITY OF DEL RIO
PROJECT MANUAL

REQUEST FOR BEST VALUE BID (BVB) FOR GENERAL CONTRACTOR FOR NEW CONSTRUCTION OF T-6 PREFABRICATED AIRCRAFT SUN SHADES AT LAUGHLIN AIR FORCE BASE

ISSUED NOVEMBER 21, 2016

Best Value Bid Opening

on December 12, 2016

at 3:00 PM

100% Submittal

CIVIL ENGINEER:

BAINMEDINABAIN
ENGINEERS & SURVEYORS

7073 San Pedro Ave
San Antonio, TX 78216
TBPE – F-1712

T-6 PREFABRICATED AIRCRAFT SUN SHADES
AT LAUGHLIN AIR FORCE BASE

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SECTION 1 – GENERAL INFORMATION AND REQUIREMENTS

1.0 DEFINITIONS: In This document the following definitions are used:

47 CES/CENMP	47th CIVIL ENGINEERING SQUARE ROUTE
LAFB	Laughlin Air Force Base
Owner	City of Del Rio, Texas (D.R.)
Owner's Representative for the overall matters	Alejandro Garcia, P.E. Public Works Director, City of Del Rio 830-774-8535 aagarcia@cityofdelrio.com
Owner's Representative for Construction	Alejandro Garcia, P.E. Public Works Director, City of Del Rio 830-774-8535 aagarcia@cityofdelrio.com
Project Engineer	Carl Bain, P.E. Bain Medina Bain, Inc. 210-494-7223 cbain@bmbi.com

1.1 GENERAL INFORMATION: CITY OF DEL RIO, TEXAS – D.R. ("Owner") is soliciting Best Value Bids ("BVB's") for selection of a general contracting firm for New Construction of T-6 PREFABRICATED AIRCRAFT SUN SHADES AT LAUGHLIN AIR FORCE BASE (Project), in accordance with the terms, conditions, and requirements set forth in this Request for Best Value Bid.

1.1.1 This Request for Best Value Bids ("RFBVB's") is for selecting a General Contractor for the Project. The RFBVB's provides the information necessary to prepare and submit Best Value Bid for consideration and ranking by the Owner.

1.1.2 The Owner may select the Proposal that offers the "Best Value Bid" for the institution based on the published selection criteria and on its ranking evaluation. The Owner may first attempt to negotiate a contract with the selected Respondent. The Owner may discuss with the selected Respondent options for a scope or time modification and any price change associated with the modification. If the owner is unable to reach a contract with the selected Respondent, the Owner may formally end negotiations with that Respondent and proceed to the next "Best Value Bid" Respondent in the order of the selection ranking until a contract is reached or all BVB's are rejected.

1.2 PUBLIC INFORMATION: All information, documentation, and other materials submitted in response to this solicitation are considered non-confidential and/or non-proprietary and are subject to public disclosure under the Texas Public Information Act (*Texas Government Code*, Chapter 552.001, *et seq.*) after the solicitation is completed.D.R. strictly adheres to

all statutes, court decisions and the opinions of the Texas Attorney General with respect to disclosure of public information under the *Texas Public Information Act* ("TPIA"), Chapter 552, *Texas Government Code*. In accordance with Section 552.002 of TPIA and Section 2252.907, *Texas Government Code*, and at no additional charge to D.R., Contractor will make any information created or exchanged with D.R. pursuant to this Agreement (and not otherwise exempt from disclosure under TPIA) available in a format reasonably requested by D.R. that is accessible by the public**.**

1.3 TYPE OF CONTRACT: Any contract resulting from this solicitation will be in the form of the Owner's Standard Agreement between owner and contractor, a copy of which is included in the Project Manual.

1.3.1 The work will be awarded under a Lump-Sum contract to the Respondent offering the "Best Value Bid" to the Owner.

1.4 CLARIFICATIONS AND INTERPRETATIONS: Any clarifications or interpretations of this RFBVB that materially affect or change its requirements will be issued by the Owner as an Addendum. It is the responsibility of all respondents to obtain this information in a timely manner. All such Addenda issued by the Owner before the BVB′s are due as part of the RFBVB, and respondents shall acknowledge receipt of each Addendum to the RFBVB and/or the BVB Documents in its Proposal.

1.4.1 Addendum may be issued by the Point-of-Contact for this BVB via the Email or USPS Mail.

1.4.2 No oral explanation in regard to the meaning of the Bidding Documents will be made and no oral instructions will be given before the award of the contract. Discrepancies, omissions or doubts as to the meaning of Drawings and Specifications shall be communicated in writing to the Point of Contact for interpretation. Any interpretation made will be in the form of an Addendum, which will be forwarded to all known plan holders and its receipt by the respondent shall be acknowledged on the BVB and Delivery Submittal Form.

1.4.3 Respondents shall consider only those clarifications and interpretations to the Drawings and Specifications that the Point of Contact issues by Addenda five (5) calendar days prior to the submittal deadline. Interpretations or clarifications in any other form, including oral statements, will not be binding on the Owner and should not be relied on in preparing BVB′s.

1.5 SUBMISSION OF BVB′s:

1.5.1 BEST VALUE BID DEADLINE AND LOCATION: The Owner will receive BVB′s at the time and location described below. Late BVB′s will not be accepted for any reason.

December 12, 2016 until 3:00 PM, Central Standard Time

City of Del Rio
C/O City Secretary, Alma Levrie
109 W. Broadway St.
Del Rio, Texas 78840

1.5.1.0 Submit one (1) BVB with original signatures, three (3) identical copies and 1 electronic copy (CD or flash drive) of the BVB & Delivery Submittal Form, Bid Bond, Execution of Offer form, Certificate of Acknowledgement form, Conflict of Interest Questionnaire, Debarment and Suspension Certification form, W-9 form, and Qualifications in one (1) envelope.

1.5.2 BVB′s that are received late will be returned to the respondent unopened. The City Secretary will identify the official time clock in the City Secretary′s office at the BVB′s submittal location identified above.

1.5.3 The Owner will not acknowledge or receive BVB′s that are delivered by telephone, facsimile (fax), or electronic mail (e-mail).

1.5.4 Properly submitted BVB′s **will not** be returned to the respondents.

1.5.5 Properly submitted BVB′s will be opened publicly and the names of the respondents will be read aloud at the City of Del Rio, Council Chambers, 109 West Broadway St. Del Rio, Texas at 3:00 PM CDT on December 12, 2016.

1.6 POINT-OF-CONTACT: The Owner designates the following person, as its representative and Point- of-Contact for this RFBVB. Respondents shall restrict all contact with the Owner and direct all questions regarding this RFBVB, including questions regarding terms and conditions, to the Point-of-Contact person.

Carl Bain, P.E.
Bain Medina Bain, Inc.
7073 San Pedro Ave.
San Antonio, TX 78216

Phone: 210.494.7223

Email: cbain@bmbi.com

1.7 EVALUATION OF BVB's: The evaluation of the BVB's shall be based on the requirements described in this RFBVB. Approximately **Fifty Percent (50%)** of the evaluation will be based on the Respondent's Pricing and Delivery BVB; the remaining evaluation will be based on the Respondent's Qualifications. All properly submitted BVB's will be reviewed, evaluated, and ranked by the Owner.

1.8 OWNER'S RESERVATION OF RIGHTS: The Owner may evaluate the BVB's based on the anticipated completion of all or any portion of the Project. The Owner reserves the right to divide the Project into multiple parts, to reject any and all BVB's and re-solicit for new BVB's, or to reject any and all BVB's and temporarily or permanently abandon the Project. Owner makes no representations, written or oral, that it will enter into any form of agreement with any respondent to this RFBVB for any project and no such representation is intended or should be construed by the issuance of this RFBVB.

1.9 ACCEPTANCE OF EVALUATION METHODOLOGY: By submitting a BVB in response to this request, the Respondent accepts the evaluation process and acknowledges and accepts that determination of the "Best Value Bid" Respondent will require subjective judgments by the Owner. The Owner reserves the right to consider any BVB "non-responsive" if the BVB base bid Cost is determined to be unreasonable or irresponsible in relation to the other submitted BVB's and/or the Owner's estimate of the construction cost.

1.9.1 Best Value Bid evaluation factors to be used shall be:

1. BVB Bid Amount;
2. Reputation of the Respondent and of the Respondent's goods or services;
3. Quality of Respondent's goods or services;
4. Extent to which the goods or services meets the City's and Laughlin Air Force Base's (LAFB) needs;
5. Respondent's past relationship with the City and LAFB;
6. Compliance with the City's and LAFB's terms and conditions;
7. Compliance with the City's and LAFB's insurance requirements; and
8. Any relevant factor that a private business entity would consider in selecting a Contractor.

City of Del Rio Officials will be the judge of the best value bid criteria.

1.10 NO REIMBURSEMENT FOR COSTS: Respondent acknowledges and accepts that any costs incurred from the respondent's participation in this RFBVB process shall be at the sole risk and responsibility of the respondent. Respondents submit BVB's at their own risk and expense.

1.11 MANDATORY PRE-SUBMITTAL CONFERENCE: A mandatory pre-submittal conference will be held at the time and location described below.

November 29, 2016 at 10:00 AM,
Standard Time
City of Del Rio, Council Chambers
109 W. Broadway St.
Del Rio, TX 78840

A site visit will be included as a part of the mandatory pre-submittal conference. This may be the only opportunity for potential respondents to view the Project site before the submittal of BVB's.

1.12 ELIGIBLE RESPONDENTS: Only individual firms or lawfully formed business organizations may apply (This does not preclude a respondent from using consultants.) The Owner will contract only with the individual firm or formal organization that submits a BVB.

1.13 NOT USED

1.14 SALES AND USE TAXES: Texas Tax Code Section 151.311 provides that certain tangible personal property incorporated into realty or consumed at the jobsite in the performance of a contract foran improvement to realty for certain exempt entities, including LAFB, and City of Del Rio, are exempt from state sales tax. Section 150.311 also provides that certain otherwise taxable services performed at the jobsite are exempt from taxes on D.R.'s projects. It is the responsibility of the Respondent to incorporate allowable tax savings into its BVB.

1.15 CERTIFICATION OF FRANCHISE TAX STATUS: Corporate or limited liability company Respondents are advised that if successful it will be required to submit certification that it is not delinquent in the payment of any franchise tax status due under Chapter 171 of the Texas Tax Code, or that it is exempt from the payment of such taxes, or that it is an out-of-state legal entity and not subject to the Texas Franchise Tax, whichever is applicable. The Respondent further agrees that each subcontractor and supplier under contract will also provide an appropriate certification of franchise tax status.

1.16 PREVAILING MINIMUM WAGE RATE DETERMINATION: Respondents are advised that the Texas Prevailing Wage Law applies to this Project will be administered in accordance with the policies and procedures set forth in the document, entitled "Prevailing Wage Guidelines." A copy is attached to this Request for BVB's.

1.17 DELINQUENCY IN PAYING CHILD SUPPORT: Pursuant to Texas Family Code Section 231.006, the Respondent or applicant certifies that the individual or business entity named in this contract, bid, or application is not ineligible to receive the award of or payment for the Project and acknowledges that any agreement may be terminated and payment may be withheld if this certification is inaccurate.

1.18 NOT USED

1.19 REQUIRED NOTICES OF WORKERS' COMPENSATION INSURANCE COVERAGE: The Division of Workers' Compensation of the Texas Department of Insurance (TDI) has adopted rule TAC Title 28, Part 2, sec. 110.110, relating to REPORTING REQUIREMENTS FOR BUILDING OR CONSTRUCTION PROJECTS FOR GOVERNMENTAL ENTITIES. The rule applies to all building or construction contracts advertised for bid on or after September 1, 1994. The rule implements sec. 406.096, Texas Labor Code, which requires Workers' compensation insurance coverage for all persons providing services on a building or construction project for a governmental entity. The requirements are set forth in paragraph 5.2 Workers' Compensation Insurance Coverage of the General Conditions.

"Persons providing services on the project ("subcontractor" in §406.096 of the Act)--With the exception of persons excluded under subsections (h) and (i) of this section, includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes but is not limited to independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity furnishing persons to perform services on the project. "Services" includes but is not limited to providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets."

1.20 PAYMENT FOR MATERIALS AND SERVICES: Any partial payments made in accordance to the General Conditions for Building Construction Contracts. With respect to payment for materials, payment will only be approved for materials that are actually installed. Invoices for payment for work performed and materials installed shall be submitted monthly, lump sum, or as mutually agreeable between Contractor and Owner's Representative. D.R.'s standard payment terms are "Net 30 days" as mandated by the Texas Prompt Payment Act (ref. Chapter 2251, Government Code). An amount to be held for retainage will be determined at the preconstruction meeting.
Most projects will require retainage amount of **5%** of the completed work be held by the Owner until final completion, approval, and final acceptance of the project.
All documentation required by this project (warranty papers as an example) must be submitted to the Owner prior to final payment on the contract.

1.21 DISPUTE RESOLUTION: The dispute resolution process provided for in Texas Government Code, Chapter 2260, shall be used by the Owner and the Contractor to attempt to resolve any claim for breach of contract made by the Contractor, that is not resolved under procedures described throughout the Uniform General and Supplementary General Conditions (UGC) (ref. UGC Article 15 Dispute Resolution)

Neither the occurrence of any event giving rise to a breach of contract claim nor the pendency of a claim constitute grounds for the suspension of performance by Contractor, in whole or in part. City of Del Rio and Contractor agree that any periods set forth in this Agreement for notice and cure of defaults are not waived.

Nothing herein shall hinder, prevent, or be construed as a waiver of Owner's right to seek redress on any disputed matter in a court of competent jurisdiction.

Nothing herein shall waive or be construed as a waiver of the state's sovereign immunity.

1.22 SAFETY TRAINING CLASS PROVIDED BY LAUGHLIN AIR FORCE BASE: Contractor and subcontractor employees working on job site must attend a safety training class provided by Laughlin Air Force Base at no cost to the contractor. More information on the class will be provided to the awarded contractor.

1.23 ASBESTOS CONTAINING MATERIALS: The Contractor shall insure that if any suspect asbestos containing material is encountered, the Construction Manager will immediately notify the Project Manager and the Resident Project Representative. The 47 CES/CENMP will arrange for Management Asbestos Program will perform or contract for any asbestos inspections, asbestos abatement, asbestos project management, and third-party asbestos monitoring.

The Contractor shall provide a certification statement, included with each material submittal, stating that no asbestos containing materials or work is included within the scope of the proposed submittal.

The Contractor shall take whatever measures he deems necessary to insure that all employees, suppliers, fabricators, material men, subcontractors, or their assigns, comply with this requirement.

All materials used on this Project shall be certified as Non Asbestos Containing Building

Materials (ACBM). The Contractor shall insure compliance with the following acts from all of his subcontractors and assigns:

Asbestos Hazard Emergency Response Act (AHERA—40 CFR 763-99 (7));

National Emission Standards for Hazardous Air Pollutants (NESHAP—EPA 40 CFR 61, National Emission Standard for Asbestos;

Texas Asbestos Health Protection Rules (TAHPR—Tex. Admin. Code Title 25, Part 1, Ch. 295C, Asbestos Health Protection

The Contractor shall provide, in hard copy and electronic form, all necessary material safety data sheets (MSDS) of all products used in the construction of the Project to the Texas Department of State Health Services Licensed Inspector or Project Architect or Engineer who will compile the information from the MSDS and, finding no asbestos in any of the product, make a certification statement.

At Final Completion, the Contractor shall provide a notarized certification statement per TAC Title 25 Part 1, Chapter 295.34, par. c.1 that no Asbestos Containing Building Materials (ACBM) was used, provided, or left on this project during construction of the Project.

1.24 SITE INVESTIGATION: The respondent shall make a thorough examination of the project site and become familiar with the existing conditions **prior** to submission of a BVB. The respondent shall make complete allowances for conditions under which the respondent will be required to operate, and this shall be considered in the proposal.

1.25 BACKGROUND CHECKS: Responsibility for Individuals Performing Services; Criminal Background Checks**:** Each individual who is assigned to perform the Work under this Agreement will be an employee of Contractor or an employee of a permitted subcontractor engaged by Contractor. Contractor is responsible for the performance of all individuals performing the Work under this Agreement. Prior to commencing the Work, Contractor will (1) provide 47 CES/CENMP with a list ("List") of all individuals who may be assigned to perform the Work, and (2) have an appropriate criminal background screening performed on all such individuals. Contractor shall determine on a case-by-case basis whether each individual assigned to perform the Work is qualified to provide such services. **Contractor will not knowingly assign any individual to provide services on 47 CES/CENMP who has a history of criminal conduct unacceptable for 47 CES/CENMP, including violent or sexual offenses.** Contractor will update the List each time there is a change in the individuals assigned to perform the Work.

Prior to commencing performance of the Work under this Agreement, Contractor will provide 47 CES/ CENMP a letter signed by an authorized representative certifying compliance with this Section.
Contractor will provide 47 CES/CENMP an updated certification letter each time there is a change in the individuals assigned to perform the Work.

1.26 UNDOCUMENTED WORKERS: The *Immigration and Nationality Act* (8 *United States Code* 1324a) ("Immigration Act") makes it unlawful for an employer to hire or continue employment of undocumented workers. The United States Immigration and

Customs Enforcement Service has established the Form I-9 Employment Eligibility Verification Form ("I-9 Form") as the document to be used for employment eligibility verification (8 *Code of Federal Regulations* 274a). Among other things, Contractor is required to:
(1) have all employees complete and sign the I-9 Form certifying that they are eligible for employment; (2) examine verification documents required by the I-9 Form to be presented by the employee and ensure the documents appear to be genuine and related to the individual; (3) record information about the documents on the I-9 Form, and complete the certification portion of the I-9 Form; and (4) retain the I-9 Form as required by Applicable Laws. It is illegal to discriminate against any individual (other than a citizen of another country who is not authorized to work in the United States) in hiring, discharging, or recruiting because of that individual's national origin or citizenship status. If Contractor employs unauthorized workers during performance of this Project in violation of the Immigration Act then, in addition to other remedies or penalties prescribed by Applicable Laws, D.R. may terminate this Agreement. Contractor represents and warrants that it is in compliance with and agrees that it will remain in compliance with the provisions of the Immigration Act.

1.27 MATERIAL PERFORMANCE DATA: Materials produced by respective firms may vary, within reason, from performance data listed herein if the system as a whole complies with key performance criteria. The performance specifications shown herein are based on manufacturers for the sole purpose of setting a desired standard for top-of-line products. No attempt has been made nor implied to exclude any qualified manufacturer or contractor from bidding this project with approved, equally suitable products. Furthermore, it is understood that each manufacturer's products will have their respective strengths individually, but will be evaluated based upon their proven--and tested--performance requirements. The Owner shall be the final judge of whether a proposed substitution meets or exceeds the characteristics of a specified item. Any substitute system must be able to be warranted by the primary manufacturer to the level of warranty as required in these specifications. (See Section 1.28 for substitution requirements).

1.28 SUBSTITUTIONS: No substitution will be considered prior to receipt of BVB's unless written request for approval has been received by the Owner **at least five (5) days prior** to the date for receipt of BVB's. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or other work that incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Owner's decision of approval or disapproval of a proposed substitution shall be final.

If the Owner approves any proposed substitution prior to the receipt of BVB's, such approval will be set forth in an Addendum. Respondent shall not rely upon approvals made in any other manner.

No substitutions will be considered after the BVB opening unless specifically provided in the contract documents.

1.29 BVB PAYMENT AND PERFORMANCE BONDS: The successful respondent will be required to furnish a bid bond in the amount of 5% of the total bid amount including alternates. Payment and Performance Bonds in the amount of One Hundred Percent (100%) of the contract price. The Bonds must be compliant with section 5.1.1 of Article 5, Bonds and Insurance, in the General Conditions for Construction Projects. The Bond(s) must be issued by a corporate surety qualified to do business in Texas and acceptable to LAFB, and City of Del Rio.

SECTION 2 – EXECUTIVE SUMMARY

2.1 HISTORICAL BACKGROUND: Del Rio, Texas has been home to Laughlin Air Force Base since 1947. Laughlin AFB is one of only three Specialized Undergraduate Pilot Training (SUPT) bases in the US, and until recently, had been the largest pilot producer for the United States Air Force.

The previous sun shades Laughlin was using to protect crews from the south Texas sun were made of inferior materials and were not able to withstand extreme temperatures and weather events and had reached the end of their life and had to be removed. Constructing new sun shades with advance design and technologies allows for a better working environment for all maintenance crews.

The Military Value of this project is beneficial not only to Laughlin AFB, but the Air Force as whole by helping to meet the Air Force's goal of training approximately 25% more pilots per year.

Heat/Sun Protection for Aircraft:
Laughlin experiences average high temperatures of above 90 degrees F for five months during the summer. An engineering test report measured the difference in temperature between a shaded and unshaded aircraft to be an astonishing 40-50 degrees Fahrenheit. Further comparison conducted between SUPT bases show electronic flight equipment failing two to three times faster at Laughlin when compared to aircraft at bases with sun shade protection. This effect has led to a strain on the supply chain, a shortage in certain electronic equipment, increased aircraft downtime, increased equipment cost, and increased maintenance labor time.

Hail Protection for Aircraft:
Because Laughlin has had to remove the outdated and deteriorated sun shades, when hail greater than ½ inch is forecasted at Laughlin, the T-6 fleet must be towed to a weather shelter or maintenance hangar, costing valuable time and money.

Heat/Sun Protection for Maintainers:
Unlike conditions at any other SUPT base, Laughlin maintainers do not have sun shade protection while they perform maintenance on the flightline. Summertime Texas temperatures can exceed 110 degrees, increasing the likely of heat illnesses to include dehydration, heat exhaustion, and heat stroke.

The metal sun shade project aims to provide protection to 68 (-90%) of Laughlin's exposed T-6 fleet. The project consists of up to 7 rows of galvanized steel sun shade structures, each row covering 7 aircraft each. The sun shades will have metal roofs and

are designed to have an initial life span of 20 years, restricted only by the life span of the roofing screws. Following the first 20 years, replacement of the screws will then provide another 25 years. The purpose of these sun shades are to provide sun and hail protection to the aircraft. This protection will aid in the military value in three primary areas: 1) sun/heat protection to the aircraft, 2) hail protection to the aircraft, 3) sun/heat protection to maintainers/pilots.

2.2 PROJECT DESCRIPTION AND SCOPE: The scope of the procurement shall include the installation of prefabricated steel aircraft sun shades with electrical distribution and lighting of the T-6 aircraft parking ramp located at Laughlin AFB, Del Rio, TX. This construction project calls for the installation of up to 7 rows of prefabricated steel sun shades. Each sun shade must accommodate 7 aircraft per row to cover up to 49 T-6 aircraft parking spaces.

The prefabricated steel aircraft sun shades are to be a stand-alone column structures with open ends and sides to accommodate the footprint of seven T-6 aircraft with a minimum wingtip clearance of 10 ft between aircraft and between the aircraft wingtips and sun shade structures.

The sun shade framework, including accessories, shall be hot dipped galvanized steel and include a 20-year warranty against defects, corrosion, and deterioration.

The sun shade roof covering shall be galvanized steel and shall include a minimum 20-year warranty against any material defects, corrosion, and deterioration.

Both ends of each row of sun shades shall be covered with vertical shades to aid in protection from elements.

Sun shades are to be free standing and shall have column footings extending through the existing airfield apron.

The aircraft sun shades are to be designed with both obstacle and security/maintenance lighting.

This project will require pavement striping work to include the removal of current taxi lines and installation of new taxi lines to the entire parking row after the spots have been repositioned (for parking spots inside and outside the shades). Also, the work will use retro reflective beads for all apron and taxi lane markings near aircraft sun shades.

The work will include the installation of new aircraft tie-down points (4 per aircraft parking spot).

Sun shade design and installation shall mitigate bird roosting or nesting within the sun shade structure.

The sunshade and GPUs' electrical power shall be brought to the equipment from the primary distribution system. The primary electrical distribution systems on Laughlin AFB is privatized and owned by Rio Grande Electric Company (RGEC).

Any pavement trenching performed shall be replaced with pavement providing equivalent structural functionality as the adjacent, existing pavement.

2.3 PROJECT PLANNING SCHEDULE: The following anticipated dates are for planning purposes (if there is a conflict between the dates below and the BVB Form, the duration shown on the BVB Form shall govern). The contractual dates required by the Owner of the "Best Value Bid" respondent will be identified in the executed agreement.

- Owner conducts Mandatory Pre-Submittal Conference 11/29/2016 at 10am
- Owner receives Request For Best Value Bid 12/12/2016 until 3pm
- Owner Awards Contract 12/29/2016
- Owner Executes Contract 01/09/2017
- Owner Issues Notice to Proceed #1 for the Submittal and Mobilization Phase (60 calendar days) 01/09/2017
- Owner Issues Notice to Proceed #2 for the Construction 03/10/2017
- General Contractor achieves Substantial Completion 08/01/2017
- General Contractor achieves Final Completion 08/31/2017

All above times are CST unless otherwise noted.

SECTION 3 – REQUIREMENTS FOR BEST VALUE BID

Respondents shall carefully read the information contained in the following criteria and submit a complete statement of BVB's to all questions in Section 3 formatted as directed in Section 4. Incomplete BVB's will be considered non-responsive and subject to rejection.

3.1 CRITERIA ONE: RESPONDENT'S SAFETY PLAN FOR THIS PROJECT

3.1.1 The Vision of the City of Del Rio and LAFB is to eliminate workplace injuries on all construction projects. We consider safety a core value within our organization and attach the highest importance to this section in scoring evaluation. The response to Criterion One may be reviewed by the Owner's safety professional, and LAFB.

3.1.2 Prepare the safety plan in accordance with the specifications with details of your corporate safety organizational structure including individuals, titles and corresponding duties and safety resources your firm will bring to the project.

3.2 CRITERIA TWO: RESPONDENT'S ABILITY TO PROVIDE CONSTRUCTION SERVICES

3.2.1 Provide the following information on your firm for the past five (5) fiscal years:

Volume

- Annual number, value and percent change of contracts in Texas per year;
- Annual number, value and percent change of contracts nationally per year;

Revenues

- Annual revenue totals and percent change per year;

Bonding

- Total bonding capacity;
- Available bonding capacity and current backlog;

3.2.2 Attach a letter of intent from a surety company indicating your firm's ability to bond for the entire construction cost of the project, both payment and performance bonds.

The surety shall acknowledge that the firm may be bonded for maximum construction cost of ***100% of Total Base Bid Amount that may be accepted***. Bonding requirements are set forth in the Agreement and in the General and Supplementary General Conditions for Building Construction Contracts.

3.2.3 Identify if your firm is currently for sale or involved in any transaction to expand or to become acquired by another business entity? If so, please explain the impact both in organization and company direction.

3.2.4 Provide details of how long firm has been in business under the current name.

3.2.5 Provide details of any past or pending litigation, or claims filed, against your firm that may affect your performance under a Contract with the Owner.

3.2.6 Identify if your firm is currently in default on any loan agreement or financing agreement with any bank, financial institution, or other entity? If so, specify date(s), details, circumstances, and prospects for resolution.

3.2.7 Does any relationship exist by relative, business associate, capital funding agreement, or any other such kinship between your firm and any Owner employee, officer or Regent? If so, please explain.

3.3 CRITERIA THREE: QUALIFICATIONS OF CONSTRUCTION TEAM

3.3.1 Provide resumes of the Respondent's team that will be directly involved in the Project, including their experience with similar projects, and the number of years with the firm. Include as applicable; Project Managers, Superintendents, Assistant Project Managers and Superintendents, Quality Control Managers, and Safety Coordinator / Assistant. Identify the individuals who will be on-site and in charge daily.

3.3.2 For the each team member identified above, provide his/her current status, and when each team member will be available to provide Construction Services for this Project.

3.3.3 Describe, in graphic and written form, the proposed Project assignments and lines of authority and communication for each team member to be directly involved in the Project. Indicate the estimated percent of time these team members will be involved in the Construction Services.

3.3.4 Identify the SHADE PROVIDER, PAVING, ELECTRICAL Subcontractors and the STEEL ERECTOR Subcontractor included as part of this BVB, including their experience with similar projects, the number of years with the firm, and their city(s) of residence.

3.3.5 Provide resumes of the Project Manager and Superintendent that will be directly involved in the Project for the SHADE PROVIDER, PAVING, ELECTRICAL Subcontractors and the STEEL ERECTOR Subcontractor, including their experience with similar projects, the number of years with the firm, and their city(s) of residence.

3.4 CRITERIA FOUR: RESPONDENT'S PAST PERFORMANCE ON REPRESENTATIVE PROJECTS

3.4.1 Identify and describe the Construction Team's past experience for providing Construction Services that are MOST RELATED TO THIS PROJECT within the last five (5) years. List the projects in order of priority, with the most relevant project listed first. Provide the following information for each project listed:

- Project name, location, contract delivery method, and description
- Color images (photographic or machine reproductions)
- Final construction cost
- Type of construction (new, renovation, or expansion)
- Actual Notice To Proceed, Substantial Completion

References, for each project listed above, identify the following:

- The Owner's representative who served as the day-to-day liaison during construction, including telephone number
- Project Engineer's name and representative who served as the day-to-day liaison during construction, including telephone number

References shall be considered relevant based on specific project participation and experience with the respondent. The Owner may contact references during any part of this process. The Owner reserves the right to contact any other references at any time during the BVB process.

3.5 CRITERIA FIVE: RESPONDENT'S PROJECT PLANNING AND SCHEDULING FOR THIS PROJECT

3.5.1 Provide a schedule for this Project and identify specific critical process, phases, milestones, approvals, and procurements anticipated. Include float time necessary to ensure delays from unforeseen circumstances (including weather) will have no impact on the finish date of the project.

3.5.2 Describe what you perceive are the critical Construction issues for this Project.

3.5.3 Describe your approach to assuring timely completion of this project, including methods for schedule recovery, if necessary. From any three (3) of the projects listed in response to Section 3.3 or 3.4 of this RFBVB provide examples of how these techniques were used, including specific scheduling challenges/requirements and actual solutions.

3.5.4 This Project will be physically located on Laughlin Air Force Base. Describe your approach to minimizes impact to LAFB personnel.

3.5.5 Describe the anticipated steps necessary to maintain operation of the existing facility during construction.

3.6 CRITERIA SIX: RESPONDENT'S QUALITY CONTROL FOR THIS PROJECT

3.6.1 Describe your quality control program. Explain the methods used to ensure quality control during the Construction phase of a project. Provide specific examples of how these techniques or procedures were used from any of three (3) projects listed in response to Section 3.3 or 3.4 of this BVB.

3.6.2 Describe how your quality control team will measure the quality of construction performed by Subcontractors on this Project, and how will you address non-conforming work.

3.7 CRITERIA SEVEN: RESPONDENT'S WARRANTY AND SERVICE SUPPORT PROGRAM FOR THIS PROJECT

3.7.1 Describe your warranty service support philosophy and warranty service implementation plan for this Project.

3.7.2 Describe how you will measure the quality of service provided to the Owner for this Project.

3.7.3 Provide reference letters from three (3) Owners identified in Sections 3.3 or 3.4 of the RFBVB that describe your response to, and performance on, warranty services AFTER substantial completion.

3.8 CRITERIA EIGHT: RESPONDENT'S BEST VALUE BID AND DELIVERY SUBMITTAL

3.8.1 Complete and return the "Respondent's Best Value Bid and Delivery Submittal" form, Bid Bond, "Execution of Offer" form, "Certificate of Acknowledgement" form, "Conflict of Interest" form, "Debarment and Suspension Certification" form, and "W-9" form included in the attachments.

SECTION 4 – FORMAT OF BEST VALUE BID

4.1 GENERAL INSTRUCTIONS

4.1.1 BVB′s shall be prepared SIMPLY AND ECONOMICALLY, providing a straightforward, CONCISE description of the respondent's ability to meet the requirements of this RFBVB. Emphasis shall be on the QUALITY, completeness, clarity of content, responsiveness to the requirements, and an understanding of Owner's needs. Fancy covers with photos and graphics and table of contents are not required. Simple folders are preferred.

4.1.2 BVB′s shall be a MAXIMUM OF SIXTY PAGES (60) PRINTED PAGES (printed on one side only). The cover, divider sheets, "Respondent's Best Value Bid and Delivery Submittal" form, Bid Bond, "Execution of Offer" form, "Certificate of Acknowledgement" form, "Conflict of Interest" form, "Debarment and Suspension Certification" form, and "W-9" form do not count as printed pages.

4.1.3 Respondent shall submit One (1) BVB with original signatures of the Qualifications and Pricing and Delivery BVB with Execution of Offer, three (3) identical copies of the signed BVB, and (1) electronic copy (CD of Flash Drive).

4.1.4 Respondents shall carefully read the information contained in this RFBVB and submit a complete response to all requirements and questions as directed. Incomplete BVB′s will be considered non-responsive and subject to rejection.

4.1.5 BVB′s and any other information submitted by respondents in response to this RFBVB shall become the property of the Owner.

4.1.6 BVB′s that are qualified with conditional clauses, alterations, items not called for in the RFBVB documents, or irregularities of any kind are subject to rejection by the Owner, at its option.

4.1.7 The Owner makes no representations of any kind that an award will be made as a result of this RFBVB. The Owner reserves the right to accept or reject any or all BVB′s, waive any formalities or minor technical inconsistencies, or delete any item/requirements from this RFBVB when deemed to be in Owner's best interest.

4.1.8 BVB′s shall consist of answers to questions identified in Section 3 of the RFBVB. It is not necessary to repeat the question in the BVB′s; however, it is essential to reference the question number with the corresponding answer.

4.1.9 Failure to comply with all requirements contained in this Request for BVB′s may result in the rejection of the BVB′s.

4.2 PAGE SIZE, BINDING, DIVIDERS AND TABS:

4.2.1 BVB's shall be printed on letter-size (8-1/2" x 11") paper and assembled. Provide the original as an unbound copy and the 3 copies can be bound.

4.2.2 Additional attachments shall NOT be included with the BVB′s. Only the responses provided by the Respondent to the questions identified in Section 3 of this RFBVB will be used by the Owner for evaluation.

4.2.3 Separate and identify each criteria response to Section 3 of this RFBVB. Responses to each criteria section should be on a separate page with a header identifying the section. DIVIDER SHEETS ARE NOT REQUIRED.

4.3 PAGINATION:

4.3.1 Number all pages of the submittal sequentially using Arabic numerals (1, 2, 3, etc.).

SECTION 5 - DRAWINGS AND SPECIFICATIONS

5.1 DISTRIBUTION: Drawings and Specifications are provided electronically on a website for use by potential respondents. The project manuals are issued electronically to plan rooms. Plans will not be issued free to suppliers, material companies, or subcontractors.

5.2 DEPOSITS: No deposit is required if contractor obtains the drawings and specifications electronically. If a respondent does not have access to the internet and cannot access the website, the Point of Contact (POC) will provide one set of project manuals to general contractors who propose to submit a BVB to the Owner. A $100.00 deposit is required to be paid to the Point of Contact for contract documents. Deposit will be returned if plans and specifications are returned to POC in good useable condition. The general contractor must contact the POC to state they do not have access to the internet and arrange a time when the plans and specifications will be available. Usually, at least two days' notice is required before the printed drawings and specifications will be available.

5.3 ADDITIONAL SETS OF DOCUMENTS: Additional sets of documents, if available, may be obtained from the POC, at the contractor's expense, upon receipt of a check covering the cost of reproduction and mailing. It shall be understood that such extra sets do not become the contractor's property, but are and shall be the POC's exclusive property and shall be returned to the POC after submittals have been received. Checks will not be returned.

5.4 DOCUMENTS ON FILE: Electronic Project Manuals are on file at the following locations, and subcontractors may examine them there.

Plan Rooms of San Antonio

San Antonio Chapter of the Associated General Contractors
10806 Guldale
San Antonio, Texas 78216-3607
P: 210.349.4921
F: 210.349.4017
sanantonio@gmail.com
Dana Marsh
dmarsh@sanantonioagc.org

Virtual Builder's Exchange of Texas
4047 Naco Perrin, Suite 100
San Antonio, Texas 78217
P: 210.564.6900
F: 210.564.6902
Jeannette@virtualbx.com
Karen Sesters EXT. 126'
Karen@virtualbx.com

REQUEST FOR BEST VALUE BID

CITY OF DEL RIO, TEXAS - is soliciting Best Value Bid (BVB'S) for selection of a general contracting firm for New Construction of T-6 PREFABRICATED AIRCRAFT SUN SHADES AT LAUGHLIN AIR FORCE BASE. BVB's will be received by the City Secretary, City of Del Rio at the Council Chambers, 109 West Broadway St., Del Rio, TX. 78840 on **December 12, 2016 until 3:00 PM,** Central Standard Time. Late BVB's will not be accepted for any reason.

The scope of the procurement shall include the installation of prefabricated steel aircraft sun shades with electrical distribution and lighting on the T-6 aircraft parking ramp located at Laughlin AFB, Del Rio, TX. This calls for the installation of up to 7 rows of prefabricated steel sun shades. Each sun shade must accommodate 7 aircraft per row to cover up to 49 T-6 aircraft parking spaces.

Bid Security: Each BVB must be accompanied by a bid bond naming the City of Del Rio as obligee and duly executed by the Bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of five percent (5%) of the total bid price (including base bid(s), option(s) and alternate(s)). ALL BID BOND FORMS MUST CONTAIN ORIGINAL SIGNATURE(S).

The successful Bidder must furnish Performance and Payments Bonds each in the amount of 100% of the contract price from an approved Surety Company holding a permit from the State of Texas to act as Surety and acceptable according to the latest list of companies holding certificates of authority from the Secretary of Treasury of the United States, or other Surety or Sureties acceptable to the Owner.

Instructions to bidders: BVB packets (Specifications, Plans and all required forms) are available on the City Web Site at **http://www.cityofdelrio.com/**. Contractor may also request information to download the bid packet from the project Point of Contact Bain Medina Bain, Inc. 7073 San Pedro Avenue, **San Antonio, TX 78216. Phone: 210.494.7223. Email: cbain@bmbi.com.**

NOTE: All forms included must be printed, completed and submitted in a sealed envelope. It is the responsibility of the bidder to submit any forms that may have been issued by addendum.

Mandatory Pre-submittal Conference: A mandatory pre-submittal conference will be held on November 29, 2016 at 10:00 AM, Standard Time at the City of Del Rio Council Chambers, 109 W. Broadway, Del Rio, TX 78840. A site visit will be included as part of the mandatory pre-submittal conference. This may be the only opportunity for potential respondents to view the project site before submittal of BVB's.

The City reserves the right to accept or reject any or all BVB's and to waive formalities. In case of ambiguity in stating the price in the BVB, the City reserves the right to consider the most advantageous construction thereof or to reject any BVB's. Also, the City reserves the right to accept the low BVB based on the tabulation of any one, combination or all of the base BVB and additive alternates based on the most advantageous project bid that is desired by the City Department involved and that the City of Del Rio in their sole judgment determines what is in the City's best interest and benefit. No BVB may be withdrawn within ninety (90) days after the date on which bids are received.

Alma Levrie, City Secretary
City of Del Rio Texas

Neither Contractor nor its employees, agents, representatives or subcontractors will assist or cause Del Rio employees to violate Del Rio's "Conflicts of Interest Policy", provisions described by Del Rio's Standards of Conduct Guide, or applicable state ethics laws or rules. Contractor represents and warrants that no member of the City of Del Rio Government has a direct or indirect financial interest in the transaction that is the subject of this Agreement.

T-6 PREFABRICATED AIRCRAFT SUN SHADES
AT LAUGHLIN AIR FORCE BASE

RFBVB SUBMISSION CHECKLIST

DOCUMENT	CHECK
Complete, sign and return RFBVB Submission Checklist.	
Complete, sign and return BVB and Delivery Submittal form, see attachment.	
Complete, sign and return Bid Bond form, see attachment.	
Complete, sign and return Execution of Offer form, see attachment.	
Complete and sign Certificate of Acknowledgement form, see attachment.	
Complete and sign Conflict of Interest Questionnaire, see attachment.	
Complete and sign Debarment and Suspension Certification form, see attachment.	
Complete and sign W-9 form, see attachment.	
Submit information and answers to questions and submit Qualifications as stated in Section 3.	

BVB'S MUST BE RECEIVED IN THE OFFICE OF CITY SECRETARY, ALMA LEVRIE, BEFORE 3:00PM CENTRAL STANDARD TIME ON DECEMBER 12, 2016.

NOTE:
BVB'S ARE **NOT** ACCEPTED THAT ARE DELIVERED BY TELEPHONE, FACSIMILE (FAX), OR ELECTRONIC MAIL (E-MAIL).

_____

Signature Date

BEST VALUE BID AND DELIVERY SUBMITTAL FORM

Best Value Bid Submittal Deadline: **December 12, 2016 at 3:00 pm, Central Daylight Time**

Project: **T-6 PREFABRICATED AIRCRAFT SUN SHADES AT LAUGHLIN AIR FORCE BASE**

FOR: CITY OF DEL RIO, TEXAS Date: DECEMBER 12, 2016

BEST VALUE BID SUBMITTAL OF:

Name of Company: _____

Physical Address: _____

Mailing Address: _____

_____

Telephone Number_____ Fax Number_____

Email Address: _____

Federal Employers Identification Number: (Taxpayer identification number) _____

TO: **City of Del Rio**
C/O City Secretary, Alma Levrie
109 W. Broadway St.
Del Rio, Texas78840

NOTE: Best Value Bid are **not** accepted that are delivered by telephone, facsimile (fax), or electronic mail (e-mail).

Dear Miss:

Having carefully examined the GENERAL CONDITIONS and SPECIAL CONDITIONS, the Plans and Specifications and addenda thereto as prepared by Bain Medina Bain, Inc. as well as the premises and all the conditions affecting the work, the undersigned proposes to furnish all labor, materials, and equipment necessary to achieve final completion of the work in accordance with the contract documents for the following sum:

BEST VALUE BID

Best Value Bid must include all labor, materials, tools, equipment, and required bonds to perform the work required for the construction of 5 rows of T-6 Prefabricated Aircraft Sun Shades, located on Laughlin Air Force Base, TX in accordance with all specifications and conditions, in the following amounts.

NOTE: Amounts shall be shown in both written and figure form. In case of discrepancy between the written amount and figure amount, the written amount will govern.

1. **BEST VALUE BID: The scope of the procurement shall include the installation of five (5) rows of prefabricated steel aircraft sun shades (ROWS F-J) with striping, electrical distribution and lighting on the T-6 aircraft parking ramp located at Laughlin AFB, Del Rio. TX.**

_____ Dollars

($_____).
(Written amount)

_____
Contract Time in Calendar Days

2. **ALLOWANCE: Rio Grande Electrical Company for Electrical Service**

Seventy Thousand Dollars

($ 70,000.00).
(Written amount)

3. **ADDITIVE ALTERNATE 1: Installation of 1 row of prefabricated steel sun shades with striping, electrical and lighting (ROW E).**

_____ Dollars

($_____).
(Written amount)

_____
Additional Contract Time in Calendar Days

4. **ADDITIVE ALTERNATE 2: Installation of 1 row of prefabricated steel sun shades with striping, electrical and lighting (ROW D).**

_____ Dollars

($_____).
(Written amount)

_____
Additional Contract Time in Calendar Days

1. SUBTOTAL BEST VALUE BID: $_____

2. SUBTOTAL ALLOWANCE: $_____70,000.00_____

3. SUBTOTAL ADDITIVE ALTERNATE 1: $_____

4. SUBTOTAL ADDITIVE ALTERNATIVE 2: $_____

TOTAL BEST VALUE BID AMOUNT: $_____

_____Dollars

_____Cents

ADDENDA:

The respondent acknowledges the receipt of the following addenda:

Addendum No.1: Dated _____

Addendum No.2: Dated _____

Addendum No. 3 Dated _____

Addendum No. 4: Dated _____

CONDITIONS:

The undersigned agrees, if awarded the contract, to achieve final completion of the work as outlined by the Project Manual and Specifications within ___ calendar days from notice to proceed date to substantial completion, but no later than August 31, 2017.

The undersigned agrees that, from the compensation otherwise to be paid, the Owner may retain the sum of **Four Hundred Dollars ($400.00)** for each calendar day after the contract completion date that the work remains incomplete, which sum is agreed upon as the proper measure of liquidated damages which the Owner will sustain per diem by the failure of the undersigned to complete the work at the time stipulated in the contract. This sum is not construed in any sense as a penalty.

The undersigned agrees, if awarded the contract, to execute the Agreement and Performance and Payment Bonds within **ten (10)** days after notification of award. The undersigned acknowledges that any partial payments made in accordance to Section 3.19 of the Proposal Packet, with respect to payment for materials, will only be for those materials actually installed. In addition, the undersigned agrees to execute and deliver to the Owner a Certification of Franchise Tax Payment and further agrees to obtain from each subcontractor and supplier and hold for redelivery to the Owner, if requested, a Certification of Franchise Tax Status of such subcontractor or supplier.

It is understood that the Owner reserves the right to accept or reject any and all Best Value Bid (BVB's) and to waive minor technicalities. It is further agreed that this BVB shall be valid and not withdrawn for a period of **ninety (90) days** from this date of opening thereof.

ACCEPTANCE OF BEST VALUE BID OR AWARD OF CONTRACT

By signing this BVB, the undersigned certifies as follows:

"Under Section 2155.004, Government Code, the contractor certifies that the individual or business entity named in this BVB or contract is not ineligible to receive the specified contract and acknowledges that this contract may be terminated and payment withheld if this certification is inaccurate."

"Under Section 231.006, Texas Family Code, the vendor or applicant certifies that the individual or business entity named in this contract, BVB, or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this contract may be terminated and payment may be withheld if this certification is inaccurate."

FAILURE TO AFFIX AN ORIGINAL SIGNATURE BELOW WILL RESULT IN DISQUALIFICATION OF BEST VALUE BID SUBMITTED.

Respectfully submitted,

By: _____
(Signature)

_____
(Printed Name)

(Seal: If BVB by a Corporation)

_____
(Title)

Business Address: _____

_____

_____

Note: Submit one (1) BVB with original signatures and three (3) identical copies and (1) ELECTRONIC COPY (CD OR Flash Drive) of Respondent's Best Value Bid and Delivery Submittal form, Bid Bond, Execution of Offer form, Certificate of Acknowledgement form, Conflict of Interest form, Debarment and Suspension Certification form, W-9 form and Qualifications in one (1) envelope.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, _____as PRINCIPAL, and _____, as SURETY are held and firmly bound unto _____ hereinafter called the "Owner", in the penal sum _____ of Dollars, ($), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the Accompanying Bid, dated _____, for _____

NOW, THEREFORE, if the Principal shall not withdraw said Bid within the period specified therein after the opening of the same, or, if no period be specified, within sixty (60) days after the said opening, and shall within the period specified therefor, or if no period be specified, within ten (10) days after the prescribed forms are presented to him for signature, enter into a written contract with the Owner in accordance with the Bid as accepted, and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract; or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said Bid and the amount for which the local Public Agency may procure the required work or supplies or both, if the latter be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS THEREOF, the above-bounded parties have executed this instrument under their several seals this _____ day of _____, the name and corporate seal of each corporate party being hereto affixed and these present signed by its undersigned representative, pursuant to authority of its governing body.

(SEAL)

_____

(SEAL)

Attest: By: _____

Affix Corporate Seal

Attest: By: _____

Affix Corporate Seal

Attest: By: _____

Affix Corporate Seal

Countersigned

By _____

* Attorney-in-Fact, State of ————————

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the_____, Secretary of the Corporation named as Principal in the within bond; that _____, who signed the said bond on behalf of the Principal was then _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to, for and in behalf of said corporation by authority of this governing body.

Corporate Seal

Title: _____

* Power-of-attorney for person signing for suretycompany must be attached to bond.

EXECUTION OF OFFER

THIS SECTION MUST BE COMPLETED, SIGNED, AND RETURNED WITH RESPONDENT'S BEST VALUE BID. FAILURE TO SIGN AND RETURN THIS SECTION MAY RESULT IN THE REJECTION OF YOUR BVB.

1. By signature hereon, Respondent offers and agrees to furnish the goods and/or services at the prices quoted and comply with all terms, conditions, requirements set forth in the RFBVB documents and contained herein. Respondent acknowledges and agrees that (1) this RFBVB is a solicitation for BVB and is *not* a contract or an offer to contract; (2) the submission of a Best Value Bid (BVB) by Respondent in response to this RFBVB will *not* create a contract between D.R. and Respondent; (3) D.R. has made no representation or warranty, written or oral, that one or more contracts with D.R. will be awarded under this RFBVB; and (4) Respondent shall bear, as its sole risk and responsibility, any cost which arises from Respondent's preparation of a response to this RFBVB.

2. By signature hereon, Respondent agrees that in the event its makes a false statement by affirming or certifying the information below, D.R. may, at its option, reject Respondent's BVB without further liability. In addition, Respondent agrees to notify D.R. in writing within thirty (30) days of any changes in the information affirmed or certified by Respondent below.

3. By signature hereon, Respondent affirms that it has not given, offered to give, nor intends to give at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor or service to a public servant in connection with this BVB.

4. By signature hereon, Respondent affirms that it has not received compensation for participation in the preparation of the specifications for the RFBVB (ref. *Texas Government Code* Section 2155.004).

5. By signature hereon, Respondent affirms that the individual or business entity named in this BVB or contract is not ineligible to receive the specified contract and acknowledges that this contract may be terminated and payment withheld if this certification is inaccurate (ref. *Texas Government Code* Section 2155.004).

6. By signature hereon, the Respondent hereby further certifies that, to the best knowledge of Respondent, neither Respondent, nor any affiliate of Respondent, nor anyone acting for Respondent, has violated the antitrust laws of the State of Texas codified in Section 15.01, et. Seq., *Texas Business and Commerce Code*, or the Federal anti-trust laws, nor communicated directly or indirectly Respondent's BVB or BVB made to any competitor or any other person engaged in the line of business which is the subject of this RFBVB.

7. A BVB or application for a contract, grant or loan paid from state funds must include the name and social security number of the individual or sole proprietor and each partner, shareholder, or owner with an ownership interest of at least twenty-five percent (25%) of the business entity submitting the BVB or application. ***This disclosure is mandatory pursuant to Section 231.006, Family Code, and will be used for the purpose of determining whether an owner of BVB with an ownership interest of at 25% is more than 30 days delinquent in paying child support.***

(Name)	(Social Security Number)
(Name)	(Social Security Number)
(Name)	(Social Security Number)
(Name)	(Social Security Number)

8. By signature hereon, Respondent agrees that any payments due under this contract will be applied towards any debt, including but not limited to delinquent taxes and child support that is owed to the State of Texas.

9. By signature hereon, Respondent agrees to comply with Texas Government Code, title 10, Subtitle D, Section 2155.4441, relating to use of service contracts for products produced in the State of Texas.

10. By signature hereon, Respondent certifies that they are in compliance with Texas Government Code, Title 6, Subtitle B, Section 669.003 of the Government Code, relating to contracting with executive head of a state agency. If Section 669.003 applies, Respondent will complete the following information in order for the BVB to be evaluated:

    Name of Former Executive: _____ Name of State Agency: _____
    Date of Separation from State Agency: _____ Position with Bid: _____
    Date of Employment with Respondent: _____

11. By signature hereon, Respondent certifies that if a Texas address is shown as the address of the Respondent, Respondent qualifies as a Texas Resident as defined in Texas Government Code 2155.444. In the case of a tie the award will be made in accordance with Texas Administrative Code Title 34 Rule §20.32 (68). Check below preference claimed under TAC Title 34, Rule §20.32:
    ( ) Texas Respondent.
    ( ) Texas and United States products and Texas services.
    ( ) Products of persons with mental or physical disabilities.
    ( ) Recycled, remanufactured or environmentally sensitive products. ( ) Energy efficient products.
    ( ) Rubberized asphalt paving materials. ( ) Recycled motor oil and lubricants.
    ( ) Products and services from economically depressed or blighted areas as defined in Texas Government Code §2306.004 or that meet the definition of a historically underutilized business zone as defined by 15 U.S.C. §632(p).
    ( ) Products produced at a facility located on property for which the owner has received a certificate of completion under §361.609, Health and Safety Code, if the goods meet state specifications regarding quantity, quality, delivery, life cycle costs, and price.
    ( ) Vendors that meet or exceed air quality standards.

12. By signature hereon, Respondent confirms that any dispute arising under a contract for goods and services for which this chapter applies must be resolved under the provisions of Chapter 2260 of the Texas Government Code.

13. By signature hereon, Respondent confirms that Respondent shall defend, indemnify, and hold harmless the City of Del Rio and the State of Texas, all of its officers, agents and employees from and against all claims, actions, suits, demands, proceedings, costs, damages, and liabilities, arising out of, connected with, or resulting from any acts or omissions of Respondent or any agent, employee, subcontractor, or supplier of Respondent in the execution or performance of this contract.

14. By signature hereon, Respondent agrees that information, documentation, and other material in connection with this solicitation or any resulting contract may be subject to public disclosure pursuant to Chapter 552 of the Texas Government Code (the "Public Information Act").

15. By signature hereon, Respondent agrees that any terms and conditions attached to a solicitation will not be considered unless specifically referred to on this solicitation and may result in disqualification.

16. By signature hereon, Respondent agrees that any contract resulting from this solicitation is contingent upon the continued availability of lawful appropriations by the Texas Legislature and/or allocation of funds by the State of Texas). If the Legislature fails to appropriate or allot the necessary funds or the State fails to allocate the necessary funds, then D.R. shall issue written notice to Contractor and D.R. may terminate the contract without further duty or obligation hereunder. Contractor acknowledges that appropriation, allotment, and allocation of funds are beyond the control of D.R.

17. By signature hereon, Respondent understands that acceptance of funds under this contract acts as acceptance of the authority of the State Auditor's Office, or any successor agency, to conduct an audit or investigation in connection with those funds (Texas Government Code Section 2262.003). Contractor further agrees to cooperate fully with the State Auditor's Office or its successor in the conduct of the audit or investigation, including providing all records requested. Contractor will ensure that this clause concerning the authority to audit funds received indirectly by subcontractors through Contractor and the requirement to cooperate is included in any subcontract awards.

18. By signature hereon, Respondent agrees to comply with all specifications, requirements, terms, and conditions set forth in this BVB and on any attachments hereto.

19. By signature hereon, Respondent certifies that, to the best knowledge of Respondent, all statements and information prepared and submitted to D.R. in connection with this RFBVB are current, complete, and accurate.

20. By signature hereon, a corporate or limited liability company Respondent certifies that it is not currently delinquent in the payment of any Franchise Taxes due under Chapter 171, *Texas Tax Code*, or that the corporation or limited liability company is exempt from the payment of such taxes, or that the corporation or limited liability company is an out-of-state corporation or a limited liability company that is not subject to the Texas Franchise Tax, whichever is applicable. A false certification shall be deemed a material breach of contract and, at D.R.'s option, may result in cancellation of this Contract and any Transaction Confirmation pursuant to this Contract.

21. By signature hereon, Respondent certifies that the individual signing this document and the documents made part of their Respondent is authorized to sign such documents on behalf of Respondent and to bind Respondent under any contract that which may result from the submission of this Respondent.

22. By signature hereon, Respondent certifies that no relationship, whether by relative, business associate, capital funding agreement or by any other such kinship exist between Respondent and an employee of LAFB, City of Del Rio and Val Verde County, or Respondent has not been an employee LAFB, City of Del Rio and Val Verde County within the immediate twelve (12) months prior to the execution of this Contract.

23. By signature hereon, Respondent represents and warrants that all goods and services under this offered as a result of this RFBVB meet or exceed the safety standards established and promulgated under the Federal Occupational Safety and Health Law (Public Law 91-596) and its regulations in effect or proposed as of the date of this RFBVB.By signature hereon, Respondent confirms that neither Respondent nor its Principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts from United States ("U.S.") federal government procurement or non-procurement programs, or are listed in the List of Parties Excluded from Federal Procurement or Non-procurement Programs issued by the U.S. General Services Administration. "Principals" means officers, directors, owners, partners, and persons having primary management or supervisory responsibilities within a business entity (e.g. general manager, plant manager, head of a

subsidiary, division or business segment, and similar positions). Respondent shall provide immediate written notification to D.R. if, at any time prior to award, Respondent learns that this certification was erroneous when submitted or has become erroneous by reason of changed circumstances. This certification is a material representation of fact upon which reliance will be placed if D.R. enters into a contract with Respondent. If it is later determined that Respondent knowingly rendered an erroneous certification, in addition to the other remedies available to D.R., D.R. may reject Respondent's Respondent and terminate any resulting Contract for default by Respondent.

24. By signature hereon, Respondent acknowledges that Laughlin is prohibited by federal regulations from allowing any employee, subcontractor, or agent of Respondent to work on site at D.R.'s premises or facilities if that individual is not eligible to work on federal healthcare programs such as Medicare, Medicaid, or other similar federal programs. Therefore, Respondent shall not assign any employee, subcontractor or agent that appears on the List of Excluded Individuals issued by the General Services Administration (GSA) System for Award Management, to work on site at D.R.'S premises or facilities. Respondent shall perform a GSA sanctions check quarterly on each of its employees, subcontractors and agents during the time such employees, subcontractors and agents are assigned to work on site at D.R.'s premises or facilities. Respondent acknowledges that D.R. will require immediate removal of any employee, subcontractor or agent of Respondent assigned to work at D.R.'s premises or facilities if such employee, subcontractor or agent is found to be on the GSA's List of Excluded Individuals. The GSA's List of Excluded individuals may be accessed through the following Internet website: https://www.sam.gov/portal/public/SAM/

25. By signature hereon, Respondent certifies that, except for restrooms and wash rooms and one (1) or more lactation rooms each of which is segregated on the basis of sex: (1) it does not maintain or provide for its employees any segregated facilities at any of its establishments and that it does not permit its employees to perform their services at any location under its control where segregated facilities are maintained; (2) it will not maintain or provide for its employees any segregated facilities at any of its establishments; and (3) it will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. Respondent agrees that a breach of this certification is a violation of Equal Opportunity provisions of Federal Law. The term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, entertainment areas, transportation, or housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin, because of habit, local custom, or otherwise. Respondent further agrees that, except where it has contracts prior to the award with subcontractors exceeding $10,000.00 which are not exempt from the provisions of the Equal Opportunity provisions of Federal Law, Respondent will retain such certifications for each one of its subcontractors in Respondent's files, and that it will forward the following notice to all proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES - A Certification on Non-segregated

Facilities must be submitted prior to the award of any subcontract exceeding $10,000.00 which is not exempt from the provisions of the Equal Opportunity provisions of Federal Law. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e. quarterly, semiannually, or annually). Respondent understands that the penalty for making false statements regarding the subject matters of this Section is prescribed in 18 U.S.C. 1001.

26. Not Used

27. By signature hereon, Respondent represents and warrants that is has not been the subject of allegations of Deceptive Trade Practices violations under Texas Business & Commerce Code, Chapter 17, or allegations of any unfair business practice in any administrative hearing or court suit and that and that Respondent has not been found to be liable for such practices in such proceedings. Respondent certifies that it has no officers who have served as officers of other entities who have the subject allegations of Deceptive Trade Practices violations or allegations of any unfair business practices in an administrative hearing or court suit and that such officers have not been found to be

liable for such practices in such proceedings.

29. By signature hereon, Respondent certifies it is a small business and/or a minority/female owned business as defined by the State of Texas or as indicated below. Check status below:
    ( ) Small Business (House Bill 366, 64th Legislature)
    ( ) Minority/Female Owned Business (House Bill 2626, 73rd Legislature)
    ( ) Certified by Texas Department of Commerce
    ( ) Status not claimed

Complete the following:

If Respondent is a Corporation:

State of Incorporation: _____

Charter No: _____

FAILURE TO AFFIX AN ORIGINAL SIGNATURE BELOW WILL RESULT IN DISQUALIFICATION OF BEST VALUE BID SUBMITTED.

Submitted By:

_____	_____
(Company Name)	(Respondent's Authorized Signature)
_____	_____
(Street Address)	(Printed Name/Title)
_____	_____
(City, State, Zip Code)	(Date)
_____	_____
(Telephone Number)	(Facsimile Number)

NOTICE:
You may be entitled to know what information **City of Del Rio** collects concerning you. You may review and have **City of Del Rio** correct this information according to procedures set forth in UTS 139. The law is found in sections 552.021, 552.023 and 559.004 of the Texas Government Code.

CITY OF DEL RIO
CENTRAL PURCHASING

CERTIFICATE OF ACKNOWLEDGEMENT

I,_____, hereby certify that I have obtained a copy of the statement of specifications, requirements and needs concerning the BVB for the T-6 Prefabricated Aircraft Sun Shades at LAFB and I have examined and studied same. I further certify that the bid submitted herein is based upon will comply with all of said specifications, requirements and needs.

AFFIDAVIT OF NON-COLLUSION

THE STATE : _____

COUNTY OF: _____

Before me, the undersigned authority personally appeared_____, known to me to be the person whose name is subscribed hereto and after being duly sworn be me stated and deposed under oath as follows:

My name is_____, and I am over the age of 18 years old, competent, and duly authorized to make and file this affidavit on behalf of _____.
(name of submitting party)

I am_____**(Title: Owner, partner, etc.)** of said bidder and I have personal knowledge of all facts and matter stated herein. The attached bid or bids have been arrived at by the bidder independently, and have been submitted without collusion with, and without any agreement, understanding, or planned common course of action with, any other vendor of materials, supplies, equipment or services designed to limit independent and competitive bidding.

The contents of the bid or bids have not been communicated by the bidder or its employees, agents, servants, or any other person not any employee, agent or servant of the bidder or its surety on any bond furnished with the bid or bids, and will not communicate to any such person prior to the official opening of said bid or bids.

_____
(SIGNATURE)

SWORN ANB SUBSCRIBED TO BEFORE ME ON THIS_____DAY OF_____, 20___.

My Commission Expires On:

_____
(NOTARY PUBLIC IN AND FOR)

_____

_____**, County,** _____
(State)

NOTICE TO VENDORS

Disclosure of Certain Relationships

Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that any vendor or person considering doing business with a local governmental entity make certain disclosures concerning any affiliation or business relationship that might cause a conflict of interest with the local governmental entity. The provisions of Chapter 176 and the Form CIQ questionnaire that you must complete, if applicable, to comply with this new law, are available and explained in more detail at the Texas Ethics Commission website at http://www.ethics.state.tx.us/whasnew/confliict forms.htm.

A current list of City of Del Rio officers is available in the office of the City of Del Rio City Secretary, 109 Broadway Del Rio, Texas 78840 or on the City's website at http://cityofdelrio.com. If you are considering doing business with the City of Del Rio and have an affiliation or business relationship that requires you to submit a completed Form CIQ, it must be filed with the records administrator (City Secretary) of the City of Del Rio not later than the 7th business day after the date you become aware of facts that require the form to be filed. See Section 176.006, Texas Local Government Code. It is a Class C misdemeanor to violate this provision.

By Submitting a response to a City of Del Rio, Request for Proposals, or Request for Qualifications or by conducting business with this entity, you are representing that you are in compliance with the requirements of Chapter 176 of the Texas Local Government Code.

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 1491, 80th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code by a person who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the person meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. *See* Section 176.006, Local Government Code.

A person commits an offense if the person knowingly violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of person who has a business relationship with local governmental entity.**

2 **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 **Name of local government officer with whom filer has employment or business relationship.**

Name of Officer

This section (item 3 including subparts A, B, C & D) must be completed for each officer with whom the filer has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. **Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the filer of the questionnaire?**

Yes No

B. Is the filer of the questionnaire receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer named in this section AND the taxable income is not received from the local governmental entity?

Yes No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

Yes No

D. Describe each employment or business relationship with the local government officer named in this section.

4

Signature of person doing business with the governmental entity

Date

INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this proposal, the prospective participant is providing the certification set out below.
2. The inability of a person to provide the certification required below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the determination whether to enter into this transaction. However, failure of the prospective participant to furnish a certification or an explanation shall disqualify such person from participation in this transaction.
3. The certification in this clause is a material representation of fact upon which reliance was placed when the City of Del Rio determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available, the City of Del Rio may terminate this transaction for cause.
4. The prospective participant shall provide immediate written notice to the City of Del Rio to which this proposal is submitted if at any time the prospective participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
5. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549(13 CFR Part 145). You may contact the City of Del Rio for assistance in obtaining a copy of these regulations.
6. The prospective participant agrees by submitting this proposal that, should the proposed transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the City of Del Rio.
7. The prospective participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment and Suspension" provided by the City of Del Rio, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
8. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the ineligibility of its principals. Each participant may, but is not required to, check the Non-procurement List.
9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
10. Except for transactions authorized under paragraph 6 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the City of Del Rio, the City of Del Rio may terminate this transaction for cause

DEBARMENT AND SUSPENSION CERTIFICATION

(1) The prospective primary participant certifies to the best of its knowledge and belief that it and its principals:

(a) Are not presently debarred, suspended, proposed for disbarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this application been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective primary participant shall attach an explanation to this proposal.

Business Name: _____

_____ _____

Name and Title of Authorized Representative **Date**

_____

Signature of Authorized Representative

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See **Specific Instructions** on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:
☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate
☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶
Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.
☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
Exempt payee code (if any)
Exemption from FATCA reporting code (if any)
(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ – ☐☐ – ☐☐☐☐

or

Employer identification number
☐☐ – ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here **Signature of U.S. person ▶** **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

Note. If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States:

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),
3. The IRS tells the requester that you furnished an incorrect TIN,
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code* on page 3 and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships* above.

What is FATCA reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code* on page 3 and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account, list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note. ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C Corporation, or S Corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box in line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box in line 3.

Limited Liability Company (LLC). If the name on line 1 is an LLC treated as a partnership for U.S. federal tax purposes, check the "Limited Liability Company" box and enter "P" in the space provided. If the LLC has filed Form 8832 or 2553 to be taxed as a corporation, check the "Limited Liability Company" box and in the space provided enter "C" for C corporation or "S" for S corporation. If it is a single-member LLC that is a disregarded entity, do not check the "Limited Liability Company" box; instead check the first box in line 3 "Individual/sole proprietor or single-member LLC."

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space in line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over $600 required to be reported and direct sales over $5,000[1]	Generally, exempt payees 1 through 5[2]
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note. You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on this page), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note. See the chart on page 4 for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.ssa.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note. Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: *A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.*

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if items 1, 4, or 5 below indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor[2]
4. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee[1]
b. So-called trust account that is not a legal or valid trust under state law	The actual owner[1]
5. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
6. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	**Give name and EIN of:**
7. Disregarded entity not owned by an individual	The owner
8. A valid trust, estate, or pension trust	Legal entity[4]
9. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
10. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
11. Partnership or multi-member LLC	The partnership
12. A broker or registered nominee	The broker or nominee
13. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
14. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 2.

*Note. Grantor also must provide a Form W-9 to trustee of trust.

Note. If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov*. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at: *spam@uce.gov* or contact them at *www.ftc.gov/idtheft* or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

SAMPLE

STANDARD AGREEMENT

BETWEEN OWNER AND CONTRACTOR
for
T-6 Prefabricated
Aircraft Sun Shades
at Laughlin Air Force Base

This Agreement is made as of_____, 20____(the "Effective Date"), by and between

The **Owner**: **City of Del Rio**
109 W. Broadway
Del Rio, Texas 78840

and **Contractor**:

Texas Tax Account No. :

for the **Project**: **Construction of T-6 Prefabricated Aircraft Sun Shades at Laughlin Air Force Base**

Project Engineer: **Bain Medina Bain, Inc.**
7073 San Pedro Ave.
San Antonio, TX 78216
Phone: 210.494.7223/210.490.5120
Email: cbain@bmbi.com

The Owner and the Contractor agree as follows:

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LIST OF EXHIBITS

The following Exhibits are incorporated into the Agreement as if set out verbatim.

Exhibit A:
General Conditions for Construction Contracts

Exhibit B:
Owner's Special Conditions

Exhibit C:
List of Drawings, Specifications Addenda, details and other documents developed by The Engineer that describe the Project with the date they were issued

ARTICLE 1 SCOPE OF WORK

The Contractor has overall responsibility for and shall provide and furnish all materials, equipment, tools and labor as necessary or reasonably inferable to complete the Work, or any phase of the Work, in accordance with the Owner's requirements and the terms of the Contract Documents.

ARTICLE 2 CONTRACT DOCUMENTS

2.1 The Contract Documents consist of:

a. This Agreement and all exhibits and attachments listed, contained or referenced in this Agreement;
b. The applicable General Conditions for Construction Contracts (GCCC), version identified, above;
c. Special Conditions and Owner's Specifications;
d. All Addenda issued before the Effective Date of this Agreement;
e. All Alternate BVB′s accepted by the Owner before the Effective Date of this Agreement;
f. All Change Orders issued after the Effective Date of this Agreement;
g. The Plans, Specifications, details and other documents developed by Project Engineer to describe the Project and accepted by Owner;
h. The Drawings and Specifications developed or prepared by Owner's other consultants, if any, and accepted by the Owner; and
i. Contractor's BVB if incorporated into the Project. To the extent of any conflict between Contractor's BVB and any other Contract Document, the Contact Document shall govern.

2.2 The Contract Documents form the entire and integrated Contract between Owner and Contractor and supersede all prior negotiations, representations or agreements, written or oral.

ARTICLE 3 THE CONTRACT SUM:

3.1 The Owner shall pay the Contractor for performance of the Contract, including the Best Value Bid and Alternate BVB(s), the sum of _____ **($_____),** and make payment on account as provided in the GCCC.

3.2 The following Alternate BVB, fully described in the Specifications and Drawings, are included as a part of the contract sum:_____.

ARTICLE 4 TIME OF COMPLETION:

The Owner shall issue a Notice to Proceed identifying the date for commencement of the Work. The commencement date shall be 10 or more days after the date the notice is issued. The Contractor shall achieve substantial completion of the Work within _____ calendar days after the commencement date, as such completion date may be extended by approved Change Orders, but not later than August 31, 2017. **THE TIME SET FORTH FOR COMPLETION OF THE WORK IS AN ESSENTIAL ELEMENT OF THE CONTRACT.**

ARTICLE 5 LIQUIDATED DAMAGES:

For each consecutive calendar day after the expiration of the substantial completion period set forth in Article 4 that any incomplete Work prevents or impairs the Owner's ability to operate and use the Project for its intended purposes, including the correction of deficiencies found during the final testing and inspection, the amount of **Four Hundred ($400.00)** will be deducted from the money due or that becomes due the Contractor, not as a penalty but as liquidated damages representing the parties' estimate at the time of executing this Agreement of the damages that the Owner will sustain for late completion.

ARTICLE 6 NOT USED

ARTICLE 7 SAFETY

7.1 In accordance with the General Conditions for the Construction, Contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. The safety program shall comply with all applicable requirements of the Occupational Safety and Health Act of 1970 and all other applicable federal, state and local laws and regulations and with the requirements of Owner's project safety specification.

7.2 Contractor shall provide recommendations and information to Owner and Project Engineer regarding the assignment of responsibilities for safety precautions and programs, temporary Project facilities, and equipment, materials, and services for common use of the Subcontractors. Contractor shall verify that appropriate safety provisions are included in the Construction Documents. The existence or creation of any Owner controlled insurance program in connection with the Work shall not lessen or reduce the Contractor's safety responsibilities.

7.3 Contractor shall comply with all applicable safety requirements of LAFB and D.R.

ARTICLE 8 CERTIFICATION OF NO ASBESTOS CONTAINING MATERIALS OR WORK

8.1 The Contractor shall be responsible for ensuring that no asbestos containing materials or work is included within the scope of the Work. The Contractor shall take whatever measures it deems necessary to insure that all employees, suppliers, fabricators, material men, subcontractors, or their assigns, comply with this requirement.

8.2 The Contractor shall insure that if any suspect asbestos containing material is encountered, the Contractor will immediately notify LAFB 47 CES/CENMP and the owners. The 47 CES/CENMP will perform or contract for any asbestos inspections, asbestos abatement, asbestos project management, and third-party asbestos monitoring.

8.3 AT SUBSTANTIAL COMPLETION AND FINAL COMPLETION THE CONTRACTOR SHALL PROVIDE A CERTIFICATION LETTER CERTIFYING THAT THE WORK DOES NOT CONTAIN ASBESTOS AS REQUIRED BY THE GCCPS.

ARTICLE 9 PRE-EXISTING CONDITIONS

The Contractor acknowledges that it has been provided access to the existing improvements and conditions on the Project site and that it has thoroughly investigated those conditions. Contractor's investigation was instrumental in preparing its BVB to perform the Work. Contractor shall not make or be entitled to any adjustment to the Contract Time or the Contract Sum arising from Project conditions that Contractor discovered or, in the exercise of reasonable care, should have discovered in Contractor's investigation.

ARTICLE 10 BONDS AND INSURANCE

10.1 The Contractor shall provide performance and payment bonds on forms prescribed by Owner and in accordance with the requirements set forth in the GCCC. The penal sum of the payment and performance bonds shall be equal to the Contract Sum.

10.2 The Contractor shall not commence work under the Agreement until it has obtained all insurance coverage as required by the GCCC and until evidence of the required insurance has been reviewed and approved by the Owner. Owner's review of the insurance shall not relieve nor decrease the liability of the Contractor.

ARTICLE 11 NOT USED

ARTICLE 12 CONTRACTOR'S SPECIAL WARRANTIES AND RESPONSIBILITIES

12.1 Contractor agrees and acknowledges that Owner is entering into this Agreement in reliance on Contractor's represented expertise and ability to provide construction services. Contractor agrees to use its best efforts, skill, judgment, and abilities to perform its obligations and to further the interests of Owner in accordance with Owner's requirements and procedures.

12.2 Contractor represents and agrees that it will perform its services in accordance with the usual and customary standards of Contractor's profession or business and in compliance with all applicable national, federal, state, and municipal, laws, regulations, codes, ordinances, orders and with those of any other body having jurisdiction over the Project. Contractor agrees to bear the full cost of correcting Contractor's negligent or improper work and services, those of its consultants, and any harm caused by the negligent or improper work or services.

12.3 Contractor's duties shall not be diminished by any approval by Owner nor shall the Contractor be released from any liability by any approval by Owner, it being understood that the Owner is ultimately relying upon the Contractor's skill and knowledge in performing the services required by this Agreement.

12.4 Contractor represents and agrees that all persons connected with the Contractor directly in charge of its services are duly registered and/or licensed under the laws, rules and regulations of any authority having jurisdiction over the Project if registration is required.

12.5 Contractor represents and agrees to advise Owner of anything of any nature in any drawings, specifications, plans, sketches, instructions, information, requirements, procedures, and other data supplied to the Contractor (by the Owner or any other party) that is, in its opinion, unsuitable, improper, or inaccurate for the purposes for which the document or data is furnished.

12.6 The Contractor represents and agrees to perform its services under this Agreement in an expeditious and economical manner consistent with good business practices and the interests of Owner.

12.7 Contractor represents and agrees that there are no obligations, commitments, or impediments of any kind that will limit or prevent performance of its obligations under this Agreement.

12.8 Contractor represents and agrees that the individual executing this Agreement on behalf of Contractor has been duly authorized to act for and to bind Contractor to its terms.

12.9 Contractor shall designate a representative authorized to act on Contractor's behalf with respect to the Project.

12.10 Contractor shall establish and maintain a numbering and tracking system for all Project records including, but not limited to: changes, requests for information, submittals, and supplementary instructions and shall provide updated records to the Owner when requested.

12.11 Except for the obligation of Owner to pay Contractor certain fees, costs, and expenses pursuant to the terms of this Agreement, Owner shall have no liability to Contractor or to anyone claiming through or under Contractor by reason of the execution or performance of this Agreement. Notwithstanding any obligation or liability of Owner to Contractor, no present or future partner or affiliate of Owner or any agent, officer, director, or employee of Owner, LAFB. City of Del Rio or Val Verde County, or of the components comprising LAFB, City of Del Rio or Val Verde County, or anyone claiming under Owner has or shall have any personal liability to Contractor or to anyone claiming through or under Contractor by reason of the execution or performance of this Agreement.

ARTICLE 13 INDEMNITY

13.1 SEE ARTICLE 3 OF THE GENERAL CONDITIONS FOR BUILDING CONSTRUCTIOIN CONTRACTS FOR CONTRACTOR'S GENERAL INDEMNIFICATION OBLIGATIONS.

ARTICLE 14 PARTY REPRESENTATIVES

14.1 The Owner's Designated Representative authorized to act in the Owner's behalf with respect to the Project is:

Alejandro Garcia, P.E.
Public Works Director
109 W. Broadway
830-774-8538
aagarcia@cityofdelrio.com

14.2 The Contractor's designated representative authorized to act on the Contractor's behalf and bind the Contractor with respect to the Project is:

[*Name*]
[*Title*]
[*Address*]
[*Phone Number*]
[*Email Address*]

14.3 The parties may make reasonable changes in their designated representatives upon advance written notice to the other party.

ARTICLE 15 NOTICES

Notices of claims or disputes or other legal notices required by this Agreement shall be sent to the following persons at the indicated locations.

If to Owner:	Alejandro Garcia, P.E. Public Works Director 109 W. Broadway 830-774-8538 aagarcia@cityofdelrio.com
If to Contractor:	[*Name*] [*Company Name*] [*Street Address*] [*City, State, Zip*] [*Fax No.*]

The parties may make reasonable changes in the person or place designated for receipt of notices upon advance written notice to the other party.

ARTICLE 16 MISCELLANEOUS PROVISIONS

16.1 Assignment. This Agreement is a personal service contract for the services of Contractor, and Contractor's interest in this Agreement, duties hereunder and/or fees due hereunder may not be assigned or delegated to a third party without the written consent of the Owner.

16.2 Records of expenses pertaining to Additional Services and services performed on the basis of a Worker Wage Rate or Monthly Salary Rate shall be kept on the basis of generally accepted accounting principles and in accordance with cost accounting standards promulgated by the Federal Office of Management and Budget Cost Accounting Standards Board and shall be available for audit by the Owner or the Owner's authorized representative on reasonable notice.

16.3 Family Code Child Support Certification. Pursuant to Section 231.006, Texas Family Code, Service Provider certifies that it is not ineligible to receive the award of or payments under this Agreement and acknowledges that this Agreement may be terminated and payment may be withheld if this certification is inaccurate.

16.4 Franchise Tax Certification. A corporate or limited liability company Contractor certifies that it is not currently delinquent in the payment of any Franchise Taxes due under Chapter 171 of the *Texas Tax Code*, or that the corporation or limited liability company is exempt from the payment of such taxes, or that the corporation or limited liability company is an out-of-state corporation or limited liability company that is not subject to the Texas Franchise Tax, whichever is applicable.

16.5 Payment of Debt or Delinquency to the State. Pursuant to Sections 2107.008 and 2252.903, *Texas Government Code*, Contractor agrees that any payments owing to Contractor under this Agreement may be applied directly toward any debt or delinquency that Contractor owes the State of Texas or any agency of the State of Texas regardless of when it arises, until such debt or delinquency is paid in full.

16.6 Entire Agreement; Modifications. This Agreement supersedes all prior agreements, written or oral, between Contractor and Owner and shall constitute the entire Agreement and understanding between the parties with respect to the Project. This Agreement and each of its provisions shall be binding upon the parties and may not be waived, modified, amended or altered except by a writing signed by Contractor and Owner.

16.7 Captions. The captions of paragraphs in this Agreement are for convenience only and shall not be considered or referred to in resolving questions of interpretation or construction.

16.8 Governing Law and Venue. This Agreement and all of the rights and obligations of the parties and all of the terms and conditions shall be construed, interpreted and applied in accordance with and governed by and enforced under the laws of the State of Texas without reference to its conflicts of law provisions. City of Del Rio, Texas shall be the sole places of venue for any legal action arising from or related to this Agreement or the Project in which the Owner is a party.

16.9 Waivers. No delay or omission by either party in exercising any right or power arising from non-compliance or failure of performance by the other party with any of the provisions of this Agreement shall impair or constitute a waiver of any such right or power. A waiver by either party of any covenant or condition of this Agreement shall not be construed as a waiver of any subsequent breach of that or of any other covenant or condition of the Agreement.

16.10 Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties and their respective permitted assigns and successors.

16.11 Appointment. Owner hereby expressly reserves the right from time to time to designate by notice to Contractor a representative(s) to act partially or wholly for Owner in connection with the performance of Owner's obligations. Contractor shall act only upon instructions from the designated representative(s) unless otherwise specifically notified to the contrary.

16.12 Records. Records of Contractor’s costs, reimbursable expenses pertaining to the Project and payments shall be available to Owner or its authorized representative during business hours and shall be retained for four (4) years after final Payment or abandonment of the Project, unless Owner otherwise instructs Contractor in writing.

16.13 Notices. All notices, consents, approvals, demands, requests or other communications relied on by the parties shall be in writing. Written notice shall be deemed to have been given when delivered in person to the designated representative of the Contractor or Owner for whom it is intended; or sent by U. S. Mail to the last known business address of the designated representative; or transmitted by fax machine to the last known business fax number of the designated representative. Mail notices are deemed effective upon receipt or on the third business day after the date of mailing, whichever is sooner. Fax notices are deemed effective the next business day after faxing.

16.14 Severability. Should any term or provision of this Agreement be held invalid or unenforceable in any respect, the remaining terms and provisions shall not be affected and this Agreement shall be construed as if the invalid or unenforceable term or provision had never been included.

16.15 Illegal Dumping. The Contractor shall ensure that it and all of its Subcontractors and assigns prevent illegal dumping of litter in accordance with Title 5, *Texas Health and Safety Code*, Chapter 365.

16.16 By signature hereon, Contractor certifies that no member of Val Verde County, LAFB, or City of Del Rio Executive Officers, including component institutions, has a financial interest, directly or indirectly, in the transaction that is the subject of this contract.

16.17 Ethics Matters/No Financial Interest. Contractor and its employees, agents, representatives and subcontractors have read and understand the following: https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm See the following link and review the HB 1295 regulations.

BY SIGNING BELOW, the Parties have executed and bound themselves to this Agreement as of the day and year first above written.

(SEAL) (Contractor)

ATTEST:

By: _____ By: _____
(original signature) (original signature)

_____
(name and title typed) (name and title typed)

CITY OF DEL RIO, TEXAS
(Owner)

By: _____
(original signature)

Name: Henry Arredondo

Title: CITY OF DEL RIO
CITY MANAGER

PERFORMANCE BOND

Surety Bond No._____

STATE OF TEXAS §

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF §

That we,_____, as Principal, and _____, as Surety, are hereby held and firmly bound unto the State of Texas as Obligee in the penal sum of_____ Dollars ($_____) for payment whereof the said Principal and Surety bind themselves, their heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

The conditions of this obligation are such that whereas the Principal entered into a certain contract, hereto attached, and made a part hereof, with the State of Texas, acting by and through City of Del Rio, Texas for and on behalf of dated_____, 201X, for project **T-6 Prefabricated Aircraft Sun Shades at Laughlin Air Force Base**.

NOW THEREFORE, the condition of this obligation is such that, if the Principal shall faithfully perform the said Contract in accordance with the Plans and Specifications and Contract Documents, and shall fully indemnify and save harmless the State of Texas from all cost and damage which the State of Texas may suffer by reason of Principal's default or failure so to do and shall fully reimburse and repay the State of Texas all outlay and expense which the State of Texas may incur in making good any such default, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

In the event that the Principal is declared in default under the said Contract, the Surety will within Fifteen (15) days of the State of Texas' declaration of such default take over and assume completion of said contract and become entitled to the payment of the balance of the Contract Price. Conditioned upon the Surety's faithful performance of its obligations, the liability of the Surety for the Principal's default shall not exceed the penalty of this bond.

The Surety agrees to pay to the State of Texas upon demand all loss and expense, including attorney's fees, incurred by the State of Texas by reason of or on account of any breach of this obligation by the Surety.

This bond is issued pursuant to the requirements of Section 2253.021, Texas Government Code, as amended.

Provided further, that if any legal action be filed upon this bond, venue shall lie in the county where the said Contract is to be performed.

Provided further, that the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the said Contract, or to the work to be performed thereunder, or the Specifications accompanying the same, shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition, to the terms of the said Contract or to the work or to the Specifications. By signature hereon, if the amount of this bond exceeds $100,000, then the Surety attests that at the time the bond was executed (and Surety shall provide the Obligee with evidence of the following):

(1) it was a holder of a certificate of authority from the United States Secretary of the Treasury to qualify as a surety on obligations permitted or required under federal law; or

(2) had reinsured any liability in excess of $100,000 by a reinsurer holding a certificate of authority from the United States Secretary of the Treasury.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this_____ day of_____in the year _____, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

(SEAL)

ATTEST:

By:_____

_____
(Typed Name and Title)

_____
Principal

By: _____

_____
(Typed Name and Title)

(SEAL)

ATTEST:

By:_____

_____
(Typed Name and Title)

_____
Surety

By: _____

_____
(Typed Name and Title)

Surety's Texas Local Recording Agent or Resident Agent:

_____
(Signature)

_____
(Typed Name)

License No. _____

File No. _____

Address: _____

_____

Telephone No.: _____

Surety's Home Office Agent or Servicing Agent:

Name: _____

Title:_____

Address: _____

_____

Telephone No._____

PAYMENT BOND

Surety Bond No._____

STATE OF TEXAS §

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF §

That we,_____, as Principal, and _____, as Surety, are hereby held and firmly bound unto the State of Texas as Obligee in the penal sum of _____ Dollars ($_____)for the payment whereof, the said Principal and Surety bind themselves, their heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

The conditions of this obligation are such that whereas the Principal entered into a certain contract, hereto attached, and made a part hereof, with the State of Texas, acting by and through Val City of Del Rio, Texas for and on behalf of, dated_____, 201X, for project T-6 Prefabricated Aircraft Sun Shades at Laughlin Air Force Base.

NOW, THEREFORE, the condition of this obligation is such that, if the Principal shall promptly make payments to all claimants as defined in Section 2253.021, Texas Government Code, as amended, of all persons supplying labor and materials in the prosecution of the work provided for in said contract, then this obligation shall be null and void, but otherwise it shall remain in full force and effect.

In the event that the Principal fails to promptly pay when due persons who have supplied labor, materials, or supplies used in the performance of the said contract, the Surety will, upon receipt of notice from the State of Texas or a claim in the form required by law, satisfy all undisputed balances due, and make arrangements satisfactory to the interested parties to resolve all amounts disputed in good faith, but in no event shall the liability of the Surety for the Principal's failure to promptly pay for labor, materials, or supplies exceed the penalty of this bond.

This Surety agrees to pay the State of Texas upon demand all loss and expense, including attorney's fees, incurred by the State of Texas by reason or on account of any breach of this obligation by Surety.

Provided further, that this bond is made and entered into for the protection of all claimants supplying labor and material in the prosecution of the work provided for in said Contract, and all such claimants shall have a direct right of action under the bond as provided in Section 2253.021, Texas Government Code, as amended. If any legal action is filed upon this bond, venue shall be in the county where the said Contract is to be performed.

By signature hereon, if the amount of this bond exceeds $100,000, then the Surety attests that at the time the bond was executed (and Surety shall provide the Obligee with evidence of the following):

(1) it was a holder of a certificate of authority from the United States Secretary of the Treasury to qualify as a surety on obligations permitted or required under federal law; or

(2) had reinsured any liability in excess of $100,000 by a reinsurer holding a certificate of authority from the United States Secretary of the Treasury.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this_____ day of_____in the year _____, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

(SEAL)
ATTEST:

By:_____

_____
(Typed Name and Title)

_____
Principal

By: _____

_____
(Typed Name and Title)

(SEAL)
ATTEST:

By:_____

_____
(Typed Name and Title)

_____
Surety

By: _____

_____
(Typed Name and Title)

Surety's Texas Local Recording Agent or Resident Agent:

_____
(Signature)

_____
(Typed Name)

License No. _____

File No. _____

Address: _____

_____

Telephone No.: _____

Surety's Home Office Agent or Servicing Agent:

Name: _____

Title:_____

Address: _____

_____

Telephone No._____

LAUGHLIN AIR FORCE BASE
INSURANCE REQUIREMENTS:

If this Contract requires the presence of Contractor, its employees, agents, suppliers or subcontractors (if any) on the property of Laughlin Air Force Base, Contractor will maintain and cause its agents, suppliers and subcontractors (if any) to maintain the following insurance coverage's with companies authorized to do insurance business in the State of Texas or eligible surplus lines insurers operating in accordance with the Texas Insurance Code, having an A.M. Best Rating of A-:VII or better, and in amounts not less than the following minimum limits of coverage:

TYPE OF COVERAGE	MINIMUM LIMITS OF LIABILITY
Worker's Compensation	Statutory
Employer's Liability:	$1,000,000 per Accident, Employee and Policy Limit
Commercial General Liability	$1,000,000 per Occurrence *Including contractual liability*
Personal & Advertising Injury	$1,000,000 per Occurrence
General Aggregate	$2,000,000 per Policy Limit
Product/Completed Ops	$2,000,000 Aggregate
Automobile Liability	$1,000,000 Single Limit *Must cover all owned, non-owned or hired automobiles,*

All policies (with the exception of Workers' Compensation and Employer's Liability) will be endorsed and name LAFB, and their officers and employees as Additional Insured's for liability caused in whole or in part by Contractor's acts or omissions with respect to its on-going and completed operations up to the actual liability limits of the required insurance policies maintained by Contractor. Commercial General Liability Additional Insured endorsement including ongoing and completed operations coverage will be submitted with the Certificates of Insurance. Commercial General Liability and Business Auto Liability will be endorsed to provide primary and non-contributory coverage.

All Policies will be endorsed to provide a Waiver of Subrogation in favor of *Laughlin Air Force Base*. No policy will be canceled until after thirty (30) days unconditional written notice to *LAFB*. *All insurance policies* will be endorsed to require the insurance carrier providing coverage to send notice to *LAFB* thirty (30) days prior to any cancellation, material change, or non-renewal to any insurance policy required from *LAFB.* Additional evidence of insurance will be provided verifying the continued existence of all required insurance no later than thirty (30) days after each annual insurance policy renewal.

Certificate Holder:
XXXX
XXX
XXXX TX 76019

Place the following in the "Description of Operations…" section of the certificate:
"For the T-6 Prefabricated Aircraft Sun Shades at Laughlin Air Force Base and their officers and employees are named as additional insured on the above policies except Worker's Compensation. Waiver of Subrogation is provided in favor of certificate holder – Laughlin Air Force Base and as required by written contract between named insured and the certificate holder.

MINIMUM WAGE RATE DETERMINATION

City of Del Rio, Texas is the contracting agency for this construction project. The following statue requires the contracting agency to specify the generally minimum rates of wages in contracts.

Government Code 2258
"Construction of Public Works in State and
Municipal or Political Subdivisions; Prevailing
Wage Rates to be maintained"
and
The U General and Supplementary General Conditions
for Building Construction Contracts

Pursuant to the requirements of this statute, we have determined that the following rates of wages are paid to various classifications of workers in the locality of this project.

Total hourly compensations to each worker must equal or exceed the minimum wage rates stated in the following attachment. Contributions by a worker toward health, pension, vacation, and the like are part of the worker's pay; contributions by the employer are not. Any dollar amounts shown in columns for health, pension, and vacation may be paid either in case or in kind. Workers in classifications where rates are not identified shall be paid not less than the general minimum rate of "laborer" for the various classifications of work therein listed.

All hours of work over 40 hours per week are overtime and will be compensated at the rate of 1 and ½ times the regular wage.

Trainees/helpers, where not otherwise specified above, may be compensated at a rate determined mutually by the worker and employer, commensurate with the experience and skill of the worker but a rate not less than 60% of the journeyman's wage nor less that the Laborers (General) rate. At no time shall a journeyman supervise more than two of apprentices, trainees or helpers. All apprentices/trainees/helpers shall be under the direct supervision of a journeyman working as a crew.

General Decision Number: TX160218 09/02/2016 TX218

Superseded General Decision Number: TX20150218

State: Texas

Construction Type: Building

County: Val Verde County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.15 for calendar year 2016 applies to all contracts subject to the Davis-Bacon Act for which the solicitation was issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.15 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2016. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/08/2016
1	03/18/2016
2	05/27/2016
3	09/02/2016

ASBE0087-002 01/01/2016

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 21.57	10.02

BOIL0074-005 01/01/2013

	Rates	Fringes
Boilermaker	$ 22.71	20.63

IRON0066-005 06/01/2015

	Rates	Fringes
IRONWORKER, REINFORCING AND STRUCTURAL	$ 21.30	5.95

LABO0154-001 05/01/2008

	Rates	Fringes
Laborers: (Mason Tender - Cement/Concrete)	$ 12.98	3.49

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* PLUM0142-003 07/01/2016

	Rates	Fringes
Plumber	$ 30.25	11.35

SUTX2009-073 04/20/2009

	Rates	Fringes
ACOUSTICAL CEILING MECHANIC	$ 14.50	0.00
BRICKLAYER	$ 17.76	0.00
CARPENTER, Includes Drywall Hanging (Excludes Acoustical Ceiling Installation)	$ 15.50	0.30
CEMENT MASON/CONCRETE FINISHER	$ 13.27	0.00
ELECTRICIAN	$ 15.85	0.00
LABORER: Common or General	$ 7.66	0.00
LABORER: Landscape & Irrigation	$ 8.50	0.22
LABORER: Mason Tender - Brick	$ 12.02	0.00
LABORER: Mortar Mixer	$ 9.50	0.00
LATHER	$ 12.00	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 13.75	0.00
OPERATOR: Bulldozer	$ 12.80	0.43
OPERATOR: Crane	$ 21.33	0.00
OPERATOR: Forklift	$ 14.58	0.00
OPERATOR: Loader (Front End)	$ 10.54	0.00
PAINTER: Brush, Roller and Spray	$ 15.80	0.00
PLASTERER	$ 12.00	0.00
ROOFER	$ 15.20	0.00

SHEET METAL WORKER, Includes
HVAC Duct Installation.....$ 12.00 0.00

TILE SETTER.....$ 15.00 0.00

TRUCK DRIVER.....$ 11.24 0.35

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.)

and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

LAUGHLIN AIR FORCE BASE
ENVIRONMENTAL HEALTH & SAFETY
CONSTRUCTION SITE PROCEDURES FOR CONTRACTORS

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1. GENERAL SAFETY
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6. STORM WATER REQUIREMENTS
7. SPILL PREVENTION, CLEAN-UP AND DISPOSAL
8. SPILL AND COMPLAINT RESPONSE PROGRAM
9. NOTIFICATION REQUIREMENTS AND PROCEDURES
10. CONTACT INFORMATION
11. SWPPP PERMIT COVERAGE REQUIREMENTS FLOWCHART

1. GENERAL SAFETY

The purpose of these procedures is to provide a safe work environment for all individuals at Laughlin Air Force Base. All contractors performing services on Laughlin Air Force Base shall comply with all applicable local, state and federal policies. This includes implementing and providing any required employee training and/or written programs.

Before providing any services, the contractor shall furnish to the Environmental Health & Safety Office (EH&S) a copy of all applicable required written programs and documentation of training for all employees under their control.

2. APPLICABLE REGULATIONS

The terms pollutant, pollution, hazardous waste, hazardous substance, hazardous material, or contaminant, refer to any toxic or harmful substance as defined by the Occupational Safety & Health Act (OSHA), the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental

Response, Compensation, and Liability Act (CERCLA), the Superfund Amendments and Reauthorization Act (SARA), the National Fire Protection Association (NFPA), Texas Regulations for Control of Radiation (TRCR) and/or any other applicable federal, state, or local law, rule, or regulation.

The following OSHA regulations may apply to services performed and require the contractor to provide proper employee training, documentation of employee proficiency, and/or a written program:

- Respirator Protection, 29 CFR 1910.134, Subpart I
- Personal Protective Equipment, 29 CFR 1910, Subpart I
- Permit-Required Confined Spaces, 29 CFR 1910.146, Subpart J
- The Control of Hazardous Energy (Lockout/Tagout), 29 CFR 1910.147, Subpart J
- Welding, Cutting, and Brazing, 29 CFR 1910, Subpart Q
- Electrical, 29 CFR 1910, Subpart S
- Bloodborne Pathogen, 29 CFR 1910.1030, Subpart Z
- Hazard Communication, 29 CFR 1910.1200 Subpart Z
- Cranes, Derricks, Hoists, Elevators & Conveyors, 29 CFR 1926, Subpart N
- Fall Protection, 29 CFR 1926, Subpart M
- Excavation, 29 CFR 1926, Subpart P
- Scaffolds, 29 CFR 1926, Subpart L

3. FIRE & LIFE SAFETY REQUIREMENTS

The following information regarding fire and life safety requirements on Laughlin Air Force Base shall be adhered to during all phases of construction activity:

Hot Work Permit

Hot work can be any of the following: electric arc welding, oxygen acetylene welding, tig/mig welding, cutting/soldering, propane torch, grinding, torch applied roofing, tar kettles and/or any other activity or the use of a device that creates heat or sparks. Before beginning any of these hot work activities the contractor must obtain a Hot Work Permit issued by the *47 CES/CEIE* office. Prior to beginning hot work, all individuals performing the hot work, as well as the required fire watch, must complete *LAFB's* Hot Work Training (provided by *47 CES/CEIE*). Please call *47 CES/CEIE* at *830-298-5746* at least one day prior to requesting a Hot Work Permit to make arrangements for training. Contractors should also contact EH&S directly when they are ready for the permit to be issued at the site.

Fire Extinguishers

Contractor furnished fire extinguishers are required on all job sites to meet NFPA requirements.

Nuisance Alarms

Prior to beginning any operation that will affect the fire alarms system (i.e., dust, smoke, steam, fog, etc.) contact EH&S to arrange for the temporary disabling and/or disconnection of any potential affected smoke detectors.

Means of Egress

Means of egress must be maintained from occupied spaces at all times. Reduction in required exit width, reduction in the number of means of egress, and/or temporary egress must be approved in advance by EH&S. Temporary exit signs must be in place at all times where necessary.

Emergency Access
Fire Department emergency access, to include the approach and all designated fire lanes, must be in place prior to building construction. In addition to *Laughlin AFB Fire Prevention Office at 830-298-5037* Dept. approval, *LAFB* must be informed of all temporary street obstructions or closures.

Flammable/Combustible Storage
The use of mobile or temporary storage tanks containing flammable or combustible materials will require prior written approval from *LAFB*.

Temporary Structures
Temporary structures, including tents, shall be erected and secured in a safe manner. A site plan and a flame retardant certificate shall be provided to *LAFB* prior to the erection of a tent or temporary structure.

4. PROCEDURES TO FOLLOW WHILE ON *LAUGHLIN AIR FORCE BASE*

Equipment Cleaning
Equipment should be cleaned in a manner that does not create any discharge of cleaning agents, paints, oil, or other pollutants to a storm sewer or waterway. Soaps and detergents should never be discharged to the ground or off-site. When rinsing painting equipment outside, contain rinse water in a bucket or other container. Water-based or latex paint rinse water may be discharged to the sanitary sewer. Oil- based paint wastes, including solvents and thinners, should ***not*** be disposed into the sanitary sewer. They must be collected and disposed of through the contractor's disposal company. Cement handling equipment should be rinsed in a contained area so there is no drainage off-site.

Asbestos Containing Materials
Before beginning work in any building, the contractor shall verify that no asbestos containing or suspected asbestos containing materials will be damaged or disturbed during any portion of the work to be performed. This can be verified through the LAFB Asbestos Program office at 830-298-5457. If the contractor incidentally damages or disturbs asbestos containing or suspected asbestos containing materials during any portion of the work, the contractor shall immediately stop work in that area, restrict access to the area, and contact the *Accidentally disturb asbestos* Office at 830-298-5457.

Trash/Debris Disposal
All trash or debris must be cleaned daily, contained on-site and disposed of in a recycling bin or waste receptacle to prevent wind or rain from carrying it off-site into a storm drain or waterway. Petroleum wastes, such as waste oil and used oil filters, should be containerized for recycling or disposal by the contractor. Non-hazardous solid wastes, such as general construction debris, can be recycled or disposed of in the trash container. Never place liquid wastes of any kind in dumpsters.

Ionizing/Non-Ionizing Radiation
The contractor may not bring radioactive materials, radiation-producing machines, and/or class IIIb or

class IV laser devices on campus without first notifying and obtaining written approval from the *Laughlin's* Safety Officer *(LSO)*. Additionally, if it is necessary for a contractor to enter any campus area that is posted "Radioactive Material," "X-ray Radiation," or "Danger Laser," they must first notify and obtain approval from the *LSO*. The *LSO* may be reached in *LSO-47 CES/HAZMO* at 830-298-4351.

5. CONTRACTOR REQUIREMENTS AND RESPONSIBILITIES

- The contractor shall maintain a legible copy of a current Material Safety Data Sheet (MSDS) for each hazardous chemical brought to the construction site. MSDS(s) shall be readily available, on request, for review by *LAFB* personnel.
- The Contractors will conduct daily safety inspections of all assigned areas to identify and correct hazards.
- The Contractor will provide employees with required personal protective equipment.
- The Contractors are responsible for establishing and maintaining an effective Housekeeping Program. The Contractors are responsible for cleaning up and properly disposing of all spilled pollutants brought to the site, including oil, paint, fuels, antifreeze, solvents, etc. Contractors should keep accurate records (such as receipts, copies of analytical results, etc.) indicating proper disposal of spilled materials.
- The Contractors are responsible for ensuring that all discharges from the site are in compliance with applicable regulations.
- No substance that might cause pollution should be dumped, leaked onto the ground, or allowed to run-off of a construction site. Be aware that the contractor is responsible for pollutant contaminated run-off and proper disposal of all waste materials generated.
- No substance should be abandoned on *LAFB* property.

6. STORM WATER REQUIREMENTS

Storm Water Management

LAFB has implemented a Storm Water Management Plan. Prior to beginning construction, contractors are required to submit a Storm Water Pollution Prevention Plan for review by the *City of Del Rio* Office and the *LAFB* Storm Water Management (SWM) Team.

The purpose of this section is to inform contractors about the Storm Water Pollution Prevention Plan (SWPPP) requirements for *LAFB*.

Construction is a specialized type of industrial activity that involves intense, varied activities in a limited area. Erosion and sedimentation are two of the largest potential problems from these sites. Debris and on-site chemicals are other sources to consider.

SWPPPs

A Storm Water Pollution Prevention Plan (SWPPP), if required, must be submitted to 47 CES/CEIE for review no less than two (2) weeks before a project is scheduled to begin. The plan must be approved by 47 CES/CEIE before any earth moving activity takes place. In addition, one of the requirements of a SWPPP will be a

field verification (walking of the site). This will be performed by the author of the SWPPP along with 47 CES/CEIE. *The telephone contract number for Civil Engineering is 830-298-5746* staff.

A SWPPP should include (but not be limited to) the following:

Site description
Project and soil description
List of potential pollutants
Detailed site map (erosion control plan)
Description of construction support activities
Copy of construction general permit
Copy of Notice of Intent (NOI)- large construction projects, or
a Construction Site Notice (CSN) for small construction projects
Discharge plans (filtering and pumping storm water from the site)

Inspections

Inspections will be conducted on a weekly basis. Sites will be walked together by a representative from *47 CES/CEIE* and the contractor.

BMPs

BMPs must be installed prior to any earth disturbing activity. Even small projects such as boring, saw cutting, trenching, etc. will be required to utilize erosion and sediment controls. A list of approved BMPs can be found in the *integrated Storm Water Management Technical Manual – Construction Controls*. and provides the design criteria for permanent and temporary structural controls during preconstruction, construction, and post construction phases.

Silt Fence and Inlet Protection Requirements

Silt fence materials and installation requirements must meet stated technical specifications (http://www.tceq.state.tx.us/assets/public/permitting/waterquality/attachment)
. All inlet protection must be anchored with orange colored gravel bags. There should be no protruding or bent wires that may be potential safety hazards. Such wires must be clipped off, tied down or bent back into place.

Stormwater Pollution Prevention Signage

All permitted construction projects must display appropriate signage. The following link contains examples for both small and large construction sites.
(http://www.tceq.state.tx.us/permitting/stormwater/WQ_stormwater_construction)
Small construction site notices must contain the operator name, contact name and number, project description, and location of SWPPP. Large site notices should include all the previous items plus a Notice of Intent and the site specific TPDES authorization number. Signs must be displayed at the main entrance.

Permit Coverage Requirements

The size of a project determines the amount of regulation. The flow chart on page 8 will help contractors determine which regulations apply to their particular project.

Final Stabilization

Final stabilization of a construction site is satisfied when all soil disturbing activities are complete and a uniform vegetative cover with 70 percent coverage has been established. Disturbed areas that will not be re-distributed for 21 days must be stabilized by the 14th day after the last disturbance.

Erosion/Sediment Control
Proper erosion and sedimentation controls must be in place to prevent sediment or silt run-off. Sediment (including cement) should never be rinsed off the site; instead, it should be cleaned up in a manner that does not allow it to reach a storm drain or waterway. Equipment tires may be rinsed before leaving the site to avoid tracking sediment into the roadway or off the site.

Stormwater Pollution Prevention Resources
Texas Commission on Environmental Quality (TCEQ) Stormwater Program
(http://www.tceq.texas.gov/permitting/stormwater/sw_permits.html)

Separators or Traps
Before removing oil/water separators or traps connected to the sanitary sewer, the materials in them must have been tested within the last two years (Toxicity Characteristic Leachate Procedure or TCLP) *before* they are cleaned out. Be aware that this test may take three weeks to complete if a recent test has not been completed, so plan accordingly. Documentation of the test results must be submitted to *47 CES/CEIE* for review and approval *before* emptying or removing the trap.

7. SPILL PREVENTION, CLEAN-UP AND DISPOSAL

SPCC (Spill Prevention Control and Countermeasure)
Contractors are required to have materials on hand at all times in the event of a spill. They are required to notify *Laughlin AFB Fire Prevention Office at 830-298-5037* immediately if a spill occurs. Additionally, MSDSs are required to be on site for any and all chemicals on site.

Petroleum
Spills of hydraulic fluid, oil and other petroleum products should always be immediately cleaned up to prevent discharge of these fluids with storm water run-off. Petroleum contaminated soil should be cleaned up and disposed of properly. Storage containers should be kept closed, clean, and free of oily residue. Construct a liquid-tight bermed area for temporary fuel tanks used during construction.

Plan Ahead
It is cheaper to prevent spills than to mitigate them. Be prepared to contain or dike spills to prevent spreading. Small areas are easier to clean than large ones. Keep sorbent materials such as clay (kitty litter), polypropylene booms and pads, rags and sawdust on hand for clean-up of spilled liquids.

Clean-up
Sorbent materials can be used to effectively clean up various materials spilled on pavement, water, and soil. Soil or other media that has been contaminated with petroleum or other pollutants should be excavated or remediated to prevent contaminated discharges to a storm drain or waterway. Excavated contaminated materials should be stored in containers or on plastic and covered so that the contamination is not flushed back onto the ground during a rainstorm.

Contaminated Material Disposal

Proper disposal of waste materials depends partly on the type of contaminant. Hazardous wastes (such as flammable petroleum products and solvents, thinners) and materials contaminated with hazardous wastes are considered regulated wastes, and should be containerized for transport and disposal by a permitted company. Disposal also depends on the amount of contaminant**.** For information on testing of contaminated soil and disposal options, contact *Laughlin AFB Fire Prevention Office* at *830-298-5037*.

8. SPILL AND COMPLIANCE RESPONSE PROGRAM

47 CES/CEIE has a program to enforce water quality regulations and assist you in compliance with those regulations. The *47 CES/CEIE* staff respond 24 hours a day, 7 days a week to hazardous materials spills and spills which threaten surface water quality within *LAFB.* Investigations are conducted to determine compliance with environmental laws and regulations and ensure corrective actions are taken when necessary. Discharges of any material or substance that will cause, or could potentially cause, pollution to surface waters is strictly prohibited. Staff have specialized training in hazardous materials response and spill clean-up regulations. For information about spill clean-up requirements and other regulations, contact *47 CES/CEIE* at *830-298-5746*.

9. NOTIFICATION REQUIREMENTS AND PROCEDURES

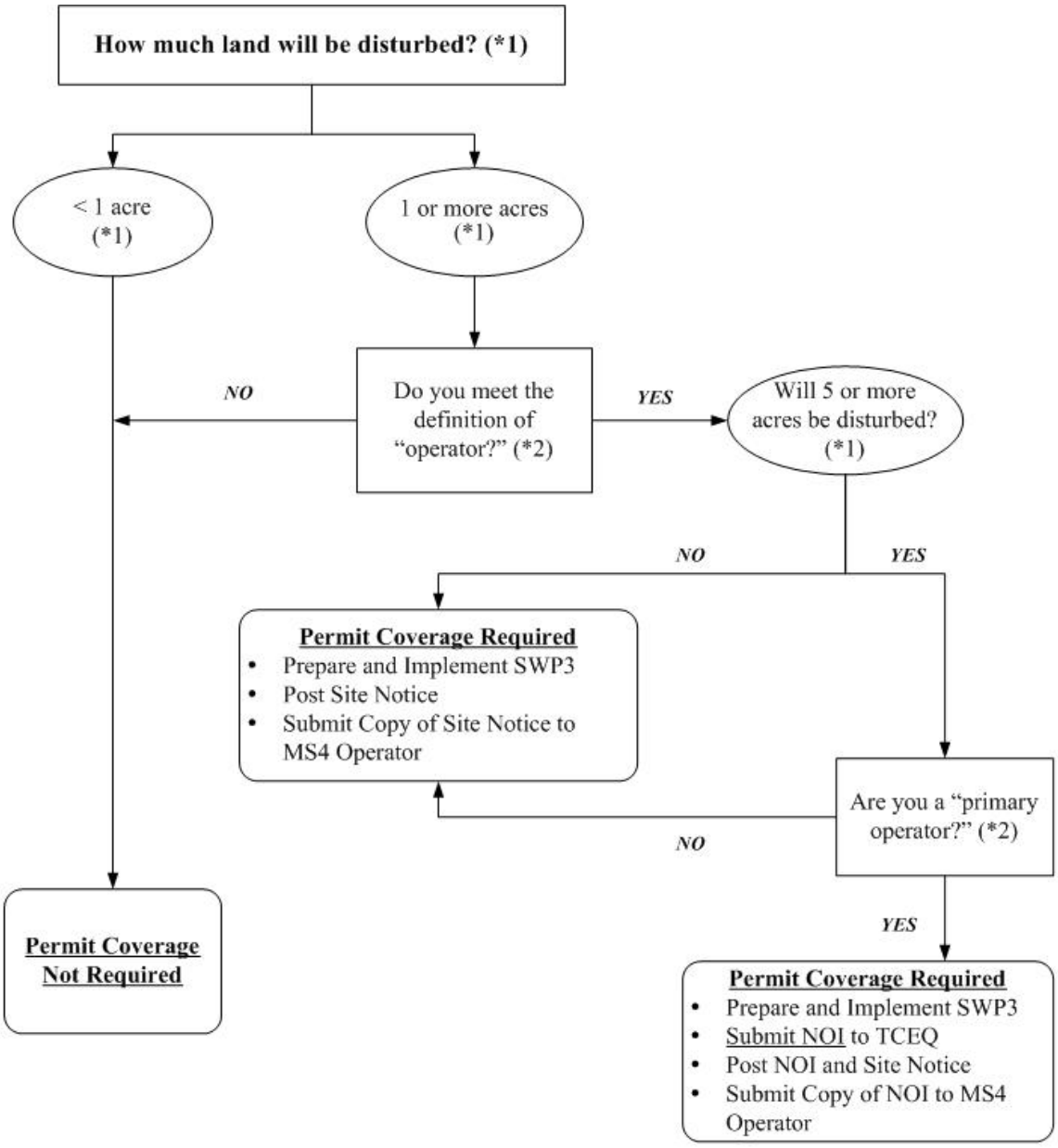
The contractor shall immediately notify *47 CES/CEIE* in the event of:

- Any spill that threatens to enter a storm sewer or watercourse.
- All petroleum spills, e.g. hydraulic fluid, transmission fluid, diesel, gasoline, etc.
- Contact with asbestos containing or suspected asbestos containing materials.
- Any hazardous or unknown material spill, e.g. many solvents, cleaners, etc.
- Any discharge from the site that is suspected to be in violation of local, state, and/or federal regulations, e.g. discharges that are cloudy, foul-smelling, colored, contain chemicals or heavy sediment loads.

10. CONTACT INFORMATION

Environmental Health & Safety	830-298-5694
Office hours –M-F-7:30 AM to 16:00 PM	
Facilities Management	
Main	830-298-5062
Asbestos Program	830-298-5457
After-hours Emergency	830-298-5100
Laughlin Air Force Base	
Emergency	911 (indicate you are on Laughlin AFB)
Non-emergency	830-298-5100

SWPPP Permit Coverage Requirements Flowchart
(based on amount of land disturbed)



(*1) To determine the size of the construction project, use the size of the entire area to be disturbed, and include the size of the larger common plan of development or sale, if the project is part of a larger project (refer to Part I.B., "Definitions," for an explanation of "larger common plan of development or sale").

(*2) Refer to the definitions for "operator," "primary operator," and "secondary operator" in Part I., Section B. of this permit.

Hot Works Question Set

General Information

1. Department of Requestor (Single-Pick)
2. Name of Requestor
3. Location Description
4. Starting Date and Time
5. Stopping Date and Time
6. Person(s) Performing Hot Work
7. Have person(s) performing hot work completed *LAFB* Hot Work/Fire Extinguisher Training within the last year?
8. Contact Number
9. Type of Work to be Performed
10. Description of Work to be Performed

Precautions Checklist

1. Hot work equipment is in good repair and appropriate for work being performed
2. Appropriate PPE is available and will be utilized
3. Protective dividers such as welding curtains to protect from public view or non-combustible wall will be provided
4. Vendor/department has supplied the person performing fire watch with suitable type and sufficient number of fire extinguishers (minimum 10 lb. ABC)
5. All fire extinguishers have current inspections and are operable
6. Person Responsible for Performing Fire Watch
7. Fire watch will be provided during, and for 30 minutes after work, including any coffee or lunch breaks
8. Fire watch will be required for adjoining areas, above and below
9. Have person(s) performing fire watch completed *LAFB* Hot Work/Fire Extinguisher Training within the last year?

Work Area Evaluation

1. If outdoors, wind speeds are 15 mph or less
2. Does the building have a fire alarm system?
    a. If necessary, have any smoke devices been disabled?
    b. If necessary, have temporary heat detectors have been put in place?
3. Does the building have a fire sprinkler system?
    a. Building fire sprinkler systems are in service and operable
    b. If necessary, have sprinkler heads in the area of hot work been disabled?
4. Is Lockout/Tagout required?
5. Flammable liquids, dust, lint, and oil deposits are removed from work area
6. Floors are free of debris
7. Combustible floors are protected by fire resistant blankets
8. Other combustibles are removed where possible or protected with fire-resistant blankets
9. All wall and floor openings are covered
10. Will work be performed behind walls, above ceilings, or on other enclosed equipment?
    a. If true…
        i. Construction is noncombustible and without combustible covering or insulation
        ii. Combustibles on other side of walls are moved away
        iii. Enclosed equipment is cleaned and all combustible are removed
11. If necessary, fire-resistant blankets are suspended beneath work
12. Conduction of heat into other areas is safe-guarded
13. Containers are purged of flammable liquids/vapors and no explosive atmosphere is present
14. Is work area where hot work is being performed considered a confined space?
15. There is ample ventilation to perform hot work
16. Potential IAQ problems have been addressed

Signature

1. Special Conditions or Other Additional Comments
2. Expiration Date and Time
3. Is this Hot Works Permit granted?
4. Signature of representative performing hot work
5. Signature of representative performing fire watch
6. Signature of *47 CES/CEIE* Permiter

General Conditions

for

Construction Contracts

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Article 1. Definitions

Unless the context clearly requires another meaning, the following terms have the meaning assigned herein.

1.1 *Application for Payment* means Contractor's monthly partial invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted and performed in accordance with the requirements of the Contract Documents. The Application for Payment accurately reflects the progress of the Work, is itemized based on the Schedule of Values, bears the notarized signature of Contractor, and shall not include subcontracted items for which Contractor does not intend to pay.

1.2 *Application for Final Payment* means Contractor's final invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of remaining Contractor's retainage.

1.3 *Architect/Engineer (A/E)* means a person registered as an architect pursuant to Tex. Occ. Code Ann., Chapter 1051, as a landscape architect pursuant to Tex. Occ. Code Ann., Chapter 1052, a person licensed as a professional engineer pursuant Tex. Occ. Code Ann., Chapter 1001, and/or a firm employed by Owner or Design-Build Contractor to provide professional architectural or engineering services and to exercise overall responsibility for the design of a Project or a significant portion thereof, and to perform the contract administration responsibilities set forth in the Contract.

1.4 *Baseline Schedule* means the initial time schedule prepared by Contractor for Owner's information and acceptance that conveys Contractor's and Subcontractors' activities (including coordination and review activities required in the Contract Documents to be performed by A/E and ODR), durations, and sequence of work related to the entire Project to the extent required by the Contract Documents. The schedule clearly demonstrates the critical path of activities, durations and necessary predecessor conditions that drive the end date of the schedule. The Baseline Schedule shall not exceed the time limit current under the Contract Documents.

1.5 *Certificate of Final Completion* means the certificate issued by A/E that documents, to the best of A/E's knowledge and understanding, Contractor's completion of all Contractor's Punchlist items and pre-final Punchlist items, final cleanup and Contractor's provision of Record Documents, operations and maintenance manuals, and all other Close-Out documents required by the Contract Documents.

1.6 *Change Order* means a written modification of the Contract between Owner and Contractor, signed by Owner, Contractor and A/E.

1.7 *Close-out Documents* mean the product brochures, submittals, product/equipment maintenance and operations instructions, manuals, and other documents/warranties, record documents, affidavit of payment, release of lien and claim, and as may be further defined, identified, and required by the Contract Documents.

1.8 *Contract* means the entire agreement between Owner and Contractor, including all of the Contract Documents.

1.9 *Contract Date* is the date when the agreement between Owner and Contractor becomes effective.

1.10 *Contract Documents* mean those documents identified as a component of the agreement (Contract) between Owner and Contractor. These may include, but are not limited to, Drawings; Specifications; these General Conditions and Owner's Special Conditions; and all pre-bid and/or pre-proposal addenda.

1.11 *Contract Sum* means the total compensation payable to Contractor for completion of the Work in Accordance with the terms and Contract.

1.12 *Contract Time* means the period between the start date identified in the Notice to Proceed with construction and the Substantial Completion date identified in the Notice to Proceed or as subsequently amended by a Change Order.

1.13 *Contractor* means the individual, corporation, limited liability company, partnership, firm, or other entity contracted to perform the Work, regardless of the type of construction contract used, so that the term as used herein includes a Construction Manager-at-Risk or a Design-Build firm as well as a general or prime Contractor. The Contract Documents refer to Contractor as if singular in number.

1.14 *Construction Documents* mean the Drawings, Specifications, and other documents issued to build the Project. Construction Documents become part of the Contract Documents when listed in the Contract or any Change Order.

1.15 *Not Used*

1.16 *Date of Commencement* means the date designated in the Notice to Proceed for Contractor to commence the Work.

1.17 *Day* means a calendar day unless otherwise specifically stipulated.

1.18 *Not Used*

1.19 *Drawings* mean that product of A/E which graphically depicts the Work.

1.20 *Final Completion* means the date determined and certified by A/E and Owner on which the Work is fully and satisfactorily complete in accordance with the Contract.

1.21 *Final Payment* means the last and final monetary compensation made to Contractor for any portion of the Work that has been completed and accepted for which payment has not been made, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of Contractor's retainage.

1.22 *NOT USED*

1.23 *Notice to Proceed* means written document informing Contractor of the dates beginning Work and the dates anticipated for Substantial Completion.

1.24 *Open Item List* means a list of work activities, Punchlist items, changes or other issues that are not expected by Owner and Contractor to be complete prior to Substantial Completion.

1.25 *Owner* means City of Del Rio, *Texas during construction of the project, until the project ownership is conveyed to the USAF.*

1.26 *Owner's Designated Representative (ODR)* means the individual assigned by Owner to act on its behalf and to undertake certain activities as specifically outlined in the Contract. ODR is the only party authorized to direct changes to the scope, cost, or time of the Contract.

1.27 *Owner's Special Conditions* mean the documents containing terms and conditions which may be unique to the Project. Owner's Special Conditions are a part of the Contract Documents and have precedence over the Uniform General Conditions

1.28 *Project* means all activities necessary for realization Owner's desired building or other structure including all ancillary and related work. This includes design, contract award(s), execution of the Work itself, work by Owner's forces and/or other contractors and fulfillment of all Contract and warranty obligations.

1.29 *Progress Assessment Report (PAR)* means the monthly compliance report to Owner verifying compliance with the HUB subcontracting plan (HSP).

1.30 *Proposed Change Order (PCO)* means a document that informs Contractor of a proposed change in the Work and appropriately describes or otherwise documents such change including Contractor's response of pricing for the proposed change.

1.31 *Punchlist* means a list of items of Work to be completed or corrected by Contractor before Final Completion. Punchlists indicate items to be finished, remaining Work to be performed, or Work that does not meet quality or quantity requirements as required in the Contract Documents.

1.32 *Record Documents* mean the drawing set, Specifications, and other materials maintained by Contractor that documents all addenda, Architect's Supplemental Instructions, Change Orders and postings and markings that record the as-constructed conditions of the Work and all changes made during construction.

1.33 *Request for Information (RFI)* means a written request by Contractor directed to A/E or ODR for a clarification of the information provided in the Contract Documents or for direction concerning information necessary to perform the Work that may be omitted from the Contract Documents.

1.34 *Samples* mean representative physical examples of materials, equipment, or workmanship used to confirm compliance with requirements and/or to establish standards for use in execution of the Work.

1.35 *Schedule of Values* means the detailed breakdown of the cost of the materials, labor, and equipment necessary to accomplish the Work as described in the Contract Documents, submitted by Contractor for approval by Owner and A/E.

1.36 *Shop Drawings* mean the drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data prepared by Contractor or its agents which detail a portion of the Work.

1.37 *Site* means the geographical area of the location of the Work.

1.38 *Specifications* mean the written product of A/E that establishes the quality and/or performance of products utilized in the Work and processes to be used, including testing and verification for producing the Work.

1.39 *Subcontractor* means a business entity that enters into an agreement with Contractor to perform part of the Work or to provide services, materials, or equipment for use in the Work.

1.40 *Submittal Register* means a list provided by Contractor of all items to be furnished for review and approval by A/E and Owner and as identified in the Contract Documents including anticipated sequence and submittal dates.

1.41 *Substantial Completion* means the date determined and certified by Contractor, A/E, and Owner when the Work, or a designated portion thereof, is sufficiently complete, in accordance with the Contract, so as to be operational and fit for the use intended.

1.42 *Unit Price Work* means the Work, or a portion of the Work, paid for based on incremental units of measurement.

1.43 *Unilateral Change Order (ULCO)* means a Change Order issued by Owner without the complete agreement of Contractor, as to cost and/or time.

1.44 *Work* means the administration, procurement, materials, equipment, construction and all services necessary for Contractor, and/or its agents, to fulfill Contractor's obligations under the Contract.

1.45 *Work Progress Schedule* means the continually updated time schedule prepared and monitored by Contractor that accurately indicates all necessary appropriate revisions as required by the conditions of the Work and the Project while maintaining a concise comparison to the Baseline Schedule.

Article 2. Wage Rates and Other Laws Governing Construction

2.1 Environmental Regulations. Contractor shall conduct activities in compliance with applicable laws and regulations and other requirements of the Contract relating to the environment and its protection at all times. Unless otherwise specifically determined, Owner is responsible for obtaining and maintaining permits related to stormwater run-off. Contractor shall conduct operations consistent with stormwater run-off permit conditions. Contractor is responsible for all items it brings to the Site, including hazardous materials, and all such items brought to the Site by its Subcontractors and suppliers, or by other entities subject to direction of Contractor. Contractor shall not incorporate hazardous materials into the Work without prior approval of Owner, and shall provide an affidavit attesting to such in association with request for Substantial Completion inspection.

2.2 Wage Rates. Contractor shall not pay less than the wage scale of the various classes of labor as shown on the prevailing wage schedule provided by Owner in the BVB specifications. The specified wage rates are minimum rates only. Owner is not bound to pay any claims for additional compensation made by any Contractor because the Contractor pays wages in excess of the applicable minimum rate contained in the Contract. The prevailing wage schedule is not a representation that qualified labor adequate to perform the Work is available locally at the prevailing wage rates.

2.2.1 Notification to Workers. Contractor shall post the prevailing wage schedule in a place conspicuous to all workers on the Project Site and shall notify each worker, in writing, of the following as they commence work on the Contract: the worker's job classification, the established minimum wage rate requirement for that classification, as well as the worker's actual wage. The notice must be delivered to and signed in acknowledgement of receipt by the worker and must list both the wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties. When requested by Owner, Contractor shall furnish evidence of compliance with the Texas Prevailing Wage Law and the addresses of all workers.

2.2.1.1 Contractor shall submit a copy of each worker's wage-rate notification to ODR with the application for progress payment for the period during which the worker was engaged in activities on behalf of the Project.

2.2.1.2 The prevailing wage schedule is determined by Owner in compliance with Tex. Gov't Code, Chapter 2258. Should Contractor at any time become aware that a particular skill or trade not reflected on Owner's prevailing wage schedule will be or is being employed in the Work, whether by Contractor or by Subcontractor, Contractor shall promptly inform ODR of the proposed wage to be paid for the skill along with a justification for same and ODR shall promptly concur with or reject the proposed wage and classification. Contractor is responsible for determining the most appropriate wage for a particular skill in relation to similar skills or trades identified on the prevailing wage schedule. In no case, shall any worker be paid less than the wage indicated for laborers.

2.2.2 Penalty for Violation. Contractor, and any Subcontractor, will pay to the State a penalty of sixty dollars ($60) for each worker employed for each day, or portion thereof, that the worker is paid less than the wage rates stipulated in the prevailing wage schedule.

2.2.3 Complaints of Violations.

2.2.3.1 Owner's Determination of Good Cause. Upon receipt of information concerning a violation, Owner will conduct an investigation in accordance with Tex. Gov't Code, Chapter 2258 and make an initial determination as to whether good cause exists that a violation occurred. Upon making a good cause finding, Owner will retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the prevailing wage schedule and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.

2.2.3.2 No Extension of Time. If Owner's determination proves valid that good cause existed to believe a violation had occurred, Contractor is not entitled to an extension of time for any delay arising directly or indirectly from the arbitration procedures.

2.3 Venue for Suits. The venue for any suit arising from the Contract will be in a court of competent jurisdiction in Val Verde County, Texas, or as may otherwise be designated in the Owner's Special Conditions.

2.4 Licensing of Trades. Contractor shall comply with all applicable provisions of State law related to license requirements for skilled tradesmen, contractors, suppliers and or laborers, as necessary to accomplish the Work. In the event Contractor, or one of its Subcontractors, loses its license during the term of performance of the Contract, Contractor shall promptly hire or contract with a licensed provider of the service at no additional cost to Owner.

2.5 Royalties, Patents, and Copyrights. Contractor shall pay all royalties and license fees, defend suits or claims for infringement of copyrights and patent rights, and shall hold Owner harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by Owner or A/E. However, if Contractor has reason to believe that the required design, process, or product is an infringement of a copyright or a patent, Contractor shall be responsible for such loss unless such information is promptly furnished to A/E.

2.6 State Sales and Use Taxes. Owner qualifies for exemption from certain State and local sales and use taxes pursuant to the provisions of Tex. Tax Code, Chapter 151. Upon request from Contractor, Owner shall furnish evidence of tax exempt status. Contractor may claim exemption from payment of certain applicable State taxes by complying with such procedures as prescribed by the State Comptroller of Public Accounts. Owner acknowledges not all items qualify for exemption. Owner is not obligated to reimburse Contractor for taxes paid on items that qualify for tax exemption.

Article 3. General Responsibilities of Owner and Contractor

3.1 Owner's General Responsibilities. Owner is the entity identified as such in the Contract and referred to throughout the Contract Documents as if singular in number.

3.1.1 Preconstruction Conference. Prior to, or concurrent with, the issuance of Notice to Proceed with construction, a conference will be convened for attendance by Owner, Contractor, A/E and appropriate Subcontractors. The purpose of the conference is to establish a working understanding among the parties as to the Work, the operational conditions at the Project Site, and general administration of the Project. Topics include communications, schedules, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, maintaining required records and all other matters of importance to the administration of the Project and effective communications between the Project team members.

3.1.2 Owner's Designated Representative. Prior to the start of construction, Owner will identify Owner's Designated Representative (ODR), who has the express authority to act and bind Owner to the extent and for the purposes described in the various Articles of the Contract, including responsibilities for general administration of the Contract.

3.1.2.1 Unless otherwise specifically defined elsewhere in the Contract Documents, ODR is the single point of contact between Owner and Contractor. Notice to ODR, unless otherwise noted, constitutes notice to Owner under the Contract.

3.1.2.2 All directives on behalf of Owner will be conveyed to Contractor and A/E by ODR in writing.

3.1.2.3 Owner will furnish or cause to be furnished, free of charge, the number of complete sets of the Drawings, Specifications, and addenda as provided in the Agreement or Owner's Special Conditions.

3.1.3 Owner Supplied Materials and Information.

3.1.3.1 Owner will furnish to Contractor those surveys describing the physical characteristics, legal description, limitations of the Site, Site utility locations, and other information used in the preparation of the Contract Documents.

3.1.3.2 Owner will provide information, equipment, or services under Owner's control to Contractor with reasonable promptness.

3.1.4 Availability of Lands. Owner will furnish, as indicated in the Contract, all required rights to use the lands upon which the Work occurs. This includes rights-of-way and easements for access and such other lands that are designated for use by Contractor. Contractor shall comply with all Owner identified encumbrances or restrictions specifically related to use of lands so furnished. Owner will obtain and pay for easements for permanent structures or permanent changes in existing facilities, unless otherwise required in the Contract Documents.

3.1.5 Limitation on Owner's Duties.

3.1.5.1 Owner will not supervise, direct, control or have authority over or be responsible for Contractor's means, methods, technologies, sequences or procedures of construction or the safety precautions and programs incident thereto. Owner is not responsible for any failure of Contractor to comply with laws and regulations applicable to the Work. Owner is not responsible for the failure of Contractor to perform or furnish the Work in accordance with the Contract Documents. Except as provided in Section 2.5, Owner is not responsible for the acts or omissions of Contractor, or any of its Subcontractors, suppliers or of any other person or organization performing or furnishing any of the Work on behalf of Contractor.

3.1.5.2 Owner will not take any action in contravention of a design decision made by A/E in preparation of the Contract Documents, when such actions are in conflict with statutes under which A/E is licensed for the protection of the public health and safety.

3.2 Role of Architect/Engineer. Unless specified otherwise in the Contract between Owner and Contractor, A/E shall provide general administration services for Owner during the construction phase of the project. Written correspondence, requests for information, and Shop Drawings/submittals shall be directed to A/E for action. A/E has the authority to act on behalf of Owner to the extent provided in the Contract Documents, unless otherwise modified by written instrument, which will be furnished to Contractor by ODR, upon request.

3.2.1 Site Visits.

3.2.1.1 A/E will make visits to the Site at intervals as provided in the A/E's Contract with Owner, to observe the progress and the quality of the various aspects of Contractor's executed Work and report findings to Owner.

3.2.1.2 A/E has the authority to interpret Contract Documents and inspect the Work for compliance and conformance with the Contract. Except as referenced in Paragraph 3.1.5.2, Owner retains the sole authority to accept or reject Work and issue direction for correction, removal, or replacement of Work.

3.2.2 Clarifications and Interpretations. It may be determined that clarifications or interpretations of the Contract Documents are necessary. Upon direction by ODR, such clarifications or interpretations will be provided by A/E consistent with the intent of the Contract Documents. A/E will issue these clarifications with reasonable promptness to Contractor as A/E's supplemental instruction ("ASI") or similar instrument. If Contractor believes that such clarification or interpretation justifies an adjustment in the Contract Sum or the Contract Time, Contractor shall so notify Owner in accordance with the provisions of Article 11.

3.2.3 Limitations on Architect/Engineer Authority. A/E is not responsible for:

3.2.3.1 Contractor's means, methods, techniques, sequences, procedures, safety, or programs incident to the Project, nor will A/E supervise, direct, control or have authority over the same;

3.2.3.2 The failure of Contractor to comply with laws and regulations applicable to the furnishing or performing the Work;

3.2.3.3 Contractor's failure to perform or furnish the Work in accordance with the Contract Documents; or

3.2.3.4 Acts or omissions of Contractor, or of any other person or organization performing or furnishing any of the Work.

3.3 Contractor's General Responsibilities. Contractor is solely responsible for implementing the Work in full compliance with all applicable laws and the Contract Documents and shall supervise and direct the Work using the best skill and attention to assure that each element of the Work conforms to the Contract requirements. Contractor is solely responsible for all construction means, methods, techniques, safety, sequences, coordination and procedures.

Contractor shall visit the Site before commencing the Work and become familiar with local conditions such as the location, accessibility and general character of the Site and/or building.

3.3.1 Project Administration. Contractor shall provide Project administration for all Subcontractors, vendors, suppliers, and others involved in implementing the Work and shall coordinate administration efforts with those of A/E and ODR in accordance with these general conditions, Division 1 of the Specifications and other provisions of the Contract, and as outlined in the pre-construction conference.

3.3.1.1 At the request of Owner and at no additional cost, Contractor shall furnish to the ODR one copy of the current edition of the RSMeans Facilities Construction Cost Data Book in hard copy format or digital medium as directed by the ODR.

3.3.2 Contractor's Management Personnel. Contractor shall employ a competent person or persons who will be present at the Project Site during the progress of the Work to supervise or oversee the work. The competent persons are subject to the approval of ODR. Contractor shall not change approved staff during the course of the project without the written approval of ODR unless the staff member leaves the employment of Contractor. Contractor shall provide additional quality control, safety and other staff as stated in the Contract Documents.

3.3.3 Labor. Contractor shall provide competent, suitably qualified personnel to survey, lay-out, and construct the Work as required by the Contract Documents and maintain good discipline and order at the Site at all times.

3.3.4 Services, Materials, and Equipment. Unless otherwise specified, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities, incidentals, and services necessary for the construction, performance, testing, start-up, inspection and completion of the Work.

3.3.5 Contractor General Responsibility. For Owner furnished equipment or material that will be in the care, custody, and control of Contractor, Contractor is responsible for damage or loss.

3.3.6 Non-Compliant Work. Should A/E and/or ODR identify Work as non-compliant with the Contract Documents, A/E and/or ODR shall communicate the finding to Contractor, and Contractor shall correct such Work at no additional cost to the Owner. The approval of Work or the failure to find non-compliant Work by either A/E or ODR does not relieve Contractor from the obligation to comply with all requirements of the Contract Documents.

3.3.7 Subcontractors. Contractor shall not employ any Subcontractor, supplier or other person or organization, whether initially or as a substitute, against whom Owner shall have reasonable objection. Owner will communicate such objections in writing within ten (10) days of receipt of Contractor's intent to use such Subcontractor, supplier, or other person or organization. Contractor is not required to employ any Subcontractor, supplier or other person or organization to furnish any of the work to whom Contractor has reasonable objection. Contractor shall not substitute Subcontractors without the acceptance of Owner.

3.3.7.1 All Subcontracts and supply contracts shall be consistent with and bind the Subcontractors and suppliers to the terms and conditions of the Contract Documents including provisions of the Contract between Contractor and Owner.

3.3.7.2 Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Require all Subcontractors, suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Owner only through Contractor. Contractor shall furnish to Owner a copy, at Owner's request, of each first-tier subcontract promptly after its execution. Contractor agrees that Owner has no obligation to review or approve the content of such contracts and that providing Owner such copies in no way relieves Contractor of any of the terms and conditions of the Contract, including, without limitation, any provisions of the Contract which require the Subcontractor to be bound to Contractor in the same manner in which Contractor is bound to Owner.

3.3.8 Continuing the Work. Contractor shall carry on the Work and adhere to the progress schedule during all disputes, disagreements, or alternative resolution processes with Owner. Contractor shall not delay or postpone any Work because of pending unresolved disputes, disagreements or alternative resolution processes, except as Owner and Contractor may agree in writing.

3.3.9 Cleaning. Contractor shall at all times, keep the Site and the Work clean and free from accumulation of waste materials or rubbish caused by the construction activities under the Contract. Contractor shall ensure that the entire Project is thoroughly cleaned prior to requesting Substantial Completion inspection and, again, upon completion of the Project prior to the final inspection.

3.3.10 Acts and Omissions of Contractor, its Subcontractors and Employees. Contractor shall be responsible for acts and omissions of his employees and all its Subcontractors, their agents and employees. Owner may, in writing, require Contractor to remove from the Project any of Contractor's or its Subcontractor's employees whom ODR finds to be careless, incompetent, unsafe, uncooperative, disruptive, or otherwise objectionable.

3.3.11 Ancillary Areas. Contractor shall operate and maintain operations and associated storage areas at the site of the Work in accordance with the following:

3.3.11.1 All Contractor operations, including storage of materials and employee parking upon the Site of Work, shall be confined to areas designated by Owner.

3.3.11.2 Contractor may erect, at its own expense, temporary buildings that will remain its property. Contractor shall remove such buildings and associated utility service lines upon completion of the Work, unless Contractor requests and Owner provides written consent that it may abandon such buildings and utilities in place.

3.3.11.3 Contractor shall use only established roadways or construct and use such temporary roadways as may be authorized by Owner. Contractor shall not allow load limits of vehicles to exceed the limits prescribed by appropriate regulations or law. Contractor shall provide protection to road surfaces, curbs, sidewalks, trees, shrubbery, sprinkler systems, drainage structures and other like existing improvements to prevent damage and repair any damage thereto at the expense of Contractor.

3.3.11.4 Owner may restrict Contractor's entry to the Site to specifically assigned entrances and routes.

3.3.12 Separate Contracts. Owner reserves the right to award other contracts in connection with the Project under the same or substantially similar contract terms, including those portions related to insurance and waiver of subrogation. Owner reserves the right to perform operations related to the Project with Owner's own forces.

3.3.13 Under a system of separate contracts, the conditions described herein continue to apply except as may be amended by change order.

3.3.14 Contractor shall cooperate with other contractors or forces employed on the Project by Owner, including providing access to Site, integration of activities within Contractor's Work Progress Schedule and Project information as requested.

3.3.15 Owner shall be reimbursed by Contractor for costs incurred by Owner which are payable to a separate contractor because of delays, improperly timed activities, or defective construction by Contractor. Owner will equitably adjust the Contract by Change Order for costs incurred by Contractor because of delays, improperly timed activities, damage to the Work orderefctive construction by a separate contractor.

3.4 Indemnification of Owner.

3.4.1 Contractor covenants and agrees to FULLY INDEMNIFY and HOLD HARMLESS, Owner and the elected and appointed officials, employees, officers, directors, volunteers, and representatives of Owner, individually or collectively, from and against any and all costs, claims, liens, damages, losses, expenses, fees, fines, penalties, proceedings, actions, demands, causes of action, liability and suits of any kind and nature, including but not limited to, personal or bodily injury, death or property damage, made upon Owner directly or indirectly arising out of, resulting from or related to Contractor's activities under this Contract, including any acts or omissions of Contractor, or any agent, officer, director, representative, employee, consultant or the Subcontractor of Contractor, and their respective officers, agents, employees, directors and representatives while in the exercise of performance of the rights or duties under this Contract. The indemnity provided for in this paragraph does not apply to any liability resulting from the negligence of the Owner, its officers or employees, separate contractors or assigned contractors, in instances where such negligence causes personal injury, death or property damage. IN THE EVENT CONTRACTOR AND OWNER ARE FOUND JOINTLY LIABLE BY A COURT OF COMPETENT JURISDICTION, LIABILITY WILL BE APPORTIONED COMPARATIVELY IN ACCORDANCE WITH THE LAWS OF THE STATE OF TEXAS, WITHOUT WAIVING ANY GOVERNMENTAL IMMUNITY AVAILABLE TO THE STATE UNDER TEXAS LAW AND WITHOUT WAIVING ANY DEFENSES OF THE PARTIES UNDER TEXAS LAW.

3.4.2 **Contractor shall protect and indemnify the Owner from and against all claims, damages, judgments and losses arising from infringement or alleged infringement of any United States patent, or copyright that arise out of any of the work performed by the Contractor or the use by Contractor, or by Owner at the direction of Contractor, of any article or material. Upon becoming aware of a suit or threat of suit for patent or copyright infringement, Owner shall promptly notify Contractor and Contractor shall be given full opportunity to negotiate a settlement. Contractor does not warrant against infringement by reason of Owner's or Project Architect's design of articles or their use in combination with other materials or in the operation of any process. In the event of litigation, Owner agrees to cooperate reasonably with Contractor and parties shall be entitled, in connection with any such litigation, to be represented by counsel at their own expense.**

3.4.3 The provisions of this indemnification are solely for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

3.4.4 Contractor shall promptly advise Owner in writing of any claim or demand against Owner or against Contractor which involves Owner and known to Contractor and related to or arising out of Contractor's activities under this Contract.

3.4.5 These indemnitie provisions shall survive the termination of this Agreement regardless of the reason for termination.

Article 4. NOT USED

Article 5. Bonds and Insurance

5.1 Construction Bonds. Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by Tex. Gov't Code, Chapter 2253. On Construction Manager-at-Risk and Design-Build Projects the Owner shall require a security bond, as described in Subsection 5.1.2 below.

5.1.1 Bond Requirements. Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas and acceptable to Owner, on Owner's form, and in compliance with the relevant provisions of the Texas Insurance Code. If any bond is for more than ten (10) percent of the surety's capital and surplus, Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized to do business in the State. A reinsurer may not reinsure for more than ten (10) percent of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, Contractor shall, within thirty (30) days after such loss, furnish a replacement bond at no added cost to Owner.

5.1.1.1 A Performance bond is required if the Contract Sum is in excess of $100,000. The performance bond is solely for the protection of Owner. The performance bond is to be for the Contract Sum to guarantee the faithful performance of the Work in accordance with the Contract Documents. The form of the bond shall be approved by the Office of the Attorney General of Texas. The performance bond shall be effective through Contractor's warranty period.

5.1.1.2 A Payment bond is required if the Contract price is in excess of $25,000. The payment bond is to be for the Contract Sum and is payable to Owner solely for the protection and use of payment bond beneficiaries. The form of the bond shall be approved by the Office of the Attorney General of Texas.

5.1.1.3 A bid bond is required in the amount of 5% of the bid amount, and is payable to the owner for compensation in this event that bidder fails to execute a contractor construction. The form shall be approved by the officer of the Attorney General of Texas.

5.1.2 Security Bond. The security bond provides protection to Owner if Contractor presents an acceptable guaranteed maximum price ("GMP") to Owner but is unable to deliver the required payment and performance bonds within the time period stated below.

5.1.3 When Bonds Are Due

5.1.3.1 Security bonds are due before execution of a Construction Manager-at-Risk or Design-Build Contract.

5.1.3.2 Payment and performance bonds are due before execution of a contract on competitively sealed bids or before execution of a GMP proposal on Construction Manager-at-Risk projects or Design-Build projects.

5.1.4 Power of Attorney. Each bond shall be accompanied by a valid power of attorney (issued by the surety company and attached, signed and sealed with the corporate embossed seal, to the bond) authorizing the attorney-in-fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.

5.1.5 Bond Indemnification. The process of requiring and accepting bonds and making claims thereunder shall be conducted in compliance with Tex. Gov't Code, Chapter 2253. IF FOR ANY REASON A STATUTORY PAYMENT OR PERFORMANCE BOND IS NOT HONORED BY THE SURETY, CONTRACTOR SHALL FULLY INDEMNIFY AND HOLD OWNER HARMLESS OF AND FROM ANY COSTS, LOSSES, OBLIGATIONS OR LIABILITIES IT INCURS AS A RESULT.

5.1.6 Furnishing Bond Information. Owner shall furnish certified copies of the payment bond and the related Contract to any qualified person seeking copies who complies with Tex. Gov't Code § 2253.026.

5.1.7 Claims on Payment Bonds. Claims on payment bonds must be sent directly to Contractor and his surety in accordance with Tex. Gov't Code § 2253.041. All payment bond claimants are cautioned that no lien exists on the funds unpaid to Contractor on such Contract, and that reliance on notices sent to Owner may result in loss of their rights against Contractor and/or his surety. Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.

5.1.8 Payment Claims when Payment Bond not Required. The rights of Subcontractors regarding payment are governed by Tex. Prop. Code §§ 53.231 – 53.239 when the value of the Contract between Owner and Contractor is less than $25,000.00. These provisions set out the requirements for filing a valid lien on funds unpaid to Contractor as of the time of filing the claim, actions necessary to release the lien and satisfaction of such claim.

5.1.9 Sureties. A surety shall be listed on the US Department of the Treasury's Listing of Approved Sureties maintained by the Bureau of Financial Management Service (FMS), www.fms.treas.gov/c570, stating companies holding Certificates of Authority as acceptable sureties on Federal bonds and acceptable reinsuring companies (FMS Circular 570).

5.2 Insurance Requirements. Contractor shall carry insurance in the types and amounts indicated in this Article for the duration of the Contract. The required insurance shall include coverage for Owner's property prior to construction, during construction and during the warranty period. The insurance shall be evidenced by delivery to Owner of certificates of insurance executed by the insurer or its authorized agent stating coverages, limits, expiration dates and compliance with all applicable required provisions. Upon request, Owner, and/or its agents, shall be entitled to receive without expense, copies of the policies and all endorsements. Contractor shall update all expired policies prior to submission for monthly payment. Failure to update policies shall be reason for withholding of payment until renewal is provided to Owner.

5.2.1 Contractor, consistent with its status as an independent contractor, shall provide and maintain all insurance coverage with the minimum amounts described below until the end of the warranty period unless otherwise stated in Owner's Special Conditions. Failure to maintain insurance coverage, as required, is grounds for suspension of Work for cause pursuant to Article 14. The Contractor will be notified of the date on which the Builder's Risk insurance policy may be terminated by any means deemed appropriate by Owner.

5.2.2 Coverage shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A-, VII or better by A.M. Best Company or similar rating company or otherwise acceptable to Owner.

5.2.2.1 Insurance Coverage Required.

5.2.2.1.1 Workers' Compensation. Insurance with limits as required by the Texas Workers' Compensation Act and Employer's Liability Insurance with limits of not less than:

$1,000,000 each accident;

$1,000,000 disease each employee ; and

$1,000,000 disease policy limit.

Policies must include (a) Other States Endorsement to include TEXAS if business is domiciled outside the State of Texas, and (b) a waiver of all rights of subrogation in favor of Owner.

5.2.2.1.2 Commercial General Liability Insurance, including premises, perations, independent contractor's liability, products and completed operations and contractual liability, covering, but not limited to, the liability assumed under the indemnification provisions of this Contract, fully insuring Contractor's (or Subcontractor's) liability for bodily injury (including death) and property damage with a minimum limit of:

$1,000,000 per occurrence;

$2,000,000 general aggregate;

$2,000,000 products and completed operations aggregate;

and Coverage shall be on an "occurrence" basis.

The policy shall include coverage extended to apply to completed operations and explosion, collapse, and underground hazards. The policy shall include endorsement CG2503 Amendment of Aggregate Limits of Insurance (per Project) or its equivalent.

If the Work involves any activities within fifty (50) feet of any railroad, railroad protective insurance as may be required by the affected railroad, written for not less than the limits required by such railroad.

5.2.2.1.3 Asbestos Abatement Liability Insurance, including coverage for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos containing materials. *This requirement applies if the Work or the Project includes asbestos containing materials.

The combined single limit for bodily injury and property damage will be a minimum of $1,000,000 per occurrence.

*Specific requirement for claims-made form: Required period of coverage will be determined by the following formula: continuous coverage for life of the Contract, plus one (1) year (to provide coverage for the warranty period), and an extended discovery period for a minimum of five (5) years which shall begin at the end of the warranty period.

Employer's liability limits for asbestos abatement will be:

$1,000,000 each accident;

$1,000,000 disease each employee; and

$1,000,000 disease policy limit.

If this Contract is for asbestos abatement only, the All-Risk Builder's Risk or all-risk installation floater (5.2.2.1.5.e) is not required.

5.2.2.1.4 Business Automobile Liability Insurance, covering all owned, hired, and non-owned vehicles, with a minimum combined single limit for bodily injury (including death) and property damage of $1,000,000per occurrence. No aggregate shall be permitted for this type of coverage.

Such insurance is to include coverage for loading and unloading hazards.

Contractor or any subcontractor responsible for transporting asbestos or other hazardous materials defined as asbestos shall provide pollution coverage for any vehicle hauling asbestos containing cargo. The policy must include a MCS 90 endorsement with a $5,000,000 limit and the CA 9948 Pollution Endorsement, or its equivalent.

5.2.2.1.5 All-Risk Builder's Risk Insurance, if applicable (or all-risk installation floater for instances in which the project involves solely the installation of material and/or equipment). Coverage is determined by the Contract Sum, as detailed, below.

BUILDERS RISK REQUIREMENT FOR PROJECTS WITH A CONTRACT SUM <$20 MILLION

5.2.2.1.5.1 Contractor shall purchase and maintain in force builders risk insurance on the entire Work. Such insurance shall be written in the amount of the original contract, plus any subsequent change orders and plus the cost of materials supplied or installed by others, comprising Total Value for the entire Project at the site. The insurance shall apply on a replacement cost basis with no coinsurance provision. A sublimit may be applicable to flood coverage, but sublimit must be at least 20% of the Total Value of the Project. The limit for all other perils, including Named Windstorm, Wind, and Hail, must be equal to the Total Value for the entire Project at the site. (If Installation Floater, limit shall be equal to 100 percent of the contract cost.)

5.2.2.1.5.2 This insurance shall name as insureds the Owner, the Contractor, and all subcontractors and sub-subcontractors in the Work.

5.2.2.1.5.3 Builders risk insurance shall be on an "all risk" or equivalent policy form and shall include, without limitation, insurance against fire and extended coverage perils, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, boiler and machinery/mechanical breakdown, testing and startup, and terrorism.

5.2.2.1.5.4 This insurance shall cover the entire work at the site as required in 5.2.2.1.5.1, including, but not limited to, the following:

- Temporary works including but not limited to scaffolding, form work, fences, shoring, hoarding, falsework and temporary buildings
- Offsite Storage
- Portions of the work in transit
- Debris removal
- Extra Expense
- Expediting Expenses
- Demolition and Increased Cost of Construction
- Pollutant Clean-Up and Removal
- Trees, Shrubs, Plants, Lawns and Landscaping (if applicable)
- Errors & Omissions (applicable to purchase of Builders Risk policy only)

5.2.2.1.5.5 This insurance shall not contain an occupancy clause suspending or reducing coverage should the Owner occupy, or begin beneficial occupancy before the Owner has accepted final completion.

5.2.2.1.5.6 This insurance shall be specific as to coverage and shall be primary to any permanent insurance or self-insurance that may be maintained on the property by Owner.

5.2.2.1.5.7 This insurance shall include a waiver of subrogation in favor of Owner, the Contractor, and all subcontractors and sub-subcontractors in the work.

5.2.2.1.5.8 As applicable, Flood deductible shall not exceed $250,000 for Zone A, $100,000 for Zone B and $50,000 for all other Zones. For Tier 1 and Tier 2, Named Windstorm deductible shall not exceed 2% of the project values in place at the time of the loss.

5.2.2.1.5.9 Before the commencement of the work, Contractor shall provide to Owner an accurate certificate of insurance that provides specific evidence of all requirements outlined in Section 5.2.2.1.5. A copy of the policy itself shall be provided to Owner within 30 days after Notice to Proceed.

5.2.2.1.5.10 Refer to Owner's Special Conditions for possible additional Builders Risk insurance requirements.

<u>BUILDERS RISK REQUIREMENT FOR PROJECTS WITH A CONTRACT SUM ≥$20 MILLION</u>

5.2.2.1.5.1 Contractor shall purchase and maintain in force builders risk insurance on the entire Work. Such insurance shall be written in the amount of the original contract, plus any subsequent change orders and plus the cost of materials supplied or installed by others, comprising Total Value for the entire Project at the site. The insurance shall apply on a replacement cost basis with no coinsurance provision and shall include a margin clause of plus/minus 10% on project value.

A sublimit may be applicable to flood coverage, but sublimit must be at least 20% of the Total Value of the Project. A sublimit of $50 million or the Total Value of the Project, whichever is less, is acceptable for Earthquake. The limit for all other perils, including Named Windstorm, Wind, and Hail, must be equal to the Total Value for the entire Project at the site. (If Installation Floater, limit shall be equal to 100 percent of the contract cost.)

5.2.2.1.5.2 This insurance shall name as insureds the Owner, the Contractor, and all subcontractors and sub-subcontractors in the Work.

5.2.2.1.5.3 Builders risk insurance shall be on an "all risk" or equivalent policy form and shall include, without limitation, insurance against fire and extended coverage perils, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, boiler and machinery/mechanical breakdown, testing and startup, and terrorism.

5.2.2.1.5.4 This insurance shall cover the entire work at the site as required in 5.2.2.1.5.1, including, but not limited to, the following:

Coverage	Minimum Limit Required
Temporary works including but not limited to scaffolding, form work, fences, shoring, hoarding, falsework and temporary buildings	$1 million
Offsite Storage	Sufficient to cover the anticipated maximum values stored offsite
Portions of the work in Transit	Sufficient to cover the anticipated maximum values in transit
Debris Removal	25% of Physical damage amount subject to maximum of $5 million or 25% of Total Value of Project whichever is higher
Expediting Expenses	$1 million
Extra Expense	$5 million
Demolition and Increased Cost of Construction	$2 million or 10% of Total Value of Project whichever is higher
Pollutant Clean-Up and Removal	$250,000
Trees, Shrubs, Plants, Lawns and Landscaping (if applicable)	$2,500 per item subject to a maximum of $1 million
Errors & Omissions (applicable to purchase of Builders Risk policy only)	$2.5 million

This insurance shall not contain an occupancy clause suspending or reducing coverage should the Owner occupy, or begin beneficial occupancy before the Owner has accepted final completion.

5.2.2.1.5.5 This insurance shall be specific as to coverage and shall be primary to any permanent insurance or self-insurance that may be maintained on the property by Owner.

5.2.2.1.5.6 This insurance shall include a waiver of subrogation in favor of Owner, the Contractor, and all subcontractors and sub-subcontractors in the work.

5.2.2.1.5.7 As applicable, Flood deductible shall not exceed $250,000 for Zone A, $100,000 for Zone B and $50,000 for all other Zones. For Tier 1 and Tier 2, Named Windstorm deductible shall not exceed 2% of the project values in place at the time of the loss.

5.2.2.1.5.8 Before the commencement of the work, Contractor shall provide to Owner an accurate certificate of insurance that provides specific evidence of all requirements outlined in Section 5.2.2.1.5. A copy of the policy itself shall be provided to Owner within 30 days after Notice to Proceed.

5.2.2.1.5.9 Refer to Owner's Special Conditions for possible additional Builders Risk insurance requirements.

5.2.2.1.6 "Umbrella" Liability Insurance. On Projects that are not insured under the Owner's Revolving Owner Controlled Insurance Program (ROCIP) or any project requiring demolition services, Contractor shall obtain, pay for and maintain umbrella liability insurance during the Contract term, insuring Contractor (or Subcontractor) that provides coverage at least as broad as and applies in excess and follows form of the primary liability coverages required above. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted.

5.2.2.1.7 "Umbrella" Liability Insurance coverage shall be in the following amounts:

- If Contract sum is $1,000,000 or less: No Umbrella Required
- If Contract Sum is greater than $1,000,000 up to $3,000,000: $1,000,000 each occurrence and $2,000,000 annual aggregate
- If Contract Sum is greater than $3,000,000 up to $5,000,000: $5,000,000 each occurrence and $5,000,000 annual aggregate
- If Contract Sum is greater than $5,000,000: $10,000,000 each occurrence and $10,000,000 annual aggregate

5.2.3 All Policies must include the following clauses, as applicable:

5.2.3.1 Contractor must provide to Owner immediate notice of cancellation, material change, or non-renewal to any insurance coverages required herein above. This requirement may be satisfied by the Contractor providing a copy of the notice received by the insurer to Owner within two business days of date of receipt or by Endorsement of the policies that require Insurer to provide notice to Owner.

5.2.3.2 It is agreed that Contractor's insurance shall be deemed primary with respect to any insurance or self insurance carried by Owner for liability arising out of operations under the Contract with Owner.

5.2.3.3 Owner, its officials, directors, employees, representatives, and volunteers are added as additional insureds as respects operations and activities of, or on behalf of the named insured performed under Contract with Owner. The additional insured status must cover completed operations as well. This is not applicable to workers' compensation policies.

5.2.3.4 A waiver of subrogation in favor of Owner shall be provided in all policies.

5.2.3.5 If Owner is damaged by the failure of Contractor (or Subcontractor) to maintain insurance as required herein and/or as further described in Owner's Special Conditions, then Contractor shall bear all reasonable costs properly attributable to that failure.

5.2.4 Without limiting any of the other obligations or liabilities of Contractor, Contractor shall require each Subcontractor performing work under the Contract, at Subcontractor's own expense, to maintain during the term of the Contract, the same stipulated minimum insurance including the required provisions and additional policy conditions as shown above. As an alternative, Contractor may include its Subcontractors as additional insureds on its own coverage as prescribed under these requirements. Contractor's certificate of insurance shall note in such event that Subcontractors are included as additional insureds and that Contractor agrees to provide workers' compensation for Subcontractors and their employees. Contractor shall obtain and monitor the certificates of insurance from each Subcontractor in order to assure compliance with the insurance requirements. Contractor must retain the certificates of insurance for the duration of the Contract plus five (5) years and shall have the responsibility of enforcing these insurance requirements among its Subcontractors. Owner shall be entitled, upon request and without expense, to receive copies of these certificates.

5.2.5 Workers' compensation insurance coverage must meet the statutory requirements of Tex. Lab. Code § 401.011(44) and specific to construction projects for public entities as required by Tex. Lab. Code § 406.096.

5.2.5.1 Definitions:

5.2.5.1.1 Certificate of coverage ("certificate")- A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (DWC-81, DWC-82, DWC-83, or DWC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

5.2.5.1.2 Duration of the project - includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

5.2.5.1.3 Persons providing services on the project ("subcontractor" in Texas Labor Code, §406.096) – includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

5.2.5.2 The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contractor providing services on the project, for the duration of the project.

5.2.5.3 The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

5.2.5.4 If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

5.2.5.5 The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

(1) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and

(2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

5.2.5.6 The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

5.2.5.7 The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

5.2.5.8 The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Depart of Insurance Division of Workers' Compensation, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

5.2.5.9 The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;

(2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

(3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(4) obtain from each other person with whom it contracts, and provide to the contractor:

(a) a certificate of coverage, prior to the other person beginning work on the project; and

(b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

(7) contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

5.2.5.10 By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self- insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

5.2.5.11 The contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

Article 6. Construction Documents, Coordination Documents, and Record Documents

6.1 Drawings and Specifications.

6.1.1 Copies Furnished. Contractor will be furnished, free of charge, the number of complete sets of the Drawings, Specifications, and addenda as provided in the Agreeement or the Owner's Special Conditions. Additional complete sets of Drawings and Specifications, if requested, will be furnished at reproduction cost to the entity requesting such additional sets. Electronic copies of such documents will be provided to Contractor without charge.

6.1.2 Ownership of Drawings and Specifications. All Drawings, Specifications and copies thereof furnished by A/E are to remain A/E's property. These documents are not to be used on any other project, and with the exception of the Contract record set and electronic versions needed for warranty operations, are to be returned to the A/E, upon request, following completion of the Work.

6.1.3 Interrelation of Documents. The Contract Documents as referenced in the Contract between Owner and Contractor are complementary, and what is required by one shall be as binding as if required by all.

6.1.4 Resolution of Conflicts in Documents. Where conflicts may exist within the Contract Documents, the documents shall govern in the following order: (a) Change Orders, addenda, and written amendments to the Contract; (b) the Contract; (c) Drawings; (d) Specifications (but Specifications shall control over Drawings as to quality of materials and installation); and
(e) other Contract Documents. Among other categories of documents having the same order of precedence, the term or provision that includes the latest date shall control. Contractor shall notify A/E and ODR for resolution of the issue prior to executing the Work in question.

6.1.5 Contractor's Duty to Review Contract Documents. In order to facilitate its responsibilities for completion of the Work in accordance with and as reasonably inferable from the Contract Documents, prior to commencing the Work, Contractor shall examine and compare the Contract Documents, information furnished by Owner, relevant field measurements made by Contractor and any visible or reasonably anticipated conditions at the Site affecting the Work. This duty extends throughout the construction phase prior to commencing each particular work activity and/or system installation.

6.1.6 Discrepancies and Omissions in Drawings and Specifications.

6.1.6.1 Promptly report to ODR and to A/E the discovery of any apparent error, omission or inconsistency in the Contract Documents prior to execution of the Work.

6.1.6.2 It is recognized that Contractor is not acting in the capacity of a licensed design professional, unless it is performing as a Design-Build firm.

6.1.6.3 It is further recognized that Contractor's examination of Contract Documents is to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies or to ascertain compliance with applicable laws, building codes or regulations, unless it is performing as a Design-Build firm or a Construction Manager-at-Risk.

6.1.6.4 When performing as a Design-Build firm, Contractor has sole responsibility for discrepancies, errors, and omissions in the Drawings and Specifications.

6.1.6.5 When performing as a Construction Manager-at-Risk, Contractor has a shared responsibility with A/E for discovery and resolution of discrepancies, errors, and omissions in the Contract Documents. In such case, Contractor's responsibility pertains to review, coordination, and recommendation of resolution strategies within budget constraints.

6.1.6.6 Contractor has no liability for errors, omissions, or inconsistencies unless Contractor knowingly failed to report a recognized problem to Owner or the Work is executed under a Design-Build or Construction Manager-at-Risk Contract as outlined above. Should Contractor fail to perform the examination and reporting obligations of these provisions, Contractor is responsible for avoidable costs and direct and/or consequential damages.

6.1.6.7 Owner does not warrant or make any representations as to the accuracy, suitability or completeness of any information furnished to Contractor by Owner or it representatives.

6.2 Requirements for Record Documents. Contractor shall:

6.2.1 Maintain at the Site one copy of all Drawings, Specifications, addenda, approved submittals, Contract modifications, and all Project correspondence. Keep current and maintain Drawings and Specifications in good order with postings and markings to record actual conditions of Work and show and reference all changes made during construction. Provide Owner and A/E access to these documents.

6.2.2 Maintain the Record Documents which reflect the actual field conditions and representations of the Work performed, whether it be directed by addendum, Change Order or otherwise. Make available the Record Documents and all records prescribed herein for reference and examination by Owner and its representatives and agents.

6.2.3 Update the Record Documents at least monthly prior to submission of periodic partial pay estimates. Failure to maintain current Record Documents constitutes cause for denial of a progress payment otherwise due.

6.2.4 Prior to requesting Substantial Completion inspection Contractor shall furnish a copy of its marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties and like publications, or parts for all installed equipment, systems, and like items and as described in the Contract Documents.

6.2.5 Once determined acceptable by ODR with input from A/E, provide one (1) reproducible copy and one (1) electronic media copy in a format acceptable to the ODR `of all Record Documents, unless otherwise required by the Owner's Special Conditions.

6.2.6 Contractor shall be responsible for updating the Record Documents for all Contractor initiated documents and changes to the Contract Documents due to coordination and actual field conditions, including RFIs.

6.2.7 A/E shall be responsible for updating the Record Documents for any addenda, Change Orders, A/E supplemental instructions and any other alterations to the Contract Documents generated by A/E or Owner.

Article 7. Construction Safety

7.1 General. It is the duty and responsibility of Contractor and all of its Subcontractors to be familiar with, enforce and comply with all requirements of Public Law No. 91-596, 29 U.S.C. § 651 et. seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto and the safety requirements of LAFB. Contractor shall prepare a safety plan specific to the Project and submit it to

ODR and A/E prior to commencing Work. In addition, Contractor and all of its Subcontractors shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property to protect them from damage, injury or loss and erect and maintain all necessary safeguards for such safety and protection.

7.2 Notices. Contractor shall provide notices as follows:

7.2.1 Notify owners of adjacent property including those that own or operate utility services and/or underground facilities, and utility owners, when prosecution of the Work may affect them or their facilities, and cooperate with them in the protection, removal, relocation and replacement, and access to their facilities and/or utilities.

7.2.2 Coordinate the exchange of material safety data sheets (MSDSs) or other hazard communication information required to be made available to or exchanged between or among employers at the site in connection with laws and regulations. Maintain a complete file of MSDSs for all materials in use on site throughout the construction phase and make such file available to Owner and its agents as requested.

7.3 Emergencies. In any emergency affecting the safety of persons or property, Contractor shall act to minimize, mitigate, and prevent threatened damage, injury or loss.

7.3.1 Have authorized agents of Contractor respond immediately upon call at any time of day or night when circumstances warrant the presence of Contractor to protect the Work or adjacent property from damage or to take such action pertaining to the Work as may be necessary to provide for the safety of the public.

7.3.2 Give ODR and A/E prompt notice of all such events.

7.3.3 If Contractor believes that any changes in the Work or variations from Contract Documents have been caused by its emergency response, promptly notify Owner within seventy-two (72) hours of the emergency response event.

7.3.4 Should Contractor fail to respond, Owner is authorized to direct other forces to take action as necessary and Owner may deduct any cost of remedial action from funds otherwise due Contractor.

7.4 Injuries. In the event of an incident or accident involving outside medical care for an individual on or near the Work, Contractor shall notify ODR and other parties as may be directed promptly, but no later than twenty-four (24) hours after Contractor learns that an event required medical care.

7.4.1 Record the location of the event and the circumstances surrounding it, by using photography or other means, and gather witness statements and other documentation which describes the event.

7.4.2 Supply ODR and A/E with an incident report no later than thirty-six (36) hours after the occurrence of the event. In the event of a catastrophic incident (one (1) fatality or three (3) workers hospitalized), barricade and leave intact the scene of the incident until all investigations are complete. A full set of incident investigation documents, including facts, finding of cause, and remedial plans shall be provided within one (1) week after occurrence, unless otherwise directed by legal counsel. Contractor shall provide ODR with written notification within one week of such catastrophic event if legal counsel delays submission of full report.

7.5 Environmental Safety. Upon encountering any previously unknown potentially hazardous material, or other materials potentially contaminated by hazardous material, Contractor shall immediately stop work activities impacted by the discovery, secure the affected area, and notify ODR immediately.

7.5.1 Bind all Subcontractors to the same duty.

7.5.2 Upon receiving such notice, ODR will promptly engage qualified experts to make such investigations and conduct such tests as may be reasonably necessary to determine the existence or extent of any environmental hazard. Upon completion of this investigation, ODR will issue a written report to Contractor identifying the material(s) found and indicate any necessary steps to be taken to treat, handle, transport or dispose of the material.

7.5.3 Owner may hire third-party contractors to perform any or all such steps.

7.5.4 Should compliance with ODR's instructions result in an increase in Contractor's cost of performance, or delay the Work, Owner will make an equitable adjustment to the Contract Sum and/or the time of completion, and modify the Contract in writing accordingly.

7.6 Trenching Plan. When the project requires excavation which either exceeds a depth of four (4) feet, or results in any worker's upper body being positioned below grade level, Contractor is required to submit a trenching plan to ODR prior to commencing trenching operations unless an engineered plan is part of the Contract Documents. The plan is required to be prepared and sealed by a professional engineer registered in the State of Texas, and hired or employed by Contractor or Subcontractor to perform the work. Said engineer cannot be anyone who is otherwise either directly or indirectly engaged on this project.

Article 8. Quality Control

8.1 Materials & Workmanship. Contractor shall execute Work in a good and workmanlike matter in accordance with the Contract Documents. Contractor shall develop and provide a quality control plan specific to this Project and acceptable to Owner. Where Contract Documents do not specify quality standards, complete and construct all Work in compliance with generally accepted construction industry standards. Unless otherwise specified, incorporate all new materials and equipment into the Work under the Contract.

8.2 Testing.

8.2.1 Owner is responsible for coordinating and paying for routine and special tests required to confirm compliance with quality and performance requirements, except as stated below or otherwise required by the Contract Documents.

8.2.2 Contractor shall provide the following testing as well as any other testing required of Contractor by the Specifications:

8.2. 2.1 Any test of basic material or fabricated equipment included as part of a submittal for a required item in order to establish compliance with the Contract Documents.

8.2. 2.2 Any test of basic material or fabricated equipment offered as a substitute for a specified item on which a test may be required in order to establish compliance with the Contract Documents.

8.2. 2.3 Preliminary, start-up, pre-functional and operational testing of building equipment and systems as necessary to confirm operational compliance with requirements of the Contract Documents.

8.2. 2.4 All subsequent tests on original or replaced materials conducted as a result of prior testing failure.

8.2. 3 All testing shall be performed in accordance with standard test procedures by an accredited laboratory, or special consultant as appropriate, acceptable to Owner. Results of all tests shall be provided promptly to ODR, A/E, and Contractor.

8.2. 4 Non-Compliance (Test Results). Should any of the tests indicate that a material and/or system does not comply with the Contract requirements, the burden of proof remains with Contractor, subject to:

8.2. 4.1 Contractor selection and submission of the laboratory for Owner acceptance.

8.2. 4.2 Acceptance by Owner of the quality and nature of tests.

8.2. 4.3 All tests taken in the presence of A/E and/or ODR, or their representatives.

8.2. 4.4 If tests confirm that the material/systems comply with Contract Documents, Owner will pay the cost of the test.

8.2. 4.5 If tests reveal noncompliance, Contractor will pay those laboratory fees and costs of that particular test and all future tests, of that failing Work, necessary to eventually confirm compliance with Contract Documents.

8.2. 4.6 Proof of noncompliance with the Contract Documents will make Contractor liable for any corrective action which ODR determines appropriate, including complete removal and replacement of non-compliant work or material.

8.2. 5 Notice of Testing. Contractor shall give ODR and A/E timely notice of its readiness and the date arranged so ODR and A/E may observe such inspection, testing, or approval.

8.2. 6 Test Samples. Contractor is responsible for providing Samples of sufficient size for test purposes and for coordinating such tests with their Work Progress Schedule to avoid delay.

8.2. 7 Covering Up Work. If Contractor covers up any Work without providing Owner an opportunity to inspect, Contractor shall, if requested by ODR, uncover and recover the work at Contractor's expense.

8.3 Submittals.

8.3.1 Contractor's Submittals. Contractor shall submit with reasonable promptness consistent with the Project schedule and in orderly sequence all Shop Drawings, Samples, or other information required by the Contract Documents, or subsequently required by Change Order. Prior to submitting, Contractor shall review each submittal for general compliance with Contract Documents and approve submittals for review by A/E and Owner by an approval stamp affixed to each copy. Submittal data presented without Contractor's stamp of approval will be returned without review or comment. Any delay resulting from Contractor's failure to certify approval of the Submittal is Contractor's responsibility.

8.3.1.1 Contractor shall within twenty-one (21) days of the effective date of the Notice To Proceed with construction, submit to ODR and A/E, a submittal schedule/register, organized by specification section, listing all items to be furnished for review and approval by A/E and Owner. The list shall include Shop Drawings, manufacturer's literature, certificates of compliance, materials Samples, materials colors, guarantees, and all other items identified throughout the Specifications.

8.3.1.2 Contractor shall indicate the type of item, Contract requirements reference, and Contractor's scheduled dates for submitting the item along with the requested dates for approval answers from A/E and Owner. The submittal register shall indicate the projected dates for procurement of all included items and shall be updated at least monthly with actual approval and procurement dates. Contractor's Submittal Register must be reasonable in terms of the review time for complex submittals. Contractor's submittal schedule must be consistent with the Work Progress Schedule and identify critical submittals. Show and allow a minimum of fifteen (15) days duration after receipt by A/E and ODR for review and approval. If re-submittal required, allow a minimum of an additional fifteen (15) days for review. Submit the updated Submittal Register with each request for progress payment. Owner may establish routine review procedures and schedules for submittals at the preconstruction conference and/or elsewhere in the Contract Documents. If Contractor fails to update and provide the Submittal Register as required, Owner may, after seven (7) days notice to Contractor withhold a reasonable sum of money that would otherwise be due Contractor.

8.3.1.3 Contractor shall coordinate the Submittal Register with the Work Progress Schedule. Do not schedule Work requiring a submittal to begin prior to scheduling review and approval of the related submittal. Revise and/or update both schedules monthly to ensure consistency and current project data. Provide to ODR the updated Submittal Register and schedule with each application for progress payment. Refer to requirements for the Work Progress Schedule for inclusion of procurement activities therein. Regardless, the Submittal Register shall identify dates submitted and returned and shall be used to confirm status and disposition of particular items submitted, including approval or other action taken and other information not conveniently tracked through the Work Progress Schedule.

8.3.1.4 By submitting Shop Drawings, Samples or other required information, Contractor represents that it has determined and verified all applicable field measurements, field construction criteria, materials, catalog numbers and similar data; and has checked and coordinated each Shop Drawing and Sample with the requirements of the Work and the Contract Documents.

8.3.2 Review of Submittals. A/E and ODR review is only for conformance with the design concept and the information provided in the Contract Documents. Responses to submittals will be in writing. The approval of a separate item does not indicate approval of an assembly in which the item functions. The approval of a submittal does not relieve Contractor of responsibility for any deviation from the requirements of the Contract unless Contractor informs A/E and ODR of such deviation in a clear, conspicuous, and written manner on the submittal transmittal and at the time of submission, and obtains Owner's written specific approval of the particular deviation.

8.3.3 Correction and Resubmission. Contractor shall make any corrections required to a submittal and resubmit the required number of corrected copies promptly so as to avoid delay, until submittal approval. Direct attention in writing to A/E and ODR, when applicable, to any new revisions other than the corrections requested on previous submissions.

8.3.4 Limits on Shop Drawing Review. Contractor shall not commence any Work requiring a submittal until review of the submittal under Subsection 8.3.2. Construct all such work in accordance with reviewed submittals. Comments incorporated as part of the review in Subsection 8.3.2 of Shop Drawings and Samples is not authorization to Contractor to perform extra work or changed work unless authorized through a Change Order. A/E's and ODR's review, if any, does not relieve Contractor from responsibility for defects in the Work resulting from errors or omissions of any kind on the submittal, regardless of any approval action.

8.3.5 No Substitutions Without Approval. ODR and A/E may receive and consider Contractor's request for substitution when Contractor agrees to reimburse Owner for review costs and satisfies the requirements of this section. If Contractor does not satisfy these conditions, ODR and A/E will return the request without action except to record noncompliance with these requirements. Owner will not consider the request if Contractor cannot provide the product or method because of failure to pursue the Work promptly or coordinate activities properly. Contractor's request for a substitution may be considered by ODR and A/E when:

8.3.5.1 The Contract Documents do not require extensive revisions; and

8.3.5.2 Proposed changes are in keeping with the general intent of the Contract Documents and the design intent of A/E and do not result in an increase in cost to Owner; and

8.3.5.3 The request is timely, fully documented, properly submitted and one or more of the following apply:

8.3.5.3.1 Contractor cannot provide the specified product, assembly or method of construction within the Contract Time;

8.3.5.3.2 The request directly relates to an "or-equal" clause or similar language in the Contract Documents;

8.3.5.3.3 The request directly relates to a "product design standard" or "performance standard" clause in the Contract Documents;

8.3.5.3.4 The requested substitution offers Owner a substantial advantage in cost, time, energy conservation or other considerations, after deducting additional responsibilities Owner must assume;

8.3.5.3.5 The specified product or method of construction cannot receive necessary approval by an authority having jurisdiction, and ODR can approve the requested substitution;

8.3.5.3.6 Contractor cannot provide the specified product, assembly or method of construction in a manner that is compatible with other materials and where Contractor certifies that the substitution will overcome the incompatibility;

8.3.5.3.7 Contractor cannot coordinate the specified product, assembly or method of construction with other materials and where Contractor certifies they can coordinate the proposed substitution; or

8.3.5.3.8 The specified product, assembly or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.

8.3.6 Unauthorized Substitutions at Contractor's Risk. Contractor is financially responsible for any additional costs or delays resulting from unauthorized substitution of materials, equipment or fixtures other than those specified. Contractor shall reimburse Owner for any increased design or contract administration costs resulting from such unauthorized substitutions.

8.4 Field Mock-up.

8.4.1 Mock-ups shall be constructed prior to commencement of a specified scope of work to confirm acceptable workmanship.

8.4.1.1 As a minimum, field mock-ups shall be constructed for roofing systems, exterior veneer / finish systems, glazing systems, and any other Work requiring a mock-up as identified throughout the Contract Documents. Mock-ups for systems not part of the Project scope shall not be required.

8.4.1.2 Mock-ups may be incorporated into the Work if allowed by the Contract Documents and if acceptable to ODR. If mock-ups are freestanding, they shall remain in place until otherwise directed by Owner.

8.4.1.3 Contractor shall include field mock-ups in their Work Progress Schedule and shall notify ODR and A/E of readiness for review sufficiently in advance to coordinate review without delay.

8.5 Inspection During Construction.

8.5.1 Contractor shall provide sufficient, safe, and proper facilities, including equipment as necessary for safe access, at all reasonable times for observation and/or inspection of the Work by Owner and its agents.

8.5.2 Contractor shall not cover up any Work with finishing materials or other building components prior to providing Owner and its agents an opportunity to perform an inspection of the Work.

8.5.2.1 Should corrections of the Work be required for approval, Contractor shall not over up corrected Work until Owner indicates approval.

8.5.2.2 Contractor shall provide notification of at least five (5) working days or otherwise as mutually agreed, to ODR of the anticipated need for a cover-up inspection. Should ODR fail to make the necessary inspection within the agreed period, Contractor may proceed with cover-up Work, but is not relieved of responsibility for Work to comply with requirements of the Contract Documents.

Article 9. Construction Schedules

9.1 Contract Time. **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT**. The Contract Time is the time between the dates indicated in the Notice to Proceed for commencement of the Work and for achieving Substantial Completion. The Contract Time can be modified only by Change Order. Failure to achieve Substantial Completion within the Contract Time ***or*** as otherwise agreed to in writing will cause damage to Owner and may subject Contractor to liquidated damages as provided in the Contract Documents.

9.2 If Contractor fails to achieve Final Completion in a reasonable time after Substantial Completion, Contractor shall be responsible for Owner's damages including, but not limited to, additional inspection, project management, and maintenance cost to the extent caused by Contractor's failure to achieve Final Completion.

9.3 Notice to Proceed. Owner will issue a Notice to Proceed which shall state the dates for beginning Work and for achieving Substantial Completion of the Work.

9.4 Work Progress Schedule. Refer to Owner's Special Conditions and Division 1 of the Specifications for additional schedule requirements. Unless indicated otherwise in those documents, Contractor shall submit their initial Work Progress Schedule for the Work in relation to the entire Project not later than twenty-one (21) calendar days after the effective date of the Notice to Proceed to ODR and A/E. Unless otherwise indicated in the Contract Documents, the Work Progress Schedule shall be computerized Critical Path Method (CPM) with fully editable logic. This initial schedule shall indicate the dates for starting and completing the various aspects required to complete the Work, including mobilization, procurement, installation, testing, inspection, delivery of Close-out Documents and acceptance of all the Work of the Contract. When acceptable to Owner, the initially accepted schedule shall be the Baseline Schedule for comparison to actual conditions throughout the Contract duration. Note: This article pertains to construction phase schedules. Additional requirements for design phase scheduling for Construction Manager-at-Risk and Design-Build contracts are outlined in Division 1 Project Planning and Scheduling Specifications.

9.4.1 Schedule Requirements. Contractor shall submit electronic and paper copy of the initial Work Progress Schedule reflecting accurate and reliable representations of the planned progress of the Work, the Work to date if any, and of Contractor's actual plans for its completion. Contractor shall organize and provide adequate detail so the schedule is capable of measuring and forecasting the effect of delaying events on completed and uncompleted activities.

9.4.1.1 Contractor shall re-submit initial schedule as required to address review comments from A/E and ODR until such schedule is accepted as the Baseline Schedule.

9.4.1.2 Submittal of a schedule, schedule revision or schedule update constitutes Contractor's representation to Owner of the accurate depiction of all progress to date and that Contractor will follow the schedule as submitted in performing the Work.

9.4.2 Schedule Updates. Contractor shall update the Work Progress Schedule and the Submittal Register monthly, as a minimum, to reflect progress to date and current plans for completing the Work, while maintaining original schedule as Baseline Schedule and submit paper and electronic copies of the update to A/E and ODR as directed, but as a minimum with each request for payment. Owner

has no duty to make progress payments unless accompanied by the updated Work Progress Schedule. Show the anticipated date of completion reflecting all extensions of time granted through Change Order as of the date of the update. Contractor may revise the Work Progress Schedule when in Contractor's judgment it becomes necessary for the management of the Work. Contractor shall identify all proposed changes to schedule logic to Owner and to A/E via an executive summary accompanying the updated schedule for review prior to final implementation of revisions into a revised Baseline Schedule. Schedule changes that materially impact Owner's operations shall be communicated promptly to ODR and shall not be incorporated into the revised Baseline Schedule without ODR's consent.

9.4.3 The Work Progress Schedule is for Contractor's use in managing the Work and submittal of the schedule, and successive updates or revisions, is for the information of Owner and to demonstrate that Contractor has complied with requirements for planning the Work. Owner's acceptance of a schedule, schedule update or revision constitutes Owner's agreement to coordinate its own activities with Contractor's activities as shown on the schedule.

9.4.3.1 Acceptance of the Work Progress Schedule, or update and/or revision thereto does not indicate any approval of Contractor's proposed sequences and duration.

9.4.3.2 Acceptance of a Work Progress Schedule update or revision indicating early or late completion does not constitute Owner's consent, alter the terms of the Contract, or waive either Contractor's responsibility for timely completion or Owner's right to damages for Contractor's failure to do so.

9.4.3.3 Contractor's scheduled dates for completion of any activity or the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the Substantial Completion Date(s) and Contract Time.

9.5 Ownership of Float. Unless indicated otherwise in the Contract Documents, Contractor shall develop its schedule, pricing, and execution plan to provide a minimum of ten (10) percent total float at acceptance of the Baseline Schedule. Float time contained in the Work Progress Schedule is not for the exclusive benefit of Contractor or Owner, but belongs to the Project and may be consumed by either party. Before Contractor uses any portion of the float Contractor must submit a written request to do so to the Owner and receive Owner's written authorization to use the float. Owner's approval shall not be unreasonably withheld.

9.6 Completion of Work. Contractor is accountable for completing the Work within the Contract Time stated in the Contract, or as otherwise amended by Change Order.

9.6.1 If, in the judgment of Owner, the work is behind schedule and the rate of placement of work is inadequate to regain scheduled progress to insure timely completion of the entire work or a separable portion thereof, Contractor, when so informed by Owner, shall immediately take action to increase the rate of work placement by:

9.6.1.1 An increase in working forces.

9.6.1.2 An increase in equipment or tools.

9.6.1.3 An increase in hours of work or number of shifts.

9.6.1.4 Expedite delivery of materials.

9.6.1.5 Other action proposed if acceptable to Owner.

9.6.2 Within ten (10) days after such notice from ODR, Contractor shall notify ODR in writing of the specific measures taken and/or planned to increase the rate of progress. Contactor shall include an estimate as to the date of scheduled progress recovery and an updated Work Progress Schedule illustrating Contractor's plan for achieving timely completion of the Project. Should ODR deem the plan of action inadequate, Contractor shall take additional steps or make adjustments as necessary to its plan of action until it meets with ODR's approval.

9.7 Modification of the Contract Time.

9.7.1 Delays and extension of time as hereinafter described are valid only if executed in accordance with provisions set forth in Article 11.

9.7.2 When a delay defined herein as excusable prevents Contractor from completing the Work within the Contract Time, Contractor is entitled to an extension of time. Owner will make an equitable adjustment and extend the number of days lost because of excusable delay or Weather Days, as measured by Contractor's progress schedule. All extensions of time will be granted in calendar days. In no event, however, will an extension of time be granted for delays that merely extend the duration of non-critical activities, or which only consume float without delaying the project Substantial Completion date(s).

9.7.2.1 A "Weather Day" is a day on which Contractor's current schedule indicates Work is to be done, and on which inclement weather and related site conditions prevent Contractor from performing seven (7) hours of Work between the hours of 7:00 a.m. and 6:00 p.m. Weather days are excusable delays. When weather conditions at the site prevent work from proceeding, Contractor shall immediately notify ODR for confirmation of the conditions. At the end of each calendar month, Contractor shall submit to ODR and A/E a list of Weather Days occurring in that month along with documentation of the impact on critical activities. Based on confirmation by ODR, any time extension granted will be issued by Change Order. If Contractor and Owner cannot agree on the time extension, Owner may issue a ULCO for fair and reasonable time extension.

9.7.2.2 Excusable Delay. Contractor is entitled to an equitable adjustment of the Contract Time, issued via change order, for delays caused by the following:

9.7.2.2.1 Errors, omissions and imperfections in design, which A/E corrects by means of changes in the Drawings and Specifications.

9.7.2.2.2 Unanticipated physical conditions at the Site, which A/E corrects by means of changes to the Drawings and Specifications or for which ODR directs changes in the Work identified in the Contract Documents.

9.7.2.2.3 Changes in the Work that effect activities identified in Contractor's schedule as "critical" to completion of the entire Work, if such changes are ordered by ODR or recommended by A/E and ordered by ODR.

9.7.2.2.4 Suspension of Work for unexpected natural events (sometimes called "acts of God"), civil unrest, strikes or other events which are not within the reasonable control of Contractor.

9.7.2.2.5 Suspension of Work for convenience of ODR, which prevents Contractor from completing the Work within the Contract Time.

9.7.3 Contractor's relief in the event of such delays is the time impact to the critical path as determined by analysis of Contractor's schedule. In the event that Contractor incurs additional direct costs because of the excusable delays other than described in Subparagraph 9.6.2.2.4 and within the reasonable control of Owner, the Contract price and Contract Time are to be equitably adjusted by Owner pursuant to the provisions of Article 11.

9.8 No Damages for Delay. An extension of the Contract Time shall be the sole remedy of Contractor for delays in performance of the Work, whether or not such delays are foreseeable, except for delays caused solely by acts of Owner that constitute intentional interference with Contractor's performance of the Work and then only to the extent such acts continue after Contractor notifies Owner in writing of such interference. For delays caused by any act(s) other than the sole intentional interference of Owner, Contractor shall not be entitled to any compensation or recovery of any damages including, without limitation, consequential damages, lost opportunity costs, impact damages, loss of productivity, or other similar damages. Owner's exercise of any of its rights or remedies under the Contract including, without limitation, ordering changes in the Work or directing suspension, rescheduling, or correction of the Work, shall not be construed as intentional interference with Contractor's performance of the Work regardless of the extent or frequency of Owner's exercise of such rights or remedies.

9.9 Concurrent Delay. When the completion of the Work is simultaneously delayed by an excusable delay and a delay arising from a cause not designated as excusable, Contractor may not be entitled to a time extension for the period of concurrent delay.

9.10 Other Time Extension Requests. Time extensions requested in association with changes to the Work directed or requested by Owner shall be included with Contractor's proposed costs for such change. Time extensions requested for inclement weather are covered by Paragraph 9.6.2.1 above. If Contractor believes that the completion of the Work is delayed by a circumstance other than for changes directed to the Work or weather, they shall give ODR written notice, stating the nature of the delay and the activities potentially affected, within five (5) days after the onset of the event or circumstance giving rise to the excusable delay. Contractor shall provide sufficient written evidence to document the delay. In the case of a continuing cause of delay, only one notice of claim is necessary. State claims for extensions of time in numbers of whole or half days.

9.10.1 Within ten (10) days after the cessation of the delay, Contractor shall formalize its request for extension of time in writing to include a full analysis of the schedule impact of the delay and substantiation of the excusable nature of the delay. All changes to the Contract Time or made as a result of such claims is by Change Order, as set forth in Article 11.

9.10.2 No extension of time releases Contractor or the Surety furnishing a performance or payment bond from any obligations under the Contract or such a bond. Those obligations remain in full force until the discharge of the Contract.

9.10.3 Contents of Time Extension Requests. Contractor shall provide with each Time Extension Request a quantitative demonstration of the impact of the delay on project completion time, based on the Work Progress Schedule. Contractor shall include with Time Extension Requests a reasonably detailed narrative setting forth:

9.10.3.1 The nature of the delay and its cause; the basis of Contractor's claim of entitlement to a time extension.

9.10.3.2 Documentation of the actual impacts of the claimed delay on the critical path indicated in Contractor's Work Progress Schedule, and any concurrent delays.

9.10.3.3 Description and documentation of steps taken by Contractor to mitigate the effect of the claimed delay, including, when appropriate, the modification of the Work Progress Schedule.

9.10.4 Owner's Response. Owner will respond to the Time Extension Request by providing to Contractor written notice of the number of days granted, if any, and giving its reason if this number differs from the number of days requested by Contractor.

9.10.4.1 Owner will not grant time extensions for delays that do not affect the Contract Substantial Completion date.

9.10.4.2 Owner will respond to each properly submitted Time Extension Request within fifteen (15) days following receipt. If Owner cannot reasonably make a determination about Contractor's entitlement to a time extension within that time, Owner will notify Contractor in writing. Unless otherwise agreed by Contractor, Owner has no more than fifteen (15) additional days to prepare a final response. If Owner fails to respond within forty-five (45) days from the date the Time Extension Request is received, Contractor's request for a time extension shall be deemed rejected by Owner.

9.11 Failure to Complete Work Within the Contract Time. **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT.** Contractor's failure to substantially complete the Work within the Contract Time or to achieve Substantial Completion as required will cause damage to Owner. These damages ~~shall~~ ***may*** be liquidated by agreement of Contractor and Owner, in the amount per day as set forth in the Contract Documents.

9.12 Liquidated Damages. Owner may collect liquidated damages due from Contractor directly or indirectly by reducing the Contract Sum in the amount of liquidated damages stated in the Agreement or the Owner's Special Conditions.

Article 10. Payments

10.1 Schedule of Values. Contractor shall submit to ODR and A/E for acceptance a Schedule of Values accurately itemizing material and labor for the various classifications of the Work based on the organization of the specification sections and of sufficient detail acceptable to ODR. The accepted Schedule of Values will be the basis for the progress payments under the Contract.

10.1.1 No progress payments will be made prior to receipt and acceptance of the Schedule of Values, provided in such detail as required by ODR, and submitted not less than twenty-one (21) days prior to the first request for payment. The Schedule of Values shall follow the order of trade divisions of the Specifications and include itemized costs for general conditions, costs for preparing Close-Out documents, fees, contingencies, and Owner cash allowances, if applicable, so that the sum of the items will equal the Contract price. As appropriate, assign each item labor and/or material values, the subtotal thereof equaling the value of the work in place when complete.

10.1.1.1 Owner requires that the Work items be inclusive of the cost of the Work items only. Any contract markups for overhead and profit, general conditions, etc., shall be contained within separate line items for those specific purposes which shall be divided into at least two (2) lines, one (1) for labor and one (1) for materials.

10.1.2 Contractor shall retain a copy of all worksheets used in preparation of its BVB, supported by a notarized statement that the worksheets are true and complete copies of the documents used to prepare the BVB. Make the worksheets available to ODR at the time of Contract execution. Thereafter Contractor shall grant Owner during normal business hours access to said copy of worksheets at any time during the period commencing upon execution of the Contract and ending one year after final payment.

10.2. Progress Payments. Contractor will receive periodic progress payments for Work performed, materials in place, suitably stored on Site, or as otherwise agreed to by Owner and Contractor. Payment is not due until receipt by ODR or his designee of a correct and complete Pay Application in electronic and/or hard copy format as set forth in the Agreement or the Owner's Special Conditions, and certified by A/E. Progress payments are made provisionally and do not constitute acceptance of work not in accordance with the Contract Documents. Owner will not process progress payment applications for Change Order Work until all parties execute the Change Order.

10.2.1 Preliminary Pay Worksheet. Once each month that a progress payment is to be requested, the Contractor shall submit to A/E and ODR a complete, clean copy of a preliminary pay worksheet or preliminary pay application, to include the following:

10.2.1.1 Contractor's estimate of the amount of Work performed, labor furnished and materials incorporated into the Work, using the established Schedule of Values;

10.2.1.2 An updated Work Progress Schedule including the executive summary and all required schedule reports;

10.2.1.3 HUB subcontracting plan Progress Assessment Report as required in Paragraph 4.2.5.1;

10.2.1.4 Such additional documentation as Owner may require as set forth in the elsewhere in the Contract Documents; and

10.2.1.5 Construction payment affidavit.

10.2.2 Contractor's Application for Payment. As soon as practicable, but in no event later than seven (7) days after receipt of the preliminary pay worksheet, A/E and ODR will meet with Contractor to review the preliminary pay worksheet and to observe the condition of the Work. Based on this review, ODR and A/E may require modifications to the preliminary pay worksheet prior to the submittal of an Application for Payment, and will promptly notify Contractor of revisions necessary for approval. As soon as practicable, Contractor shall submit its Application for Payment on the appropriate and completed form, reflecting the required modifications to the Schedule of Values required by A/E and/or ODR. Attach all additional documentation required by ODR and/or A/E, as well as an affidavit affirming that all payrolls, bills for labor, materials, equipment, subcontracted work and other indebtedness connected with Contractor's Application for Payment are paid or will be paid within the time specified in Tex. Gov't Code, Chapter 2251. No Application for Payment is complete unless it fully reflects all required modifications, and attaches all required documentation including Contractor's affidavit.

10.2.3 Certification by Architect/Engineer. Within five (5) days or earlier following A/E's receipt of Contractor's formal Application for Payment, A/E will review the Application for Payment for completeness, and forward it to ODR. A/E will certify that the application is complete and payable, or that it is incomplete, stating in particular what is missing. If the Application for Payment is incomplete, Contractor shall make the required corrections and resubmit the Application for Payment for processing.

10.3 Owner's Duty to Pay. Owner has no duty to pay the Contractor except on receipt by ODR of: 1) a complete Application for Payment certified by A/E; 2) Contractor's updated Work Progress Schedule; and 3) confirmation that Contractor has maintained and updated the Record Documents kept at the Site.

10.3.1 Payment for stored materials and/or equipment confirmed by Owner and A/E to be on-site or otherwise properly stored is limited to eighty-five (85) percent of the invoice price or eighty-five (85) percent of the scheduled value for the materials or equipment, whichever is less.

10.3.2 Retainage. Owner will withhold from each progress payment, as retainage, five (5) percent of the total earned amount, the amount authorized by law, or as otherwise set forth in the Owner's Special Conditions. Retainage is managed in conformance with Tex. Gov't Code, Chapter 2252, Subchapter B.

10.3.2.1 Contractor shall provide written consent of its surety for any request for reduction or release of retainage.

10.3.2.2 At least sixty-five (65) percent of the Contract, or such other discrete Work phase as set forth in Subsection 12.1.6 or Work package delineated in the Contract Documents, must be completed before Owner can consider a retainage reduction or release.

10.3.2.3 Contractor shall not withhold retainage from their Subcontractors and suppliers in amounts that are any percentage greater than that withheld in its Contract with Owner under this subsection, unless otherwise acceptable to Owner.

10.3.3 Price Reduction to Cover Loss. Owner may reduce any Application for Payment, prior to payment to the extent necessary to protect Owner from loss on account of actions of Contractor including, but not limited to, the following:

10.3.3.1 Defective or incomplete Work not remedied;

10.3.3.2 Damage to Work of a separate Contractor;

10.3.3.3 Failure to maintain scheduled progress or reasonable evidence that the Work will not be completed within the Contract Time;

10.3.3.4 Persistent failure to carry out the Work in accordance with the Contract Documents;

10.3.3.5 Reasonable evidence that the Work cannot be completed for the unpaid portion of the Contract Sum;

10.3.3.6 Assessment of fines for violations of prevailing wage rate law; or

10.3.3.7 Failure to include the appropriate amount of retainage for that periodic progress payment.

10.3.4 Title to all material and Work covered by progress payments transfers to Owner upon payment.

10.3.4.1 Transfer of title to Owner does not relieve Contractor and its Subcontractors of the sole responsibility for the care and protection of materials and Work upon which payments have been made until final acceptance, or the restoration of any damaged Work, or waive the right of Owner to require the fulfillment of all the terms of the Contract.

10.4 Progress Payments. Progress payments to Contractor do not release Contractor or its surety from any obligations under the Contract.

10.4.1 Upon Owner's request, Contractor shall furnish manifest proof of the status of Subcontractor's accounts in a form acceptable to Owner.

10.4.2 Pay estimate certificates must be signed by a corporate officer or a representative duly authorized by Contractor.

10.4.3 Provide copies of bills of lading, invoices, delivery receipts or other evidence of the location and value of such materials in requesting payment for materials.

10.4.4 For purposes of Tex. Gov't Code § 2251.021(a)(2), the date the performance of service is complete is the date when ODR approves the Application for Payment.

10.5 Off-Site Storage. With prior approval by Owner and in the event Contractor elects to store materials at an off-site location, abide by the following conditions, unless otherwise agreed to in writing by Owner.

10.5.1 Store materials in a commercial warehouse meeting the criteria stated below.

10.5.2 Provide insurance coverage adequate not only to cover materials while in storage, but also in transit from the off-site storage areas to the Project Site. Copies of duly authenticated certificates of insurance, made out to insure the State agency which is signatory to the Contract, must be filed with Owner's representative.

10.5.3 Inspection by Owner's representative is allowed at any time. Owner's inspectors must be satisfied with the security, control, maintenance, and preservation measures.

10.5.4 Materials for this Project are physically separated and marked for the Project in a sectioned- off area. Only materials which have been approved through the submittal process are to be considered for payment.

10.5.5 Owner reserves the right to reject materials at any time prior to final acceptance of the complete Contract if they do not meet Contract requirements regardless of any previous progress payment made.

10.5.6 With each monthly payment estimate, submit a report to ODR and A/E listing the quantities of materials already paid for and still stored in the off-site location.

10.5.7 Make warehouse records, receipts and invoices available to Owner's representatives, upon request, to verify the quantities and their disposition.

10.5.8 In the event of Contract termination or default by Contractor, the items in storage off-site, upon which payment has been made, will be promptly turned over to Owner or Owner's agents at a location near the jobsite as directed by ODR. The full provisions of performance and payment bonds on this Project cover the materials off-site in every respect as though they were stored on the Project Site.

10.6 Time for Payment by Contractor Pursuant to Tex. Gov't Code § 2255.022.

10.6.1 Contractor who receives a payment from a governmental entity shall pay Subcontractor the appropriate share of the payment not later than the tenth (10th) day after the date Contractor receives the payment.

10.6.2 The appropriate share is overdue on the eleventh (11th) day after the date Contractor receives the payment.

Article 11. Changes

11.1 Change Orders. A Change Order issued after execution of the Contract is a written order to Contractor, signed by ODR, Contractor, and A/E, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time can only be changed by Change Order. A Change Order signed by Contractor indicates his agreement therewith, including the adjustment in the Contract Sum and/or the Contract Time. ODR may issue a written authorization for Contractor to proceed with Work of a Change Order in advance of final execution by all parties in accordance with Section 11.9.

11.1.1 Owner, without invalidating the Contract ***and without approval of Contractor's Surety***, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, and the Contract Sum and the Contract Time will be adjusted accordingly. All such changes in the Work shall be authorized by Change Order or ULCO, and shall be performed under the applicable conditions of the Contract Documents. If such changes cause an increase or decrease in Contractor's cost of, or time required for, performance of the Contract, an equitable adjustment shall be made and confirmed in writing in a Change Order or a ULCO.

11.1.2 Owner and Contractor acknowledge and agree that the Specifications and Drawings may not be complete or free from errors, omissions and imperfections and that they may require changes or additions in order for the Work to be completed to the satisfaction of Owner. Therefore, any minor errors, omissions or imperfections in the Specifications or Drawings, or any changes in or additions to the Specifications or Drawings to correct minor errors or omissions or to the Work ordered by Owner shall not constitute or give rise to any claim, demand or cause of action of any nature whatsoever in favor of Contractor, whether for breach of Contract, or otherwise. However, should the nature of the errors or omissions necessitate substantial changes in the Work such that a Change Order is appropriate, Owner shall be liable to Contractor for the sum stated to be due Contractor in any Change Order approved and signed by both parties. The sum established in any Change Order, together with any extension of time contained in said Change Order, shall constitute full compensation to Contractor for all costs, expenses and damages to Contractor for the changes in the Work described in the Change Order, as permitted under Tex. Gov't Code, Chapter 2260.

11.1.3 Procedures for administration of Change Orders shall be established by Owner and stated in the Owner's Special Conditions, or elsewhere in the Contract Documents.

11.1.4 No verbal order, verbal statement, or verbal direction of Owner or his duly appointed representative shall be treated as a change under this article or entitle Contractor to an adjustment.

11.1.5 Contractor agrees that Owner or any of its duly authorized representatives shall have access and the right to examine any directly pertinent books, documents, papers, and records of Contractor. Further, Contractor agrees to include in all its subcontracts a provision to the effect that Subcontractor agrees that Owner or any of its duly authorized representatives shall have access to and the right to examine any directly pertinent books, documents, papers and records of such Subcontractor relating to any claim arising from the Contract, whether or not the Subcontractor is a party to the claim. The period of access and examination described herein which relates to appeals under the Disputes article of the Contract, litigation, or the settlement of claims arising out of the performance of the Contract shall continue until final disposition of such claims, appeals or litigation.

11.2 Unit Prices. If unit prices are stated in the Contract Documents or subsequently agreed upon and if the quantities originally contemplated in setting the unit prices are so changed in a Proposed Change Order that application of the agreed unit prices to the quantities of work proposed will cause substantial inequity to Owner or Contractor, the applicable unit prices shall be equitably adjusted as provided in the Owner's Special Conditions or as agreed to by the parties and incorporated into a Change Order.

11.3 Claims for Additional Costs.

11.3.1 If Contractor wishes to make a claim for an increase in the Contract Sum not related to a requested change, it shall give Owner and A/E written notice thereof within twenty-one (21) days after the occurrence of the event or discovery of any conditions giving rise to such claim. Contractor must notify Owner and A/E before proceeding to execute any Work considered to add additional cost or time, except in an emergency endangering life or property in which case Contractor shall act in accordance with Subsection 7.2.1., and failure to provide the required notice will invalidate any subsequent notice or claim for additional cost or time for the Work. If Owner and Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined as set forth under Article 15. Any change in the Contract Sum resulting from such claim shall be authorized by a Change Order or a ULCO.

11.3.2 If Contractor claims that additional cost is involved because of, but not limited to, 1) any written interpretation of the Contract Documents, 2) any order by Owner to stop the Work pursuant to Article 14 where Contractor was not at fault, or 3) any written order for a minor change in the Work issued pursuant to Section 11.4, Contractor shall make such claim as provided in Subsection 11.3.1.

11.3.3 Should Contractor or his Subcontractors fail to call attention of A/E to discrepancies or omissions in the Contract Documents, but claim additional costs for corrective Work after Contract award, Owner may assume intent to circumvent competitive bidding for necessary corrective Work. In such case, Owner may choose to let a separate Contract for the corrective Work, or issue a ULCO to require performance by Contractor. Claims for time extensions or for extra cost resulting from delayed notice of patent Contract Document discrepancies or omissions will not be considered by Owner.

11.4 Minor Changes. A/E, with concurrence of ODR, will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time. Such changes shall be effected by written order which Contractor shall carry out promptly and record on the Record Documents.

11.5 Concealed Site Conditions. Contractor is responsible for visiting the Site and being familiar with local conditions such as the location, accessibility, and general character of the Site and/or building. If, in the performance of the Contract, subsurface, latent, or concealed conditions at the Site are found to be materially different from the information included in the Contract Documents, or if unknown conditions of an unusual nature are disclosed differing materially from the conditions usually inherent in Work of the character shown and specified, ODR and A/E shall be notified in writing of such conditions before they are disturbed. Upon such notice, or upon its own observation of such conditions, A/E, with the approval of ODR, will promptly make such changes in the Drawings and Specifications as they deem necessary to conform to the different conditions, and any increase or decrease in the cost of the Work, or in the time within which the Work is to be completed, resulting from such changes will be adjusted by Change Order, subject to the prior approval of ODR.

11.6 Extension of Time. All changes to the Contract Time shall be made as a consequence of requests as required under Section 9.6, and as documented by Change Order as provided under Section 11.1.

11.7 Administration of Change Order Requests. All changes in the Contract shall be administered in accordance with procedures approved by Owner, and when required, make use of such electronic information management system(s) as Owner may employ.

11.7.1 Routine changes in the construction Contract shall be formally initiated by A/E by means of a PCO form detailing requirements of the proposed change for pricing by Contractor. This action may be preceded by communications between Contractor, A/E and ODR concerning the need and nature of the change, but such communications shall not constitute a basis for beginning the proposed Work by Contractor. Except for emergency conditions described below, approval of Contractor's cost proposal by A/E and ODR will be required for authorization to proceed with the Work being changed. Owner will not be responsible for the cost of Work changed without prior approval and Contractor may be required to remove Work so installed.

11.7.2 All proposed costs for change order Work must be supported by itemized accounting of material, equipment and associated itemized installation costs in sufficient detail, following the outline and organization of the established Schedule of Values, to permit analysis by A/E and ODR using current estimating guides and/or practices. Photocopies of Subcontractor and vendor proposals shall be furnished unless specifically waived by ODR. Contractor shall provide written response to a change request within twenty-one (21) days of receipt.

11.7.3 Any unexpected circumstance which necessitates an immediate change in order to avoid a delay in progress of the Work may be expedited by verbal communication and authorization between Contractor and Owner, with written confirmation following within twenty-four (24) hours. A limited scope not-to-exceed estimate of cost and time will be requested prior to

11.7.4 authorizing Work to proceed. Should the estimate be impractical for any reason, ODR may authorize the use of detailed cost records of such work to establish and confirm the actual costs and time for documentation in a formal Change Order.

11.7.5 Emergency changes to save life or property may be initiated by Contractor alone (see Section 7.3) with the claimed cost and/or time of such work to be fully documented as to necessity and detail of the reported costs and/or time.

11.7.6 The method of incorporating approved Change Orders into the parameters of the accepted Schedule of Values must be coordinated and administered in a manner acceptable to ODR.

11.8 Pricing Change Order Work. The amounts that Contractor and/or its Subcontractor adds to a Change Order for profit and overhead will also be considered by Owner before approval is given. The amounts established hereinafter are the maximums that are acceptable to Owner.

11.8.1 For Work performed by its forces, Contractor will be allowed its actual costs paid for materials, the total amount of its actual wages paid for labor, plus its actual cost paid for ~~of~~ State and Federal payroll taxes and for ~~of~~ worker's compensation and comprehensive general liability insurance, plus its actual additional bond and builders risk insurance cost if the change results in an increase in the premium paid by Contractor. To the total of the above costs, Contractor will be allowed to add a percentage as noted below to cover overhead and profit combined. Overhead shall be considered to include insurance other than mentioned above, field and office supervisors and assistants, including safety and scheduling personnel, use of small tools, incidental job burdens and general Home Office expenses, and no separate allowance will be made therefore.

Allowable percentages for overhead and profit on changes will not exceed 15 percent if the total of self-performed work is less than or equal to $10,000, 10 percent if the total of self- performed work is between $10,000 and $20,000 and 7.5 percent if the total of self-performed work is over $20,000, for any specific change priced.

11.8.2 For subcontracted Work each affected Subcontractor shall figure its costs, overhead and profit as described above for Contractor's Work, all Subcontractor costs shall be combined, and to that total Subcontractor cost Contractor will be allowed to add a maximum mark-up of ten
(10) percent if the total of all subcontracted work is less than or equal to $10,000, seven and half (7.5) percent if the total of all subcontracted work is between $10,000 and $20,000 and five (5) percent if the total of all subcontractor work is over $20,000.

11.8.3 On changes involving both additions and deletions, percentages for overhead and profit will be allowed only on the net addition. Owner does not accept and will not pay for additional Contract cost identified as indirect or consequential damages or as damages caused by delay.

11.8.4 For Contracts based on a Guaranteed Maximum Price (GMP), the Construction Manager-at-Risk or Design Builder shall NOT be entitled to a percentage mark-up on any Change Order Work unless the Change Order increases the Guaranteed Maximum Price.

11.9 Unilateral Change Order (ULCO). Owner may issue a written ULCO directing a change in the Work prior to reaching agreement with Contractor on the adjustment, if any, in the Contract price and/or the Contract Time.

11.9.1 Owner and Contractor shall negotiate for appropriate adjustments, as applicable, to the Contract Sum or the Contract Time arising out of a ULCO. As the changed Work is performed, Contractor shall submit its costs for such Work with its Application for Payment beginning with the next Application for Payment within thirty (30) days of the issuance of the ULCO. The Parties reserve their rights to dispute the ULCO amount, subject to Article 15.

11.10 Finality of Changes—Contractor. Upon execution of a Change Order and /or a ULCO by Owner, Contractor and A/E, all costs and time issues claimed by Contractor regarding that change are final and not subject to increase.

11.11 Audit of Changes—Owner. All Changes Orders are subject to audit by Owner or its representative at any time in accordance with Article 16.4 and Change Order amounts may be adjusted lower as a result of such audit.

Article 12. Project Completion and Acceptance

12.1 Closing Inspections.

12.1.1 Substantial Completion Inspection. When Contractor considers the entire Work or part thereof Substantially Complete, it shall notify ODR in writing that the Work will be ready for Substantial Completion inspection on a specific date. Contractor shall include with this notice Contractor's Punchlist to indicate that it has previously inspected all the Work associated with the request for inspection, noting items it has corrected and included all remaining work items with date scheduled for completion or correction prior to final inspection. The failure to include any items on this list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If any of the items on this list prevents the Project from being used as intended, Contractor shall not request a Substantial Completion Inspection. Owner and its representatives will review the list of items and schedule the requested inspection, or inform Contractor in writing that such an inspection is premature because the Work is not sufficiently advanced or conditions are not as represented on Contractor's list.

12.1.1.1 Prior to the Substantial Completion inspection, Contractor shall furnish a copy of its marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties, and like publications or parts for all installed equipment, systems, and like items as described in the Contract Documents. Delivery of these items is a prerequisite for requesting the Substantial Completion inspection.

12.1.1.2 On the date requested by Contractor, or as mutually agreed upon pending the status of the Open Items List, A/E, ODR, Contractor, and other Owner representatives as determined by Owner will jointly attend the Substantial Completion inspection, which shall be conducted by ODR or their delegate. If ODR concurs with the determination of Contractor and A/E that the Work is Substantially Complete, ODR will issue a Certificate of Substantial Completion to be signed by A/E, Owner, and Contractor establishing the date of Substantial Completion and identifying responsibilities for security, insurance and maintenance. A/E will provide with this certificate a list of Punchlist items (the pre-final Punchlist) for completion prior to final inspection. This list may include items in addition to those on Contractor's Punchlist, which the inspection team deems necessary to correct or complete prior to final inspection. If Owner occupies the Project upon determination of Substantial Completion, Contractor shall complete all corrective Work at the convenience of Owner, without disruption to Owner's use of the Project for its intended purposes.

12.1.2 Final Inspection. Contractor shall complete the list of items identified on the pre-final Punchlist prior to requesting a final inspection. Unless otherwise specified, or otherwise agreed in writing by the parties as documented on the Certificate of Substantial Completion, Contractor shall complete and/or correct all Work within thirty (30) days of the Substantial Completion date. Upon completion of the pre-final Punchlist work, Contractor shall give written notice to ODR and A/E that the Work will be ready for final inspection on a specific date. Contractor shall accompany this notice with a copy of the updated pre-final Punchlist indicating resolution of all items. On the date specified or as soon thereafter as is practicable, ODR, A/E and Contractor will inspect the Work. A/E will submit to Contractor a final Punchlist of open items that the inspection team requires corrected or completed before final acceptance of the Work.

12.1.2.1 Correct or complete all items on the final Punchlist before requesting Final Payment. Unless otherwise agreed to in writing by the parties, complete this work within seven (7) days of receiving the final Punchlist. Upon completion of the final Punchlist, notify A/E and ODR in writing stating the disposition of each final Punchlist item. A/E, Owner, and Contractor shall promptly inspect the completed

items. When the final Punchlist is complete, and the Contract is fully satisfied according to the Contract Documents ODR will issue a certificate establishing the date of Final Completion. Completion of all Work is a condition precedent to Contractor's right to receive Final Payment.

12.1.3 Annotation. Any Certificate issued under this Article may be annotated to indicate that it is not applicable to specified portions of the Work, or that it is subject to any limitation as determined by Owner.

12.1.4 Purpose of Inspection. Inspection is for determining the completion of the Work, and does not relieve Contractor of its overall responsibility for completing the Work in a good and competent fashion, in compliance with the Contract. Work accepted with incomplete Punchlist items or failure of Owner or other parties to identify Work that does not comply with the Contract Documents or is defective in operation or workmanship does not constitute a waiver of Owner's rights under the Contract or relieve Contractor of its responsibility for performance or warranties.

12.1.5 Additional Inspections.

12.1.5.1 If Owner's inspection team determines that the Work is not substantially complete at the Substantial Completion inspection, ODR or A/E will give Contractor written notice listing cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to ODR. Contractor shall complete or correct all work so designated prior to requesting a second Substantial Completion inspection.

12.1.5.2 If Owner's inspection team determines that the Work is not complete at the final inspection, ODR or A/E will give Contractor written notice listing the cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to ODR. Contractor shall complete or correct all Work so designated prior to again requesting a final inspection.

12.1.5.3 The Contract contemplates three (3) comprehensive inspections: the Substantial Completion inspection, the Final Completion inspection, and the inspection of completed final Punchlist items. The cost to Owner of additional inspections resulting from the Work not being ready for one or more of these inspections is the responsibility of Contractor. Owner may issue a ULCO deducting these costs from Final Payment. Upon Contractor's written request, Owner will furnish documentation of any costs so deducted. Work added to the Contract by Change Order after Substantial Completion inspection is not corrective Work for purposes of determining timely completion, or assessing the cost of additional inspections.

12.1.6 Phased Completion. The Contract may provide, or Project conditions may warrant, as determined by ODR, that designated elements or parts of the Work be completed in phases. Where phased completion is required or specifically agreed to by the parties, the provisions of the Contract related to closing inspections, occupancy, and acceptance apply independently to each designated element or part of the Work. For all other purposes, unless otherwise agreed by the parties in writing, Substantial Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Substantial Completion certificate. Final Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Final Completion certificate or notice.

12.2 Owner's Right of Occupancy. Owner may occupy or use all or any portion of the Work following Substantial Completion, or at any earlier stage of completion. Should Owner wish to use or occupy the Work, or part thereof, prior to Substantial Completion, ODR will notify Contractor in writing and identify responsibilities for security, insurance and maintenance Work performed on the premises by third parties on Owner's behalf does not constitute occupation or use of the Work by Owner for

purposes of this Article. All Work performed by Contractor after occupancy, whether in part or in whole, shall be at the convenience of Owner so as to not disrupt Owner's use of, or access to occupied areas of the Project.

12.3 Acceptance and Payment

12.3.1 Request for Final Payment. Following the certified completion of all work, including all final Punchlist items, cleanup, and the delivery of record documents, Contractor shall submit a certified Application for Final Payment and include all sums held as retainage and forward to A/E and ODR for review and approval.

12.3.2 Final Payment Documentation. Contractor shall submit, prior to or with the Application for Final Payment, final copies of all Close-Out documents, maintenance and operating instructions, guarantees and warranties, certificates, Record Documents and all other items required by the Contract. Contractor shall submit evidence of return of access keys and cards, evidence of delivery to Owner of attic stock, spare parts, and other specified materials. Contractor shall submit consent of surety to Final Payment form and an affidavit that all payrolls, bills for materials and equipment, subcontracted work and other indebtedness connected with the Work, except as specifically noted, are paid, will be paid, after payment from Owner or otherwise satisfied within the period of time required by Tex. Gov't Code, Chapter 2251. Contractor shall furnish documentation establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of claims and liens arising out of the Contract. Contractor may not subsequently submit a claim on behalf of Subcontractor or vendor unless Contractor's affidavit notes that claim as an exception.

12.3.3 Architect/Engineer Approval. A/E will review a submitted Application for Final Payment promptly but in no event later than ten (10) days after its receipt. Prior to the expiration of this deadline, A/E will either: 1) return the Application for Final Payment to Contractor with corrections for action and resubmission; or 2) accept it, note their approval, and send to Owner.

12.3.4 Offsets and Deductions. Owner may deduct from the Final Payment all sums due from Contractor. If the Certificate of Final Completion notes any Work remaining, incomplete, or defects not remedied, Owner may deduct the cost of remedying such deficiencies from the Final Payment. On such deductions, Owner will identify each deduction, the amount, and the explanation of the deduction on or by the twenty-first (21st) day after Owner's receipt of an approved Application for Final Payment. Such offsets and deductions shall be incorporated via a final Change Order, including a ULCO as may be applicable.

12.3.5 Final Payment Due. Final Payment is due and payable by Owner, subject to all allowable offsets and deductions, on the thirtieth (30th) day following Owner's approval of the Application for Payment. If Contractor disputes any amount deducted by Owner, Contractor shall give notice of the dispute on or before the thirtieth (30th) day following receipt of Final Payment. Failure to do so will bar any subsequent claim for payment of amounts deducted.

12.3.6 Effect of Final Payment. Final Payment constitutes a waiver of all claims by Owner, relating to the condition of the Work except those arising from:

12.3.6.1 Faulty or defective Work appearing after Substantial Completion (latent defects);

12.3.6.2 Failure of the Work to comply with the requirements of the Contract Documents;

12.3.6.3 Terms of any warranties required by the Contract, or implied by law; or

12.3.6.4 Claims arising from personal injury or property damage to third parties.

12.3.7 Waiver of Claims. Final payment constitutes a waiver of all claims and liens by Contractor except those specifically identified in writing and submitted to ODR prior to the application for Final Payment.

12.3.8 Effect on Warranty. Regardless of approval and issuance of Final Payment, the Contract is not deemed fully performed by Contractor and closed until the expiration of all warranty periods.

Article 13. Warranty and Guarantee

13.1 Contractor's General Warranty and Guarantee. Contractor warrants to Owner that all Work is executed in accordance with the Contract, complete in all parts and in accordance with approved practices and customs, and of the required finish and workmanship. Contractor further warrants that unless otherwise specified, all materials and equipment incorporated in the Work under the Contract are new. Owner may, at its option, agree in writing to waive any failure of the Work to conform to the Contract, and to accept a reduction in the Contract price for the cost of repair or diminution in value of the Work by reason of such defect. Absent such a written agreement, Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute and is not waived by any inspection or observation by Owner, A/E or others, by making any progress payment or final payment, by the use or occupancy of the Work or any portion thereof by Owner, at any time, or by any repair or correction of such defect made by Owner.

13.2 Warranty Period. Except as may be otherwise specified or agreed, Contractor shall repair all defects in materials, equipment, or workmanship appearing within one year from the date of Substantial Completion of the Work. If Substantial Completion occurs by phase, then the warranty period for ~~that~~ the Work performed for each phase begins on the date of Substantial Completion of that phase, or as otherwise stipulated on the Certificate of Substantial Completion for the particular phase.

13.3 Limits on Warranty. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

13.3.1 Modification or improper maintenance or operation by persons other than Contractor, Subcontractors, or any other individual or entity for whom Contractor is not responsible, unless Owner is compelled to undertake maintenance or operation due to the neglect of Contractor.

13.3.2 Normal wear and tear under normal usage after acceptance of the Work by Owner.

13.4 Events Not Affecting Warranty. Contractor's obligation to perform and complete the Work in a good and workmanlike manner in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or relieve the Contractor from its obligation to perform the Work in accordance with the Contract Documents:

13.4.1 Observations by Owner and/or A/E;

13.4.2 Recommendation to pay any progress or final payment by A/E;

13.4.3 The issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;

13.4.4 Use or occupancy of the Work or any part thereof by Owner**;**

13.4.5 Any acceptance by Owner or any failure to do so;

13.4.6 Any review of a Shop Drawing or sample submittal; or

13.4.7 Any inspection, test or approval by others.

13.5 Separate Warranties. If a particular piece of equipment or component of the Work for which the Contract requires a separate warranty is placed in continuous service before Substantial Completion, the warranty period for that equipment or component will not begin until Substantial Completion, regardless of any warranty agreements in place between suppliers and/or Subcontractors and Contractor. ODR will certify the date of service commencement in the Substantial Completion certificate.

13.5.1 In addition to Contractor's warranty and duty to repair, Contractor expressly assumes all warranty obligations required under the Contract for specific building components, systems and equipment.

13.5.2 Contractor may satisfy any such obligation by obtaining and assigning to Owner a complying warranty from a manufacturer, supplier, or Subcontractor. Where an assigned warranty is tendered and accepted by Owner which does not fully comply with the requirements of the Contract, Contractor remains liable to Owner on all elements of the required warranty not provided by the assigned warranty.

13.6 Correction of Defects. Upon receipt of written notice from Owner, or any agent of Owner designated as responsible for management of the warranty period, of the discovery of a defect, Contractor shall promptly remedy the defect(s), and provide written notice to Owner and designated agent indicating action taken. In case of emergency where delay would cause serious risk of loss or damage to Owner, or if Contractor fails to remedy within thirty (30) days, or within another period agreed to in writing, Owner may correct the defect and be reimbursed the cost of remedying the defect from Contractor or its surety.

Article 14. Suspension and Termination

14.1 Suspension of Work for Cause. Owner may, at any time without prior notice, suspend all or any part of the Work if, after reasonable observation and/or investigation, Owner determines it is necessary to do so to prevent or correct any condition of the Work which constitutes an immediate safety hazard or which may reasonably be expected to impair the integrity, usefulness or longevity of the Work when completed.

14.1.1 Owner will give Contractor a written notice of suspension for cause, setting forth the reason for the suspension and identifying the Work suspended. Upon receipt of such notice, Contractor shall immediately stop the Work so identified. As soon as practicable following the issuance of such a notice, Owner will initiate and complete a further investigation of the circumstances giving rise to the suspension, and issue a written determination of the findings.

14.1.2 If it is confirmed that the cause was within the control of Contractor, Contractor will not be entitled to an extension of time for delay resulting from the suspension. If the cause is determined not to have been within the control of Contractor, and the suspension has prevented Contractor from completing the Work within the Contract Time, the suspension is an excusable delay and a time extension will be granted through a Change Order.

14.1.3 Suspension of Work under this provision will be no longer than is reasonably necessary to remedy the conditions giving rise to the suspension.

14.2 Suspension of Work for Owner's Convenience. Upon seven (7) days written notice to Contractor, Owner may at any time without breach of the Contract suspend all or any portion of the Work for a period of up to sixty (60) days for its own convenience. Owner will give Contractor a written notice of suspension for convenience, which sets forth the number of suspension days for which the Work, or any portion of it, and the date on which the suspension of Work will cease. When such a suspension prevents Contractor from completing the Work within the Contract Time, it is an excusable delay. A notice of suspension for convenience may be modified by Owner at any time on seven (7) days written notice to Contractor. If Owner suspends the Work for its convenience for more than sixty (60) consecutive days, Contractor may elect to terminate the Contract pursuant to the provisions of the Contract.

14.3 Termination by Owner for Cause.

14.3.1 Upon thirty (30) days written notice to Contractor and its surety, Owner may, without prejudice to any right or remedy, terminate the Contract and take possession of the Site and of all materials, equipment, tools, construction equipment, and machinery thereon owned by Contractor under any of the following circumstances:

14.3.1.1 Persistent or repeated failure or refusal, except during complete or partial suspensions of work authorized under the Contract, to supply enough properly skilled workmen or proper materials;

14.3.1.2 Persistent disregard of laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, including ODR;

14.3.1.3 Persistent failure to prosecute the Work in accordance with the Contract, and to ensure its completion within the time, or any approved extension thereof, specified in the Contract;

14.3.1.4 Failure to remedy defective work condemned by ODR;

14.3.1.5 Failure to pay Subcontractors, laborers, and material suppliers pursuant to Tex. Gov't Code, Chapter 2251;

14.3.1.6 Persistent endangerment to the safety of labor or of the Work;

14.3.1.7 Failure to supply or maintain statutory bonds or to maintain required insurance, pursuant to the Contract;

14.3.1.8 Any material breach of the Contract; or

14.3.1.9 Contractor's insolvency, bankruptcy, or demonstrated financial inability to perform the Work.

14.3.2 Failure by Owner to exercise the right to terminate in any instance is not a waiver of the right to do so in any other instance.

14.3.3 Upon receipt of a termination notice, the Contractor or its Surety has thirty (30) days to cure the reasons for the termination or demonstrate to the satisfaction of the Owner that it is prepared to remedy to the condition(s) upon which the notice of termination was based with diligence and promptness. If the Owner is satisfied that the Contractor or its Surety can remedy the reasons for the termination and complete the Work as required, the notice of termination shall be rescinded in writing by the Owner and the Work shall continue without an extension of time.

14.3.4 If at the conclusion of the thirty (30) day cure period the Contractor or its Surety is unable to demonstrate to the satisfaction of the Owner its ability to remedy the reasons for termination, the Owner may immediately terminate the employment of the Contractor, make alternative arrangements for completion of the Work and deduct the cost of completion from the unpaid Contract Sum.

14.3.4.1 Owners cost to complete the Work includes, but is not limited to, fees for additional services by A/E and other consultants, and additional contract administration costs.

14.3.4.2 Owner will make no further payment to Contractor or its surety unless the costs to complete the Work are less than the Contract balance, then the difference shall be paid to Contractor or its surety. If such costs exceed the unpaid balance, Contractor or its surety will pay the difference to Owner.

14.3.4.3 This obligation for payment survives the termination of the Contract.

14.3.4.4 Owner reserves the right in termination for cause to take assignment of all the Contracts between Contractor and its Subcontractors, vendors, and suppliers. ODR will promptly notify Contractor of the contracts Owner elects to assume. Upon receipt of such notice, Contractor shall promptly take all steps necessary to effect such assignment.

14.4 Conversion to Termination for Convenience. In the event that any termination of Contractor for cause under Section 14.3 is later determined to have been improper, the termination shall automatically convert to a termination for convenience under Section 14.5 and Contractor's recovery for termination shall be strictly limited to the payments allowable under Section 14.5.

14.5 Termination for Convenience of Owner. Owner reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply:

14.5.1 Owner will notify Contractor and A/E in writing specifying the reason for and the effective date of the Contract termination. The notice may also contain instructions necessary for the protection, storage or decommissioning of incomplete work or systems, and for safety.

14.5.2 Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any dispute in determining or adjusting any amounts due at that point in the Contract:

14.5.2.1 Stop all work.

14.5.2.2 Place no further subcontracts or orders for materials or services.

14.5.2.3 Terminate all subcontracts for convenience.

14.5.2.4 Cancel all materials and equipment orders as applicable.

14.5.2.5 Take appropriate action that is necessary to protect and preserve all property related to the Contract which is in the possession of Contractor.

14.5.3 When the Contract is terminated for Owner's convenience, Contractor may recover from Owner payment for all Work executed. Contractor may not claim lost profits or lost business opportunities.

14.6 Termination By Contractor. If the Work is stopped for a period of ninety (90) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of Contractor or Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with Contractor, then Contractor may, upon thirty (30) additional days written notice to ODR, terminate the Contract and recover from Owner payment for all Work executed, but not lost profits or lost business opportunities. If the cause of the Work stoppage is removed prior to the end of the thirty (30) day notice period, Contractor may not terminate the Contract.

14.7 Settlement on Termination. When the Contract is terminated for any reason, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to Owner based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, Owner may unilaterally determine the amount due to Contractor because of the termination and pay the determined amount to Contractor.

Article 15. Dispute Resolution

15.1 Unresolved Contractor Disputes. To the extent that it is applicable, the dispute resolution process provided for in Tex. Gov't Code, Chapter 2260, shall be used by Contractor to resolve any claim for breach of Contract made by Contractor that is not resolved under procedures described in these Uniform General Conditions or Owner's Special Conditions of the Contract.

15.2 Alternative Dispute Resolution Process. Owner may establish a dispute resolution process to be utilized in advance of that outlined in Tex. Gov't Code, Chapter 2260.

15.3 Nothing herein shall hinder, prevent, or be construed as a waiver of Owner's right to seek redress on any disputed matter in a court of competent jurisdiction.

15.4 In any litigation between the Owner and the Contractor arising from this Contract or this Project, neither party will be entitled to an award of legal fees or costs in any judgment regardless which one is deemed the prevailing party.

15.5 Nothing herein shall waive or be construed as a waiver of the State's sovereign immunity.

Article 16. Certification of No Asbestos Containing Material or Work

16.1 Contractor shall insure that Texas Department of State Health Services licensed individuals, consultants or companies are used for any required asbestos work including asbestos inspection, asbestos abatement plans/specifications, asbestos abatement, asbestos project management and third- party asbestos monitoring.

16.2 Contractor shall provide a notarized certification to Owner that all equipment and materials used in fulfillment of its Contract responsibilities are non-Asbestos Containing Building Materials (ACBM). This certification must be provided no later than Contractor's application for Final Payment.

16.3 The Contractor shall insure compliance with the following acts from all of his subcontractors and assigns:

- Asbestos Hazard Emergency Response Act (AHERA—40 CFR 763-99 (7));
- National Emission Standards for Hazardous Air Pollutants (NESHAP—EPA 40 CFR 61, Subpart M—National Emission Standard for Asbestos;
- Texas Asbestos Health Protection Rules (TAHPR—Tex. Admin. Code Title 25, Part 1, Ch. 295C, Asbestos Health Protection

Article 17 Miscellaneous

17.1 Owner's Special Conditions. When the Work contemplated by Owner is of such a character that the foregoing Uniform General Conditions of the Contract cannot adequately cover necessary and additional contractual relationships, the Contract may include Owner's Special Conditions that relate to the Project. In the event of a conflict between the UTUGCs and the Owner's Special Conditions, the Owner's Special Conditions will govern.

17.2 Federally Funded Projects. On Federally funded projects, Owner may waive, suspend or modify any Article in these Uniform General Conditions which conflicts with any Federal statue, rule, regulation or procedure, where such waiver, suspension or modification is essential to receipt by Owner of such Federal funds for the Project. In the case of any Project wholly financed by Federal funds, any standards required by the enabling Federal statute, or any Federal rules, regulations or procedures adopted pursuant thereto, shall be controlling.

17.3 Internet-based Project Management Systems. At its option, Owner may administer its design and construction management through an Internet-based management system. In such cases, Contractor shall conduct communication through this media and perform all Project related functions utilizing this database system. This includes correspondence, submittals, Requests for Information, vouchers or payment requests and processing, amendment, Change Orders and other administrative activities.

17.3.1 Accessibility and Administration.

17.3.1.1 When used, Owner will make the software accessible via the Internet to all Project team members.

17.3.1.2 Owner shall administer the software.

17.3.2 Training. When used, Owner shall provide training to the Project team members.

17.4 Right to Audit.

17.4.1 Contractor understands that acceptance of funds under this Contract acts as acceptance of the authority of the State Auditor's Office, Owner, any successor agency and their representatives, including independent auditors, to conduct an audit or investigation in connection with those funds. Contractor further agrees to cooperate fully with any party conducting the audit or investigation, including providing all records requested.

17.4.2 Contractor shall maintain and retain supporting fiscal and any other documents relevant to showing that any payments under this Contract funds were expended in accordance with the terms of this Contact, the requirements of Owner, and with the laws and regulations of the State of Texas including, but not limited to, requirements of the Comptroller of the State of Texas and the State Auditor. Contractor shall maintain all such documents and other records relating to this Contract and Owner's property for a period of four (4) years after the date of submission of a request for Final Payment or until a resolution of all billing questions, whichever is later. Contractor shall make available at reasonable times and upon reasonable notice and for reasonable periods all documents and other information related to the Work of this Contract.

17.4.3 Contractor shall ensure that this clause concerning the authority to audit funds received indirectly by subcontractors through the Contractor and the requirement to cooperate is included in any subcontract it awards.

End of General Conditions

SPECIAL CONDITIONS

These Special Conditions are in addition to the requirements of the General Conditions for Building Construction Contracts and are a part of the Contract Documents.

1. FIELD MANAGEMENT AND TEMPORARY STRUCTURES:
The Contractor shall coordinate and direct the work of this project from the site. Adequate field office structures, staff, machines, and equipment shall be provided and maintained by the contractor for the duration of the work.

   A. The Contractor shall provide and maintain its own temporary field office(s) (weather tight, well lighted, air conditioned, and safely heated) to include provisions for telephone and facsimile services, conference area(s), toilet facilities, and maintenance of all project files including submittals, project correspondence, payment and payroll records, etc. if required.

   B. The General Contractor shall arrange for each subcontractor to have field office accommodations as necessary to adequately perform their work.

   C. The General Contractor shall provide adequate and safe entries to all field offices including steps with railings and landings or stoops as required, and shall provide hard surface walkways to connect the field office structures to one another and on site entry or exit, if required.

   D. Except as otherwise specified, the Contractor shall furnish at its own cost and risk all significant tools, apparatus, hoists or cranes, derricks, etc., and its subcontractors shall arrange with the General Contractor for the use of same.

2. SANITARY FACILITIES:
The General Contractor shall provide one or more toilet buildings for the use of all persons employed on the job. He shall post notices, take such precautions as may be necessary, and remove refuse deposited in or about the buildings necessary to maintain the premises in a sanitary condition. Neither the General Contractor nor any of the construction work forces shall use campus sanitary facilities.

3. PROTECTION:
Each Contractor shall properly and effectively protect all materials and equipment furnished by him during and after their installation. Building materials, Contractor's equipment, etc. may be stored on the premises, but not in the existing building. Each subcontractor shall protect and be responsible for any damage to its work or material from the date of the agreement until the final payment is made, and shall make good without cost to the Owner any damage or loss that may occur during this period. The Contractor shall handle all material as directed, so that it may be inspected by the Owner's representative.

4. SIGNS:
No signs or advertisements will be allowed to be displayed without the approval of the Owner.

5. WATCHMAN AND JANITOR:
The Contractor at its own expense and option may employ an unarmed watchman at such time as it deems necessary to protect its work. The Contractor shall provide a person or persons for janitor work who shall keep all offices clean, attend to the temporary toilet rooms keeping them clean and supplied, and attend to drinking water and supplies. This person shall also help to keep the construction areas broomed, free from accumulated debris, and relatively clean.

6. PROJECT CLEANLINESS:
The Contractor shall provide manpower for cleaning and it shall be the responsibility of the Contractor to see that the debris and trash resulting from operations are removed from the property. Trash, construction debris, and mud shall not be allowed to accumulate anywhere on the project whether on the grounds, in the adjacent areas, or on the campus streets serving as delivery and haul-off routes for the work on this project. All scrap from lumber, crating, excelsior, paper, and similar types of trash are to be removed from the site. This project requires a thorough cleaning of all affected areas at least once a week; more frequent cleaning may be directed by Owner. Solid debris may not be dumped on the grounds.

7. REMOVAL OF TEMPORARY FACILITY:
When a temporary facility is no longer needed for the proper conduct of the work, the Contractor shall remove it from the project and shall repair or replace any material, equipment, or finished surface damaged in doing so.

8. CLARIFICATION OF INSURANCE REQUIREMENTS:
Builder's Risk Insurance is not required on this project.

9. WEATHER DATA:
Inclement weather conditions at the project location will be documented with ODR and documented for possible excusable delays.

10. PREVAILING WAGE GUIDELINES AND DETERMINATION:
Pursuant to Article 2, Paragraph 2.2, of the General Conditions for Construction Contracts, the Contractor is responsible for compliance with the prevailing wage law in accordance with the State Law. Compliance includes submission of wage rate notification forms for all workers on the project. The schedule attached in this project manual indicates the prevailing wage rate determination determined by the Owner.

11. ONGOING LAFB OPERATIONS:
This project is surrounded by continuously functioning LAFB facilities. The Contractor shall make every effort to avoid disruptions to ongoing LAFB activities and to maintain a safe environment for all personnel, in the areas adjacent to the project. LAFB utilities must not be interrupted except when scheduled and approved in advance through established channels. **Any disruption of services to the facilities served must be coordinated and approved by Owner at least seventy-two (72) hours in advance.**

12. CONTRACTOR PARKING:
Parking shall be at the LAFB's discretion. A limited number of remote parking spaces may be provided. Such parking is provided for the convenience of the Contractor with the understanding that the Contractor is responsible for all workers and all workers' vehicles while they are at the Project Location.

Contractor is responsible for all maintenance and repair to parking areas used by workers if damaged due to excessive fluid leaks, heavy truck traffic related to construction materials, outriggers "foot prints" due to crane or backhoe use, and all other construction related damage. Photos of parking areas, at commencement of work, to be taken by Contractor with Owner's representative present.

13. RESPONSIBILITY FOR WORK FORCE:
The Contractor is responsible for the actions of its entire work force, including subcontractors' and suppliers' employees whenever they are on the Project Site. The Contractor shall submit their plan for identifying and controlling all workers and for management of personnel records, including payroll records. Identification badges for workers, busing of workers from remote parking lot(s), frequent written and verbal reminders to work force of appropriate behavior and avoidance of LAFB facilities, and publishing of established access and egress routes for vehicular and pedestrian traffic are required, as a minimum, in order to maintain control of the work force.

A. Unacceptable behavior on the part of the workers anywhere on LAFB including parking lots, the project site, and the accessing route(s), through the site, or traffic violations while on LAFB may lead to cancellation of the Contractor's parking privileges. Further, identifiable offending worker(s) will be removed from the project.

B. Harassment of any person whether personnel, or visitor to the LAFB is forbidden. Harassment includes any action such as jeering, whistling, calling-out, staring, snickering, making rude or questionable comments, or similar behavior. If identifiable, any offending worker(s) will be removed from the project.

14. SECURITY:
The Contractor is responsible for security of the construction area and staging areas of the project. LAFB police will not provide security for the Contractor's areas. The Contractor may employ unarmed security personnel for their areas of control, but must notify the Owner of any such firms or employees.

15. NOISE CONTROL:
Equipment locations and timing or sequence of work operations shall be coordinated so as to not conflict with the Owner's continuing use of adjacent buildings and/or create any interference with scheduled meetings or events.

16. SMOKING, ILLEGAL DRUGS, ALCOHOL:
Use of cigarettes, smokeless cigarettes, chewing tobacco, or any product containing tobacco is not allowed on the campus in any location. Use of tobacco products is forbidden inside of buildings, outside of buildings, and on the grounds of the ***construction site at Laughlin Air Force Base.***

Use or possession of illegal drugs or alcohol on the project site or anywhere on LAFB is forbidden.

17. UTILITY OUTAGES:
Any necessary disruption of LAFB utilities must be scheduled in advance through established procedures. The Contractor shall not activate or deactivate any LAFB system or part of any such system without expressed written direction from the owner. **Any disruption of services to the facilities served must be coordinated and approved by LAFB at least seventy-two (72) hours in advance.**

18. WATER AND ELECTRICAL ENERGY:
Water and electrical energy costs shall be paid by LAFB. The General Contractor shall provide temporary lines for water and all temporary wiring, transformer, and metering equipment for electrical requirements.

19. TESTING OF MATERIALS:
The Owner reserves the right to subject materials and systems incorporated into the Project to routine tests as may be specified or deemed necessary to ensure compliance with the quality and/or performance requirements of the contract documents and/or with laws, ordinances, rules, regulations, and/or orders of any public authority having jurisdiction. The Owner shall provide or contract for, independently of the contractor, the inspection services, the testing of construction materials engineering, and the verification testing services necessary for acceptance of the project by the Owner. If tests confirm that the material/systems comply with Contract Documents, the Owner will pay the cost of the test. (See General Conditions for Construction Contracts, Section 8.2 Testing).

20. SUBMITTALS:
All submittals shall be submitted to the Owner. Any submittals that have the potential to delay the project must be marked as "URGENT" when submitted to the Owner. It is the Contractor's responsibility to receive the response needed from the Owner. If a response is not received by the Contractor, the Contractor must contact the primary contact, and if non-responsive for any reason, continue to seek a response from the Project Engineer and City Administrative Assistant. Failure of the Contractor to **follow-up** on submittal response does not relieve the Contractor from the responsibility to keep to the schedule.

21. DOCUMENTED LABOR:
In addition to requirements of Section 1.23 UNDOCUMENTED WORKERS, the awarded Contractor will be required to hire only documented workers who are covered under the workers compensation and federal tax withholding rules. No temporary labor, "independent contractors" or "self-employed" contractors will be allowed on site without being approved by Owner in advance. Workers are expected to be selected based on their availability to work for the duration of the project. All workers must be employees of the contractor unless properly vetted. Workers will be required to demonstrate employment status on the job site. Contractor will be accountable in any situation where compensation and/or legal requirements for workers are questioned by Owner. Contractor will be responsible for any unpaid workers compensation, social security or federal tax withholdings.

The intent of this paragraph is to reiterate the requirements of Section 1.23 UNDOCUMENTED WORKERS, and to notify Contractor that Owner intends to strictly enforce this provision. All workers on site must be able to demonstrate that they are bone fide employees of the Contractor or his listed Subcontractors by documentation. One acceptable form of documentation is a paystub as proof of employment by the Contractor or vetted Subcontractor.

DATE: _____

Best Value Bid Evaluation Worksheet

PROJECT: T-6 Prefabricated Aircraft Sun Shades at Laughlin Air Force Base

RESPONDENT'S NAME: _____

EVALUATOR: _____

Requirements For Best Value Bid	Points	Score
3.1 Respondent's Safety Management Program for this Project	5	
3.2 Respondent's Ability to Provide Construction Services	5	
3.3 Respondent's Qualifications of Construction Team	5	
3.4 Respondent's Past Performance on Representative Projects	20	
3.5 Respondent's Planning and Scheduling for This Project	5	
3.6 Respondent's Quality Control and Commissioning for This Project	5	
3.7 Respondent's Warranty and Service Support Program for This Project	5	
3.8 Respondent's Pricing and Delivery Best Value Bid	50	

TOTAL SCORE: _____

Comments: _____

PERFORMANCE SPECIFICATION
FOR
T-6 PREFABRICATED AIRCRAFT SUN SHADES, LAUGHIN AFB, TX

1. Background: The scope of the procurement shall include the installation of prefabricated steel aircraft sun shades with electrical distribution and lighting on the T-6 aircraft parking ramp located at Laughlin AFB, Del Rio, TX. This calls for the purchase and installation of up to 7 rows of prefabricated steel sun shades. Each sun shade must accommodate 7 aircraft per row to cover up to 49 T-6 aircraft parking spaces.

2. Personnel: The sun shade installation contractor personnel shall present a neat appearance and be easily recognized. This may be accomplished by wearing distinctive clothing bearing the name of the company or by wearing appropriate badges, which contain the company and employee's name. Contractor's personnel shall be responsible for wearing appropriate personal protection equipment (PPE) in and around the airfield. The Contractor assumes responsibility for the actions of all their employees, subcontractors, and suppliers when on Laughlin AFB.

3. Security and Access Requirements:

3.1. The aircraft sun shade installation area is within a designated Laughlin AFB controlled area. Therefore, the contractor's work area will be designated a "Free Zone". Free zones are established within controlled areas when projects and/or similar activities make it inappropriate or impractical to apply normal circulation controls. The Air Force establishes such free zone corridors to permit access of contractor personnel and equipment to project sites located within controlled areas. Upon award of the contract, appropriate actions will be initiated to obtain the required approvals for this designation. Contractor supervisory representatives will be required to attend a pre-installation meeting prior to mobilization, where applicable Free Zone requirements and local base access procedures will be discussed.

3.2. The Contractor shall comply with security regulations imposed by the Installation Commander and the agency occupying the space where work is to be performed, including any necessary security clearances. Prior to mobilization, the Contractor shall provide the City a list with 24 hour contact numbers of two on-site key personnel--normally the Project Manager and/or Project Superintendent, authorized to act as Trusted Agents. Trusted Agents are authorized to sign-in contractor and subcontractor personnel requiring access to work on Laughlin AFB and must be able to be contacted by phone at all times. The list shall be kept current and the City or authorized representative shall be notified immediately of any changes in the list.

3.3. All Contractor and subcontractor's employees entering Laughlin AFB in the performance of this contract will be required to obtain and display employee identification as prescribed by local, AETC and Air Force Instructions only during the period of contract. This identification must be visibly displayed at all times. Contractor personnel will be made aware of the necessity for safeguarding identification cards issued and the requirement for reporting any identification cards lost.

3.4. Contractor shall obtain base access and vehicle passes for each vehicle used on Laughlin AFB during the performance period. Upon contract award, the necessary applications for passes can be obtained by contacting the Laughlin AFB Security Forces Squadron (830) 298-5100. The completed applications are then processed through the Laughlin AFB Security Forces Visitor Control Center at (830) 298-5349. The contractor will also be responsible for obtaining flight line Privately-Owned Vehicle (POV) passes from the Airfield Management Office at (830) 298-4379. The contractor will provide make, model, color, and state tag information. The contractor will need to provide names, social security numbers, photo I.D. and valid driver's licenses of all individuals working on the flight line to the City and Laughlin AFB in order to complete background checks.

3.5. If an employee is dismissed from employment, resigns, or if there is no longer a contractual requirement for the employee to enter Laughlin AFB, the Contractor Project Superintendent shall ensure that the employee identification cards and any other identification, i.e., vehicle passes, issued to the employee are expeditiously returned to Laughlin AFB prior to final invoicing and payment. If all identification is not provided, a portion of the final payment (to be determined by the City) will be withheld pending its submission.

3.6. At the close of each work period, facilities, equipment and materials shall be secured. If any government property is provided the contractor shall be responsible for safeguarding said property.

3.7. The contractor shall prohibit the use of any government issued keys by any persons other than the contractor's employees. The contractor shall prohibit the opening of locked areas by his employees to permit entrance of persons other than the contractor's employees engaged in the performance of assigned work in those areas. When the contractor is given the number to any combination lock, he shall ensure that those combinations are not revealed to unauthorized persons.

3.8. Contractor identification cards may be issued for the performance period of the contract only. Contractor personnel will be made aware of the necessity for safeguarding identification cards issued and the requirement for reporting any identification cards lost.

3.9. All contactor personnel will comply with all Antiterrorism/Force Protection measures in the event there is a threat to the installation. Although not required for contractor personnel they shall be afforded the opportunity to complete the Antiterrorism (AT) Level I awareness training. For personnel who do not have access to the Air Force's Advance Distance Learning System (ADLS) they can receiving this training from the following web site: http://jko.jten.mil/courses/atl1/launch.html

4. Base Fire Regulation:

4.1. The contractor must comply with Base Fire Regulations in LAFBI 32-2001, 23 May 2013. The contractor must use no explosives or fire in performing the work. The contractor must understand and comply with current Occupational Safety and Health Administration welding and cutting requirements, and receive a welding permit from the base fire department prior to welding or cutting operations.

4.2. Do not tamper with, disable or alter any fire protection suppression or detection systems without prior coordination with the base fire department and appropriate Civil Engineering shop.

5. Site Maintenance:

5.1. Foreign Object Damage (FOD) Prevention: Aircraft safety is paramount, therefore, during sun shade installation aircraft will not operate within the sun shade installation area. The sun shade installation contractor will take all necessary precautions, to include any necessary screening, to settle debris, cover dumpsters to prevent blowing of dust and papers, and if necessary wet down materials as needed. Contractor shall maintain work areas in a neat, clean, and safe condition.

5.2. Site Maintenance: The sun shade installation work site is located within an active aircraft operations parking apron. It is imperative that the contractor protect adjacent aircraft parking areas, property, buildings, and their contents from dust, dirt, or other materials. The site will be maintained to prevent material or debris from migrating outside of the work area due to normal activity and normal wind conditions. If notified of material or debris outside of the work area due to unusual activity or weather conditions, the contractor will remove the debris and coordinate with Airfield Management to ensure aircraft movement and aircraft maintenance operations are not effected.

5.2.1. The Contractor shall dispose of all trash and debris generated during the contract. Disposal shall be by sanitary landfill or other approved methods and shall conform to all local, state, and federal guidelines and regulations.

5.2.2. The Contractor shall store all refuse in appropriate trash containers on the jobsite. Location of a dumpster at the site shall be as directed by Laughlin AFB. The dumpster shall be covered to prevent possible use by base personnel.

5.2.3. All mud, dirt, debris, foreign objects, or spills of any kind from the Contractor's operations (including subcontractors and suppliers) on the aircraft parking apron or streets and parking lots used as access to the work or staging areas, shall be cleaned off the same day. Taxiways, runways, parking aprons and hard surfaces used as access to the work or staging areas, shall be kept clean at all times.

5.2.4. The Contractor shall have all refuse removal trucks covered and secured prior to leaving the jobsite. If any materials are observed falling off the trucks, the truck shall be stopped and reloaded to prevent damage to any other vehicles caused directly/indirectly by falling debris. The Contractor shall bear the monetary responsibility to repair all damage associated with falling debris.

5.2.5. There are no approved concrete truck cleanout sites on base. The Contractor may instruct the truck to wash out into the Contractor's dumpster only. If the concrete truck cleans out anywhere else on base, the clean up charges will be billed back to the Contractor.

5.2.6. The base refuse contract supplies dumpsters for Government produced refuse only. The Contractor shall not dump refuse from this project in the Government dumpsters. If base personnel discovers project refuse in Government dumpsters, the Contractor must immediately remove the refuse, or have Government resources remove it at the Contractor's expense.

5.2.7. The Contractor's dumpster shall be removed prior to Final Inspection. The Contractor shall repair any damage the dumpster causes to concrete, asphalt paving or lawns.

5.3. Protection of Contractor's Equipment and Government Property: All Contractor supplied equipment is the sole responsibility of the Contractor. The Government is not liable for the theft, vandalism, or damage of any Contractor supplies, equipment or property. The Contractor shall secure his materials and protect all equipment from damage. Any equipment/material the Contractor removes and which requires reinstallation as part of the job requirements shall be the responsibility of the Contractor. All damaged material shall be replaced with equipment/material of equal quality and function by the Contractor at his own expense.

5.4. Cleanup: The contractor shall ensure daily cleanup is accomplished to ensure possible FOD material is secured to prevent migration outside of the work site. The contractor must maintain work areas in a neat and safe condition. All materials shall be neatly stacked and secured to prevent wind gusts from blowing materials around the parking apron and associated taxiways. The contractor must collect all trash, debris, refuse, garbage, etc., which the contractor generates and place it in appropriate containers with lids or approved covers (whether blown in or Contractor generated). These materials must be hauled from the site by appropriate means as directed by the city. Disposal must be outside the limits of government property. Disposal must be at a municipal solid waste landfill or by other approved methods and must conform to all local, state and federal guidelines, criteria and regulations. If the City deems the site is unsightly the Contractor may be instructed to halt installation work and clean up the site.

5.5. Barricades: Contractor shall furnish, install, and maintain lighted barricades approved by the City at sites where work is being accomplished. Barricades shall meet the requirements set forth in Engineering Technical Letter (ETL) 04-2, Standard Airfield Pavement Marking Schemes, Paragraph 9.2, July 2004. Contractor shall install barricades with amber yellow or red warning lights around the boundaries of work at maximum intervals of 50 feet and shall use dual markers and lights on corners and ends. Barricades shall be anchored by sandbagging or other means to prevent overturning and/or displacement due to high winds and/or aircraft jet blast. Contractor will ensure that barricade lighting is maintained in operational conditions at all times.

5.6. Vegetation Control: Dependent on location, if the contractor's storage site requires mowing and trimming these operations will be provided at no additional cost to the government. Vegetation shall be mowed and trimmed when it reaches the height of five (5) inches. Mowing and trimming shall be to a height of three (3) inches. Mowing shall be accomplished with a rotary mower that leaves the clippings evening distributed on the soil surface. Mowing shall be accomplished during normal duty hour periods and in such a manner that the soil and grass will not be damaged. Towed mowers and self-propelled riding mowers shall not be operated within three (3) feet of trees and shrubs. Areas next to trees and shrubs shall be mowed with hand-propelled mowers.

5.7. Digging Permit/AF FORM 103: The Base CES will assist the contractor with efforts to fully complete Tab 5 - AF 103 Base CE Work Clearance Request (Digging Permit). The Base CES will locate underground utilities and issue the AF Form 103 to the contractor. It is the contractor's responsibility to have a completed and approved Form 103 prior to beginning any construction activities including clearing, grubbing, exploratory geophysical work, etc. Process these requests early to allow sufficient base coordination time for prudent planning and scheduling. The Government will require 30 days to process each Form 103.

6. Storage and Parking:

6.1. Storage Areas: The Contractor shall store all supplies and equipment on the project site as much as practicable so as to prevent theft, mechanical/climatic damage and/or to lessen material delivery delays. Laughlin AFB will determine storage area location(s). The contractor must keep all storage areas free of debris, refuse, spills, leaks, stains, splashes and excessive materials. All storage areas must be maintained

in a neat, clean and safe condition. The contractor must clean up any areas contaminated by any hazardous material or substances immediately at no additional expense to the government. Remediation may include subsequent soil analysis if directed by the government. The contractor must store all hazardous materials in a trailer or storage unit the contractor supplies, which must be leak proof or contain secondary containment devices. The storage unit must be secured when the contractor's personnel are not present.

6.2. Petroleum Storage: The contractor must store all fuel or petroleum products, whether new or used, in appropriate containers and within a concrete, or earthen bermed area with an impermeable liner (40 Mil), or other containment as approved by the pollution prevention section. All storage areas must be marked with appropriate signs (i.e., Flammable Storage - No Smoking Within 50 ft). The contractor's fuel tanks and petroleum storage containers must be structurally sound and in good condition, be kept sealed when not in use, and be grounded and bonded in accordance with NFPA guidelines. The containment area must be sized to hold fluid volume equal to 110% of the largest storage container, with a minimum of one foot of freeboard for earthen berms. The contractor must maintain the containment area to its original conditions throughout the duration of use. The contractor must immediately clean up and dispose of any evidence of a fuel or oil spill in conformance with all federal and state regulations. Contaminated soil from petroleum product storage/spills must be considered special waste as specified in 30 TAC 324, 330-335 and must be handled, stored, transported, and disposed as such in accordance with Laughlin AFB Hazardous Waste Management Plan. Costs of all soil tests because of spills are the contractor's responsibility. The contractor must drain any accumulation of rainwater from the containment area in accordance with Laughlin AFB Stormwater Pollution Prevention Plan (SWPPP).

6.3. Storm Water Discharges: The contractor must comply with the EPA's National Pollutant Discharge Elimination System (NPDES) 40 CFR 122.26, dated 8 Dec 99, Texas Pollutant Discharge Elimination System (TPDES) multisector general permit number TXR05M285, dated 29 May 02, and the TPDES general permit number TXR150000 relating to discharges from installation activities, dated 5 Mar 03, for permit requirements for storm water discharges associated with installation activities, and must comply with all provisions of Laughlin AFB SWPPP, dated October 2011.

6.3.1. Activity Disturbing equal to or greater than 1 Acre: Clean Water Act storm water regulations require permit(s). The contractor must comply with all federal, state, and local storm water permit requirements to include Notice of Intent; (NOI), Notice of Change; (NOC), Notice of Termination; (NOT), Site Notices, SWPPP, pre and post storm water run-off mitigation plans, soil erosion and control requirements, best management practices, pollution prevention measures, and storm water run-off monitoring. The storm water permit requirements are mandatory on any project equal to or greater than one acre. Copies of all storm water notices, SWPPP and monitoring data must be submitted on an Air Force Form 3000 to the Laughlin AFB Environmental Flight for review, (830) 298-5058.

6.3.2. SPCC Plans: A contractor who temporarily stores a tank >1,320 gallons (cumulative capacity of all tanks > 55 gallons in size) and the tank(s) store oil of any kind in any form on-site to fuel equipment and vehicles must comply with 40 CFR 112, requirement to have a stand alone Spill Prevention, Countermeasures and Control (SPCC) plan. The contractor must have a plan even if the tank(s) have secondary containment. This plan must be submitted to 47 CES/CEIE through the City prior to placing the tank in place on.

7. Safety:

7.1. All work shall comply with applicable state and local safety and health requirements. Where there is a conflict between applicable regulations, the most stringent shall apply. The Contractor or any of his subcontractors who are responsible for handling hazardous and toxic materials shall have the necessary certification before doing so, and shall provide evidence of certification to the City prior to installation. The contractor is also required to comply with the American General Contractors' Safety Manual and the Occupational Safety and Health Act (OSHA).

7.2. The Contractor shall assume full responsibility and liability for compliance with the applicable regulations pertaining to the health and safety of personnel during the execution of work, and shall hold the Government harmless for any action on his part or that of his employee or subcontractors, which results in illness, injury or death.

7.3. The contractor must obtain authorization to bring any nonexempt radioactive material (such as density gauges or moisture meters) onto Laughlin AFB by contacting the Nuclear Regulatory Commission, Region IV Office, using the NRC Form 241. Before bringing any radioactive material onto Laughlin AFB, the contractor must forward a copy of the NRC Form 241 to:

Bioenvironmental Engineer
590 Mitchell Blvd., Bldg 375
Laughlin AFB TX 78840
(830) 298-6859

7.4. Contractor's Use of Electromagnetic Emission Devices: Electromagnetic emission devices include: radio/RADAR transmitters, navigational aids, instrumentation's, signaling, intrusion detection and identification devices, mobile and fixed business radio communication equipment, and MARS, CBs and amateur radio stations. The Contractor shall comply with the AFMTC Regulation Sup 1 to Air Force Instruction 33-118. This regulation is available for inspection at the Communications Squadron, Building 348, Laughlin AFB TX (830-298-5339).

7.5. Hazardous Materials: The Contractor shall bring to the attention of the City and Laughlin AFB any material classified as hazardous which will be used during contract execution. Hazardous Material will need to be documented on LAFB Short Term Contractor HAZMAT Usage Report (Mar 2015).

7.6. Hazardous Material Spills: The Contractor is required to take all precautions in the prevention of a hazardous material spill. If such a spill does occur, the contractor will immediately provide spill containment and notify the Laughlin Fire Department by dialing x911 (on base line) or 298-5633 (off base/cellular phone line). The Contractor will be held responsible for reimbursing Laughlin AFB for all spill containment and clean up accomplished by Laughlin Air Force Base.

8. Hours of Operation:

Normal work hours are Monday through Friday from 7:30 A.M. to 4:30 P.M. except days observed as federal holidays as listed below:

New Year's Day	1 January
Martin Luther King's Birthday	Third Monday in January
President's Day	Third Monday in February
Memorial Day	Last Monday in May
Independence Day	4 July
Labor Day	First Monday in September
Columbus Day	Second Monday in October
Veterans Day	11 November
Thanksgiving Day	Fourth Thursday in November
Christmas Day	25 December

Holidays falling on Saturday are observed on the preceding Friday. Holidays falling on Sunday are observed on the succeeding Monday. The Contractor may request to work on a weekend, after hours, or on a holiday. All such requests must be submitted in writing to the City and Laughlin AFB with a description of the type of work to be accomplished on that date. Any request to work a weekend shall be submitted by close of business on the prior Wednesday. Requests to work other than weekends shall be submitted a minimum of 36 hours prior to the requested date. The City reserves the right to approve or deny the request.

9. Overall Specifications:

9.1. The prefabricated steel aircraft sun shades are to be a stand-alone column structures with open ends and sides to accommodate the footprint of seven T-6 aircraft with a minimum wingtip clearance of 10 ft between aircraft and between the aircraft wingtips and sun shade structures. The T-6 aircraft is 33.42 ft wide, 33.33 ft long and 10.67 ft high. All shade structures shall provide 5 ft clearance above the highest point of the aircraft. The front and back of the sun shade shall have a cantilever over hang to provide maximum coverage while moving the support columns inward, thus lessening the potential for obstruction with aircraft movements.

9.2. The sun shade framework, including accessories, shall be hot dipped galvanized steel and include a 20-year warranty against defects, corrosion, and deterioration. Galvanized sun shade framework shall be overcoated with a finish coat of paint (dry film thickness of finish coat of paint shall be of a thickness capable of hiding color of galvanized steel below but under no circumstances shall the dry film thickness of the finish coat be less than 1 mil).

9.3. The sun shade roof covering shall be galvanized steel and shall include a minimum 20-year warranty against any material defects, corrosion, and deterioration. The sun shade roof covering shall consist of minimum 24 gage thick roof panels (exception: 26 gage thick roof panels will also be considered an acceptable sun shade roof covering if submitted engineering design load calculations permit its use) with corrosion resistant fasteners with rubber-backed washers and shall include a guarantee against water leaks for a period of 2 years. Galvanized steel sun shade roof covering shall be overcoated with a manufacturer's 20-year warranty finish coat of paint. Sun shade roofing shall be built to shed water away from the parked aircraft and not between parked aircraft on the same row.

9.4. Both ends of each row of sun shades shall be covered with vertical shades to aid in protection from elements. Vertically, these end shades should start at the top of the structure and extend to approximately 7 feet above ground. Laterally, these end shades should extend from support pillar to support pillar. These end shades should be constructed of material resistant to the damaging effects of wind and sun.

9.5. Sun shades are to be free standing. Contractor shall be responsible for installing new concrete column footings extending through the existing airfield apron. The bolting to the concrete shall have a 5 year warranty against any material defects, corrosion, and deterioration.

9.6. All painted components of the sun shades will be painted with colors that will comply with LAFB Architectural Compatibility Guide.

9.7. The aircraft sun shades are to be designed with both obstacle and security/maintenance lighting. All the lighting should utilize an energy efficient LED light source with a ten year lifespan. The light fixture and intensity shall be provided to the government for approval during the submittal phase. Security and maintenance lighting should provide 360 degree illumination of the aircraft to eliminate the need for secondary lighting during the majority of night operations. This lighting should be permanently affixed to the structure and not be capable of swaying during high wind conditions. The obstacle lighting will comply with UFC 3-535-01 requirements as well as be capable of withstanding the same wind loads as the rest of the sun shade.

9.8. This project will require pavement striping work to include the removal of current taxi lines and installation of new taxi lines to the entire parking row after the spots have been repositioned (for parking spots inside and outside the shades). Also, the red lines which identify the propeller hazard areas will be removed and new lines installed as part of the restriping process. The new hazard areas will meet the standards in Engineering Technical Letter (ETL) 04-2 Change 1, "Standard Airfield Pavement Marking Schemes" and Tab 4 – AETC T-6 Prop Arc Memorandum. The removal of the ground markings will not be destructive to the pavement as an effort to maximize pavement lifespan. Also, the work will use retro reflective beads for all apron and taxi lane markings near aircraft sun shades. Paint removal shall follow the guidance and specifications in ETL 97-17 "Paint and Rubber Removal from Roadways and Airfield Pavements" and UFGS Division 32 Section 32-01-11.51 "Rubber and Paint Removal from Airfield Pavements". Any restriping requires simultaneous installation of aircraft tie-down and grounding points.

9.9. The work will include the installation of new aircraft tie-down points (4 per aircraft parking spot). Aircraft grounding points will be installed when the current points are not co-located with the new parking positions. Existing tie-down and grounding points will need to be saw cut 2" below top of pavement, and remove housing and grounding rod and fill with a high strength cement or epoxy. The material the contractor shall use will require being submitted for government approval during the submittal phase.

9.10. The sun shades must meet the following minimum clearance requirements during design and installation. The lateral wing tip clearance will meet the following: clearance of 10 feet between aircraft or aircraft to structure in the parking positions, 20 feet within the T-6 parking apron (in between the parking rows) and 30 feet when operating on the main taxiway. The vertical tail to structure clearance requirement is 5 feet. The sunshades must also be a minimum of 200 feet from taxiway G centerline.

9.11. Sun shade design and installation shall mitigate bird roosting or nesting within the sun shade structure.

9.12. The aircraft sun shade contract includes the installation of the infrastructure for permanent electrical ground power units (GPUs) capable of providing adequate support for reoccurring T-6 operations. The minimum requirements will be 28 to 28.5 VDC, 1000 amps for 5 seconds, 500 amps for 2 minutes, and 300 amps of continuous operation. The electrical grid design will eliminate the ability of a single GPU failure to impact the functionality of the remaining GPUs. However, the installation of the GPU's will not be included in this contract, only the infrastructure to the GPU locations.

9.13. The sunshade and GPUs' electrical power shall be brought to the equipment from the primary distribution system. The primary electrical distribution systems on Laughlin AFB is privatized and owned by Rio Grande Electric Company (RGEC). If any work is required on RGEC infrastructure, the contractor will need to coordinate with and sub-contract with RGEC in order to perform this necessary electrical support required. There is an allowance for the fee to RGEC.

9.14. Any pavement trenching performed shall be replaced with pavement providing equivalent structural functionality as the adjacent, existing pavement.

9.15. On-site Field Oversight: The contractor shall provide the manpower, equipment, material, services, and transportation necessary to ensure oversight services throughout accomplishment of this contract. A superintendent and Quality Control (QC) manager approved by the City must be on site whenever work is being performed. The superintendent and the QC manger shall not be the same person. It is the responsibility of the contractor to establish and maintain open communications between salient authorities associated with accomplishment of this contract. Also, the on-site supervisor(s) will submit for review their credentials and verifiable experience with LAFB Civil Engineer Squadron.

10. Ground Collision Mitigation: Protection devices for highlighting or illuminating column posts will be utilized. Sun shade columns will either be wrapped with 2 to 3 inch wide tape meeting Federal Specification L-S-300C or a self-adhesive, self illuminating tape which stores energy, or "recharges" with exposed UV-illuminated visible light. When there is no light source, the photoluminiscent material "gives off" the stored energy for an extended period of time – up to 36 hours.

11. Engineering Design Specification:

11.1. The dead load shall consist of the weight of the structural frame and all other materials of the aircraft sun shade system.

11.2. Roof areas shall be designed for a minimum live load in accordance with the American Society of Civil Engineers (ASCE) 7, but under no circumstances less than 20 pounds per square foot in addition to calculated dead loads. Roof areas shall also be designed with both positive and negative wind loads in accordance with ASCE.

11.3. The contractor will be responsible for researching all historical weather conditions within the local area and designing the sun shade to withstand these conditions.

11.3.1. Wind pressures shall be computed and applied in accordance with ASCE 7 using a basic wind speed of 110 miles per hour (fastest mile).

11.3.2. Seismic loads shall be based on ACSE 7.

11.4. A licensed Professional Engineer (PE) in structural engineering shall sign and seal their work and provide a copy of engineering calculations and with two reproducible, 36 inches by 24 inches, copies of design drawings. The registered structural engineer shall design the aircraft sun shade foundation. The registered structural engineer will provide credentials to LAFB Civil Engineer Squadron for review.

12. Grounding and Bonding The ground rods shall be constructed of copper clad steel and must be a minimum of 10 feet long, and not less than 0.75 inches in diameter. Ground rods shall be driven within 3 inches of the column base on the north or south side and the top of the ground rod shall be 3 inches above concrete apron.

If drilled concrete piers 5 feet deep or greater are used for structure foundation a 1/0 bare copper conductor shall be bonded to a main reinforcing bar and one of the anchor bolts and brought out for connection to each steel column. A ground rod shall be used in addition to this at any lightning protection down conductors.

13. Phasing Requirements: The overall phasing of this contract will include the contractor having three adjacent rows at any given time to provide for preparation and fall protection. As the center row of the three is complete the rows will shift one row to provide a new center row for building the sun shades. At any given time, the contractor can complete work on any of the three rows as long as it will not impede or threaten aircraft taxiing or parked on the T-6 apron. The contractor will have to coordinate with the City or their representative if any additional areas need cordoned off for safety. Upon successful installation and acceptance of the first row of sun shades, the project will proceed to the second row, and then proceed to the third row, and then in sequence to the fourth row. The government reserves the right to direct phasing as required to accomplish the mission.

14. Performance Period: This project will require two Notices to Proceed (NTP). The first NTP shall be the submittal and mobilization phase. The second NTP shall be for the installation of the sun shades per the accepted submittals. All construction materials shall be approved prior to the issuance of NTP 2. If all submittals are not approved within the specified time frame, liquidated damages may be assessed.

14.1. NTP 1- the submittal and mobilization phase shall have a period of performance of up to 60 calendar days. The contractor shall provide submittals on materials, Material Safety Data Sheet, FAA and free zone waivers, dig permits, the schedule, and plans for City and Government Review, as applicable. All construction materials and submittals shall be approved prior to issuance of NTP #2.

14.2. NTP 2- the installation shall have a performance period per contractor's proposal, but the substantial completion shall be no later than August 31, 2017. The area of each construction phase shall consist of three parking apron rows. All work shall be completed in a given row, all installation of the system, and all necessary testing of materials and construction shall be performed before acceptance of that given row. No work shall commence on any other rows of construction before the previous row of construction has been accepted.

15. Submittals:

15.1. The contractor shall provide pre-construction, construction material, and close-out documents through a Submittal Process. The submittals shall be submitted to the City for approval on an AF Form 3000.

15.2. Prior to purchasing any materials, the contractor shall provide material data sheets, for all material, to the City for approval. Materials that do not comply with criteria listed may be considered unacceptable. Unacceptable materials shall not be used. All deviations from this must be specifically requested in writing by the contractor and receive formal approval from the City.

16. Progress Documentation:

16.1. Partnering Meetings:

Partnering is a structured process, as well as philosophy of doing business with contractors and customers, that recognizes common goals through communication and teamwork. It helps create an environment where trust and teamwork prevents disputes, fosters good working relationships to everyone's benefit, and facilitates the completion of a successful contract. In support of the command's goals of teamwork and customer satisfaction, our policy is to practice the philosophy of Partnering on every contract we administer.

A bi-weekly partnering meeting will be held to provide an update on construction Progress and a two-week look ahead. The meeting will also be an opportunity to discuss milestones, percent completion, RFI's, Differing Site Conditions, Schedules, Safety, Submittals, Issues, and Payroll. These meetings will include all relevant base POCs and Contracting/City Personnel on an as needed basis. These meetings will cover the progress made in the past period and will include any pertinent issues which could affect future contract progress. Key personnel must attend and are defined as the Project Manager, Assistant Project Manager, Superintendent, Quality Control (QC) representative, major subcontractors, and specialized supplementary personnel.

16.2. Progress Schedule:

The contractor shall submit a signed AF 3064 (or approved equivalent), Contract Progress Schedule, depicting an overall contract progress schedule for the main elements of work for the period of performance. The contractor shall also provide a line graph depicting actual construction progress (solid line) versus scheduled construction progress (dotted line) throughout the period of performance. The progress schedule shall be signed by the government contract inspector recommending approval and approved by the City.

16.3. Progress Reports:

The contractor shall submit AF 3065 to track construction progress. This report shall be signed by the contractor's on-site representative in the Remarks section of the AF 3065. The work elements and percentages of the total job identified on the AF 3065 shall be identical to the work elements and percentages on the AF 3064. The progress report shall be signed by the government construction inspector recommending approval and approved by the City.

16.4. Pre-Construction Kick-Off Meeting:

Laughlin AFB will host a pre-construction (i.e., Kick-Off) meeting to advise and coordinate on local procedures, safety and security requirements, and project coordination activities. Laughlin AFB will arrange for a suitable Kick-Off meeting location. After NTP, Laughlin AFB will ensure the appropriate base agencies attend the Kick-Off meeting to provide necessary information or briefings to facilitate the success of the contract effort.

During the meeting, the contractor shall present a complete overview of the project and review the schedule, review anti-terrorism requirements and considerations, highlighting any issues (review periods, material submittals, etc) which are key to maintaining the schedule. The contractor shall take meeting minutes to include the recording of the attendance list.

17. Additional References:

LAUGHLIN AFBI 32-2001 Fire Emergency Services Program
ETL 04-2: Standard Airfield Pavement Marking Schemes
ETL 97-17: Paint and Rubber Removal from Roadways and Airfield Pavements
UFGS Division 32 Section 32-01-11.51
UFC 3-260-01
UFC 3-260-04
UFC 3-535-01

LAUGHLIN AIR FORCE BASE
DIVISION 01 SPECIFICATIONS
FOR CONSTRUCTION PROJECTS
LAUGHLIN AIR FORCE BASE

PROJECT: T-6 PREFABRICATED AIRCRAFT SUN SHADES AT LAUGHLIN AIR FORCE BASE

DATE: 11-18-16

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Section 01-1 SUMMARY OF WORK

1-1 PROJECT DESCRIPTION

Provide all documents, labor, materials, equipment, and oversight to construct Laughlin AFB (LAFB), Texas.

The scope of the procurement shall include the installation of prefabricated steel aircraft sun shades with electrical distribution and lighting of the T-6 aircraft parking ramp located at Laughlin AFB, Del Rio, TX. This calls for the installation of up to 7 rows of prefabricated steel sun shades. Each sun shade must accommodate 7 aircraft per row to cover up to 49 T-6 aircraft parking spaces.

The prefabricated steel aircraft sun shades are to be a stand-alone column structures with open ends and sides to accommodate the footprint of seven T-6 aircraft with a minimum wingtip clearance of 10 ft between aircraft and between the aircraft wingtips and sun shade structures.

The sun shade framework, including accessories, shall be hot dipped galvanized steel and include a 20-year warranty against defects, corrosion, and deterioration.
The sun shade roof covering shall be galvanized steel and shall include a minimum 20-year warranty against any material defects, corrosion, and deterioration.

Both ends of each row of sun shades shall be covered with vertical shades to aid in protection from elements.

Sun shades are to be free standing and shall have sun shade columns positioned atop existing pavement joints or other cases where bolting of concrete column footings extending through the existing airfield apron.

The aircraft sun shades are to be designed with both obstacle and security/maintenance lighting.

This project will require pavement striping work to include the removal of current taxi lines and installation of new taxi lines to the entire parking row after the spots have been repositioned (for parking spots inside and outside the shades). Also, the work will use retro reflective beads for all apron and taxi lane markings near aircraft sun shades.

The work will include the installation of new aircraft tie-down points (4 per aircraft parking spot).

Sun shade design and installation shall mitigate bird roosting or nesting within the sun shade structure.

The aircraft sun shade contract includes designing the installation of the infrastructure for permanent electrical ground power units (GPUs) capable of providing adequate support for reoccurring T-6 operations.

The sunshade and GPUs' electrical power shall be designed to be brought to the equipment from the primary distribution system. The primary electrical distribution systems on Laughlin AFB is privatized and owned by Rio Grande Electric Company (RGEC).

Any pavement trenching performed shall be replaced with pavement providing equivalent structural functionality as the adjacent, existing pavement.

Timeline:

- Owner conducts Mandatory Pre-Submittal Conference November 29, 2016 at 10:00am
- Owner receives Request For Best Value Bid December 12, 2016 until 3:00pm
- Owner receives Qualifications/HUB Subcontracting Plan December 12, 2016 at 3:00pm
- Owner Awards Contract December 20, 2016
- Owner Executes Contract December 27, 2016
- Owner Issues Notice to Proceed for Construction December 30, 2016
- General Contractor achieves Substantial Completion August 1, 2017
- General Contractor achieves Final Completion August 31, 2017

All above times are CST unless otherwise noted.

1-2 REGULATORY REQUIREMENTS

a. The project shall conform to all applicable Federal, State and local laws, regulations and base-specific standards and applicable Unified Facilities Criteria (UFC). Where there is a conflict between the referenced standards, the most stringent shall take precedence. All work accomplished by the Contractor shall comply with these criteria unless a waiver is obtained from the Laughlin AFB when conditions warrant such consideration.

b. The Contractor shall ensure that only qualified, competent personnel carry out the tasks outlined in this SOW. Competent is defined as a registered professional or, where registration is not applicable, trained and/or certified in the respective field.

1-3 WARRANTY REQUIREMENTS

a. The General Contractor provides all warranties required in the specifications for this project.

1-4 PRE-CONSTRUCTION CONFERENCES

Prior to commencing design or construction work, the Contractor shall meet with the 47 Civil Engineer Squadron Project Management personnel (47 CES/CENMP) and other designated technical personnel at a mutually agreeable time to discuss and develop mutual understandings concerning the design and construction progress schedule and the administration of work.

1-5 WORKING HOURS

a. The Contractor's working hours shall be between 0730 and 1630, with no work expected on weekends and Federal holidays. Permission to work at times other than those stated above must be obtained from the 47 CES/CENMP at least three working days in advance. As permission may not always be granted, the Contractor's schedule should never rely on accomplishing work at times other than those stated above.

b. No work will be allowed during quiet times for special events. Graduation ceremonies typically occur once every three weeks and require quiet times from 1600 to 2000 on Thursday and Friday evenings as well as 0900 to 1000 on Friday morning. Times may vary. Unplanned events may occur during the life of the project. Coordinate with 47 CES/CENMP for specific dates and times as the project progresses.

c. For those activities when work is prohibited, the Contractor shall have all equipment and materials removed and/or shall organize materials and equipment on the site as directed by the 47 CES/CENMP. The Contractor shall have the areas cleaned.

1-6 INSPECTION OF WORK

a. 47 CES/CENMP is designated as the office responsible for inspecting the work, while the Owners Representative is responsible for final acceptance of the work.

b. The 47 CES/CENMP shall be given the opportunity, during regular business hours, to inspect any construction aspect that will be buried or hidden (e.g., electrical conduit). The Contractor shall contact the 47 CES/CENMP at least 1 day in advance of enclosing, encasing, burying, etc., to arrange for inspection. If the Contractor is unable to contact the 47 CES/CENMP they should contact the Owners Representative for assistance.

1-7 SUPERVISION OF WORK

a. The site superintendent or approved alternate and Quality Control Manager (QC) or approved alternate shall be on the job site any time work is being accomplished. THE QC AND SUPERINTENDENT MUST BOTH BE ONSITE DURING WORK.

b. The qualifications of the superintendent, QC, and alternates shall be approved by the 47 CES/CENMP and Owners Representative prior to assuming their responsibilities and shall include a minimum of five years' experience on similar projects. Qualifications shall be submitted to the 47 CES/CENMP and Owners Representative in resume format prior to the start of construction.

c. The on-site superintendent shall be reachable by telephone at all times when work is being accomplished. The Contractor's superintendent or contract manager shall be reachable by telephone 24 hours a day, seven days a week, for the duration of the contract.

1-8 SURVEY AND VERIFICATION OF EXISTING CONDITIONS

The Contractor shall perform all surveying necessary to complete the work and shall be solely responsible for verification and validation of existing conditions, coordination of existing conditions in parallel with proposed requirements, and above- and below-grade condition assessment. Use of existing condition data provided by the Air Force or City does not relieve the Contractor of liability.

1-9 PROTECTION OF EXISTING WORK

a. At the completion of the project, existing work shall be in a condition equal to or better than the condition that existed before new work started.

b. The Contractor shall remove or alter existing work in such a manner as to prevent damage to any portions of the existing work which remain. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the 47 CES/CENMP and Owners Representative.

c. The Contractor shall investigate the adequacy of existing roads and their allowable load limit and shall repair any damage to existing roads caused by construction operations at no additional cost to the Government.

d. Vehicular traffic on concrete walkway pavement shall be restricted to equipment with pneumatic tires.

1-10 BASE ACCESS AND SECURITY

1-10.1 CRIMINAL BACKGROUND INVESTIGATION CHECK

a. All contractors/subcontractors seeking to enter Laughlin AFB (LAFB) for employment must submit to a criminal history background check prior entering LAFB. A release form and spreadsheet template will be provided and must be completely filled out. Individuals will fill out one release form per person and the Contractor shall compile all copies and provide them with a completed spreadsheet to 47 SFS/S5 through the 47 CES/CENMP. Contractor personnel convicted of the following crimes (but not limited to) will not be allowed to work on LAFB: espionage, sabotage, treason or terrorism; felony convictions; violent crimes against persons; sex crimes; drug crimes related to distribution or intent to distribute; or firearms/explosives violations. Other grounds for exclusion for working on LAFB include, but are not limited to: unable to provide proof of U.S. citizenship, outstanding warrants, individuals identified on Federal terrorist watch lists, and incarceration for 12 months or longer within the past three years. Deviations from this guideline are permitted on a case by case basis as determined by 47 SFS/CC and/or the 47 FTW/CC. Any release form/spreadsheet not correctly filled out will be considered incomplete and that contractor employee will not be granted access onto LAFB.

b. Background checks may take up to 4 weeks to process and will be considered valid for a period of 12 months for contractors without a break in service working on LAFB during that time. However, if there is a break in service (work on base) for longer than 6 months, the Contractor will have to resubmit to a criminal background check.

c. All contractor/subcontractor personnel obtaining a satisfactory criminal history background check must obtain a long (24 hrs-2 yrs) or short term (less than 24 hrs) AF Form 75 or contractor badge to enter the installation. The Contractor must provide a valid US Government issued identification. Identification must have person's picture at time of obtaining AF Form 75 and/or contractor badge. If the contractor/subcontractor is requesting a vehicle pass he/she must provide a valid drivers license, vehicle registration and insurance meeting the minimum Texas liability coverage. Contractor/subcontractor will report all lost, stolen or missing AF Form 75s and/or contractor badges to 47 SFS immediately upon discovery. All AF Form 75 and/or contractor badges will be turned in at the completion of stated contract, termination of employee, debarment from base, released from contract, and/or Government terminates contract. Failure to follow stated procedures may prevent contractor/subcontractor from further qualifying for base access.

d. Short-notice passes may be considered on a case-by-case basis and are subject to approval by the 47 CES/CENMP and Owners Representative with coordination of 47 SFS/S5 and 47 FTW/ATO personnel. Contractors are expected to do advance planning to the maximum extent practicable to minimize short notice pass requests.

1-10.2 BASE POLICIES

a. All persons entering the base must present valid identification at base entrances.

b. While operating any vehicle on base, all drivers must have in their possession a valid driver's license, valid vehicle registration, and proof of vehicle insurance. If a vehicle is registered to someone other than the operator, the operator must provide a notarized letter from the registered owner, authorizing the operator permission to operate the vehicle.

c. Access to the base may sometimes be delayed by 60 minutes or more due to security precautions, including the checking of vehicle occupants' IDs, vehicle manifests, and the searching of all vehicles. Longer wait times may occur in the event of an emergency.

d. Contractors, subcontractors, and all personnel who report for work and do not know the location of the jobsite will be held at the main gate to await escort service from the construction superintendent or other designated representative.

e. Base speed limits are strictly enforced with the use of radar equipment. The base speed limit is 5 mph in service drives and parking lots, 15 mph in housing areas, 20 mph on Barnes Street, and 30 mph everywhere else, unless otherwise posted.

f. Motorcycle operators/riders must wear protective headgear (helmets), gloves, goggles, close toed shoes, long pants, and a reflective belt or vest at all times while riding on base.

g. Mandatory seatbelt laws are in effect on base and personnel are not permitted to ride in the beds of trucks. Seatbelts must be fastened prior to entering the base.

h. No privately owned weapons or contraband (drugs, etc.) are permitted on any military installation, at any time. Violators will be prosecuted through the Federal Magistrates Court. Cameras are to be used for construction documentation only. Any photographs that need to be taken relative to the construction site must be coordinated with the 47 CES/CENMP and Owners Representative.

i. Laughlin Air Force Base is considered to be a closed facility. No unauthorized tours or visitors will be allowed on the installation.

j. Cell phone usage while driving on base is not permitted, unless communication to device is “hands free”.

k. Contractors and personnel shall obey all posted directives and adhere to Security Forces direction and instructions.

l. Failure to comply with base policies may result in loss of driving privileges or debarment.

1-11 OUTAGES AND CLOSURES

a. Any utility and communications outages necessitated by the work shall be requested in writing at least 14 calendar days prior to the proposed outage. The request shall be directed to the 47 CES/CENMP and Owners Representative and shall stipulate the specific utility system(s) to be affected and the proposed duration for the outage. Primary electrical outages including those that require power to be shut off at the transformer must be requested, in writing, 21 calendar days in advance, no exceptions.

b. If utilities are considered main utilities (water mains, overhead electrical, etc.), then 47 CES must provide this shutdown, but all other utilities should be de-energized or disconnected by the Contractor. The Contractor will provide the necessary lock-out tag devices to ensure utilities will not be energized or turned on. The Contractor shall coordinate lockout/tagout with the 47 CES/CENMP.

c. All street and parking lot closures necessitated by the work shall be requested in writing at least 14 calendar days prior to the proposed closure. The Contractor shall comply with the recommendations contained in Part 6 of the U.S. Department of Transportation, Federal Highway Administration's Manual on Uniform Traffic Control Devices and TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to ensure proper warning to motorists. Adequate traffic control devices shall be provided by the Contractor. The Contractor shall submit a complete traffic control plan for approval by the base. Work cannot begin until the traffic control plan is approved.

d. All base access gate closures necessitated by the work shall be requested in writing at least 45 calendar days prior to the proposed closure.

1-12 PRIVATIZED ELECTRICAL INFRASTRUCTURE

a. On Laughlin AFB, all primary electrical infrastructure including lines, poles, and transformers are owned by Rio Grande Electric Cooperative, Inc. (RGEC). Secondary electrical infrastructure such as electrical lines and panels inside of buildings are owned by Laughlin AFB.

b. Any work done on existing primary electrical infrastructure shall be completed by RGEC. This includes connections to the transformer on the primary side, but not connections to the transformer on the secondary side. The prime contractor shall subcontract all work on existing primary electrical infrastructure to RGEC. There is allowance for the fee to RGEC.

c. Any work done to construct new primary electrical infrastructure must conform the RGEC specifications and with the exception of making the connection to the distribution system, can be completed by the prime contractor, subcontracted to RGEC, or subcontracted to a different contractor. If RGEC does not complete the work themselves, they have the right to inspect the work completed prior to taking ownership. The prime contractor shall coordinate this inspection with RGEC and pay all inspection fees required. The contractor will be required to re-do any work that does not meet RGEC's specifications at no additional

d. cost to the Government. The prime contractor shall subcontract any work to connect to the distribution system to RGEC.

e. All underground primary electrical shall be installed underground in conduit and encased in 3000 psi red pigmented concrete. An additional conduit will be installed for backup purposes. The work shall meet the requirements of UFGS specs 33 70 02.00 10 and 33 70 02.00 20.

1-13 BID

This contract will be awarded as a lump sum.

1-14 NOTICE TO PROCEED

a. This project will require written Notices to Proceed (NTP) from the 47 CES/CENMP and Owners Representative:

(1) NTP #1 will be issued for material submittals. The Period of Performance for this work shall be 60 calendar days.
(2) NTP #2 will be issued for Construction. The Period of Performance for this work shall be per contractors proposal and will be substantially completed no later than August 1, 2017 and final completion no later than August 31, 2017.

1-15 A Schedule of Material Submittals is provided. All submittals shall be submitted according to the submittal schedule and all preconstruction submittals shall be approved within the period of performance for submittals and order and receipt of materials. If all submittals are not approved within the specified time frame, liquidated damages may be assessed.

1-16 REQUIRED USE OF HIGH EFFICIENCY EXTERIOR LIGHTING

In response to Presidential Memorandum, the Air Force has mandated, where economically viable, the use of High Efficiency Lighting (HEL) for all major renovations and new construction of parking lots, roadways, and other facilities requiring exterior lighting. HEL includes induction and light-emitting diodes (LED).

Section 01-2 Deliverables

2-1 SUBMITTALS

2-1.1 GENERAL

a. 47 CES/CENMP and Owners Representative approval is required for all submittals.

b. Submittal requirements are specified in each section of the specifications. The Contractor shall make submittals as required by the specifications and scope of work.

c. Included in this solicitation is a Schedule of Material Submittals. The register is not all inclusive and submittals on additional items may be requested by the 47 CES/CENMP and Owners Representative.

d. The Contractor shall provide submittals according to the timeline specified on the Schedule of Material Submittals.

e. The Contractor shall ensure that no work begins or material/equipment is acquired until submittals for that work or item have been approved, except to the extent that a portion of work must be accomplished as basis of a submittal.

f. The Contractor shall complete work which must be accomplished as basis of a submittal in time to allow submittals to occur as scheduled.

g. The Contractor's Quality Control (QC) Manager shall be responsible for reviewing and certifying all submittals are in compliance with contract requirements. The Contractor shall transmit submittals to the QC Manager to prevent delays in the work.

h. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements for each definable feature of work. Components of definable features interrelated as a system shall be submitted at same time. All of the various types of submittals required to evaluate a particular system, item, or material shall be submitted at the same time, including guarantees (when applicable). When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

i. The Contractor shall be prepared to discuss submittal status during Partnering Meetings.

j. Submittals not requested may not be recognized or processed.

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

2-1.2 SUBMITTAL PROCESS

a. The Contractor shall transmit the number of paper and digital copies required for each type of submittal as described in Submittal Description (SD) Format and Quantity and furnish additional copies of submittals when requested by 47 CES/CENMP and Owners Representative, to a limit of 4 copies per submittal.

b. A signed AF Form 3000 shall be included with each paper and digital copy submitted. The digital copy must include a signed Form 3000 within the same PDF Document as the submittal itself.

c. Paper and digital copies of the same submittal shall be exactly identical.

d. Unless otherwise specified, all paper copies shall be provided on 8 1/2 by 11 inch paper. The Contractor shall bind together individual pages and indicate by prominent notation the contract number, project number (MXDP------), submittal number, specification number, and paragraph number to which it pertains.

e. The Contractor shall submit paper and digital copies such that information material is clearly identifiable and legible. When required for full understanding of the submittal, color PDFs and paper copies will be required. Submittals that are not clear, identifiable, and legible will be disapproved.

f. Digital copies can be e-mailed to the 47 CES/CENMP and Owners Representative, but the submittal will not be considered received until the required paper copies are delivered to each party.

g. The Contractor shall assign each AF Form 3000 a sequential Submission Number. When required, revised submittals shall be marked with the original number and sequential alphabetic suffix (e.g., 13A).

h. The Contractor shall complete all header information, specification section number and paragraph, and a complete description of information provided on the register. Each item listed on the form will follow the numbering sequence and description provided per the material register. For example, the material register states "Concrete Mix" with a line item as #20. The Contractor will place "#20" in the item number column with "Concrete Mix" under description column of the AF Form 3000. The Contractor will determine the submission number on this form, but should follow in sequence.

i. The QC Manager shall sign the AF Form 3000 certifying the submission has been reviewed and is in accordance with contract requirements.

j. The Contractor shall identify any and all variations from contract requirements.

k. The Contractor shall bring any limitations of products or systems which may be detrimental to successful performance of the completed work to the attention of the 47 CES/CENMP and Owners Representative.

l. The 47 CES/CENMP and Owners Representative shall be allowed 7 days for review of submittals.

m. Paper copies of submittals will not be returned to the Contractor.

n. The Contractor shall correct and resubmit disapproved submittals within 7 days of the disapproval date. When revised for resubmission, changes made since previous submissions shall be identified.

o. The Contractor shall update the Schedule of Material Submittals, completing the submittal number, date submitted to contracting, date disapproved and resubmitted (if applicable), and date of final approval as actions occur.

p. The Contractor shall retain a copy of approved submittals (including Contractor's copy of approved samples) at the project site throughout the life of the project.

2-1.3 CONSTRUCTION SUBMITTALS

Construction submittals shall include 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 lists); certifications; warranties; and other such required submittals.

2-1.3.1 VARIATIONS

a. Variations from contract requirements require 47 CES/CENMP and Owners Representative and will be considered where advantageous to Government.

b. Discussion with the 47 CES/CENMP, Owners Representative and Engineer prior to submission will help ensure functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

c. For any proposed variations, the Contractor shall provide a letter on company letterhead stating the following information:

(1) How both the functional and quality requirements meet or exceed the minimum requirements of the contract and/or specific delivery order.

(2) Describe the nature and features of the variation and why the variation is desirable and beneficial to Government. Include an estimate of the cost savings, if applicable. Include the submittals required for the item. Clearly indicate the variation on submittal pages.

(3) Assurance from the Contractor and/or manufacturer, as applicable, that the variation will be compatible with other elements of the work.

(4) Any additional information requested by the 47 CES/CENMP and Owners Representative.

d. An additional 7 calendar days will be added, for a total of 14 calendar days for Government review of submittals with variations.

2-1.3.2 APPROVAL AND DISAPPROVAL

a. Approved submittals authorize the Contractor to proceed with the work covered. The Contractor shall review the submittal for, and comply with, any conditions or other information indicated on, or attached to, the approved submittal. Approval of a separate material, product, or component does not imply approval of an assembly in which item functions.

b. The 47 CES/CENMP and Owners Representative's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor is responsible for the satisfactory construction of all work. After submittals have been approved by the 47 CES/CENMP and Owners Representative, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

c. Disapproved submittals indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the clause 52.243-4 shall be given promptly to the 47 CES/CENMP and Owners Representative.

2-1.3.3 SUBMITTAL DESCRIPTION (SD) FORMAT AND QUANTITY

Submittals are identified by SD numbers and titles as follows.

2-1.3.3.1 SD-01 PRECONSTRUCTION SUBMITTALS

a. Preconstruction Submittals are those which are required prior to a Notice to Proceed for Construction. Preconstruction Submittals include all those submittals designated as Preconstruction Submittals in the specification sections and on the Schedule of Material Submittals.

b. Submit 1 paper copy and 1 digital copy (in PDF Format) of each submittal.

2-1.3.3.2 SD-02 SHOP DRAWINGS

a. SD-02 Shop Drawings include:

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

(2) Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

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

b. Submit 2 paper copies and 1 digital copy (in PDF Format) of each submittal.

c. The Contractor shall comply with the following standards for SD-02 Shop Drawings:

(1) Include on each drawing the drawing title, number, date, and revision numbers.

(2) Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Identify materials and products for work shown.

(3) Drawings shall include the nameplate data, size and capacity. Also include applicable Federal, military, industry and technical society publication references.

(4) Paper copies shall not be less than 8-1/2 by 11 inches or more than 30 by 42 inches and shall be submitted in bound sets.

2-1.3.3.3 SD-03 PRODUCT DATA

a. SD-03 Product Data includes:

(1) 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.

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

b. Submit 1 paper copy and 1 digital copy (in PDF Format) of each submittal.

c. The Contractor shall comply with the following standards for SD-03 Product Data:

(1) Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

(2) Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

(3) Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.

(4) Product data shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable Federal, military, industry and technical society publication references. Should

(5) manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for SD-07 Certificates.

(6) 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 Manufacturer's 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. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the 47 CES/CENMP and Owners Representative. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

2-1.3.3.4 SD-04 SAMPLES

a. SD-04 Samples includes:

(1) Fabricated or un-fabricated 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.

(2) 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.

(3) Field samples and mockups constructed on the project site to establish standards by which the ensuing 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.

b. The Contractor shall furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

(1) Sample of Equipment or Device: Full size.

(2) Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

(3) Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

(4) Sample of Linear Devices or Materials: 10-inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

(5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 2 by 4 inches.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: As required.

c. The Contractor shall furnish the quantity of samples as stated below:

(1) When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

(2) Submit one sample of each required item. For samples requiring a selection for various types, characteristics, etc, the Contractor shall submit two samples for three separate preferences of the Government, from which one will be chosen. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

(3) Submit one sample panel. Include components listed in technical section or as directed.

(4) Submit one sample installation, where directed.

(5) Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

d. Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use. Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

e. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

2-1.3.3.5 SD-05 DESIGN DATA

a. SD-05 Design Data includes design calculations, mix designs, analyses or other data pertaining to a part of work.

b. Submit 1 paper copy and 1 digital copy (in PDF Format) of each submittal.

2-1.3.3.6 SD-06 TEST REPORTS

a. SD-06 Test Reports includes:

(1) 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.)

(2) 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.

(3) Investigation reports

(4) Daily reports

(5) Final acceptance test and operational test procedure

b. Submit 1 paper copy and 1 digital copy (in PDF Format) of each submittal.

2-1.3.3.7 SD-08 MANUFACTURER'S INSTRUCTIONS

a. SD-08 Manufacturer's Instructions includes preprinted material describing installation of a product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

b. The Contractor shall comply with the following standards for SD-08 Manufacturer's Instructions:

(1) Submit manufacturer instructions in compliance with standards for SD-03 Product Data.

(2) Submit MSDS sheets prior to bringing hazardous materials onto base.

(3) Submit manufacturer's instruction prior to installation.

c. Submit 1 paper copy and 1 digital copy (in PDF Format) of each submittal.

2-1.3.3.8 SD-09 MANUFACTURER'S FIELD REPORTS

a. SD-09 Manufacturer's Field Reports includes documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions.

b. Submit 1 paper copy and 1 digital copy (in PDF Format) of each submittal.

c. The Contractor shall comply with the following standards for SD-09 Manufacturer's Field Reports:

(1) Submit all test results; and indicate whether the material, product, or system has passed or failed the test.

(2) Reports shall be signed by an authorized official of a testing laboratory or agency.

2-1.3.3.9 SD-10 OPERATION AND MAINTENANCE DATA

a. SD-10 Operation and Maintenance Data includes information furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel.

b. Submit 2 paper copies and 1 digital copy (in PDF Format) of each submittal.

c. The Contractor shall comply with the following standards for SD-09 Manufacturer's Field Reports:

(1) Operation and Maintenance Data shall not be submitted separately for each system or component for which it is required. Rather, all data shall be incorporated into a single bound report.

(2) The report shall be bound in a three ring binder and include a cover sheet, label for the binder spine, and a table of contents. Information for each component and/or system shall be separated by dividers that are clearly labeled.

(3) The report provided shall provide sufficient information for base maintenance personnel to safely and efficiently operate, maintain and repair all systems and components.

2-1.3.3.10 SD-11 CLOSEOUT SUBMITTALS

a. SD-11 Closeout Submittals includes:

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

(2) Special requirements necessary to properly close out a construction contract. For example, As-Built Drawings, a Construction Warranty Management Plan, and DD Form 1354, "Transfer and Acceptance of DoD Real Property".

b. Specific requirements for closeout submittals are provided in the Section 01-10 Closeout Procedures.

2-2 TRANSMITTALS

a. Transmittals are documents that shall be provided to the 47 CES/CENMP and Owners Representative and in some cases other Laughlin AFB agencies as part of this contract.

b. Transmittals do not appear on Schedule of Material Submittals and shall not be submitted with an AF Form 3000.

c. A list of required transmittals is provided at the beginning of each specification section.

d. Transmittals shall include all of the information required by this specification.

e. Payment, or a portion of the payment, including final payment, may be withheld if transmittals are not received as required or do not contain all of the required information.

Section 01-3 PROJECT SCHEDULES

3-1 DELIVERABLES

3-1.1 TRANSMITTALS

Progress Reports

Two Week "Look Ahead" Schedule

3-1.2 CONSTRUCTION SUBMITTALS

SD-01 Preconstruction Submittals:

Progress Schedule

Designation Letter of Personnel Responsible for the Schedule

3-2 QUALIFICATIONS

The Contractor shall designate personnel to be responsible for the preparation and updating of the schedules and preparation of progress reports. The authorized personnel shall be experienced in scheduling on projects similar in nature and complexity to this project. The contractor shall submit for approval a letter clearly defining who will be responsible for the schedule of this project.

3-3 PROGRESS SCHEDULE

a. In accordance with FAR 52.236-15, Schedules for Construction Contracts, the Contractor shall prepare and submit for approval a Progress Schedule using AF Form 3064, within five days after receipt of the second Notice to Proceed (NTP#2). The schedule shall show the order of the work, broken down into all major work elements, in the form of a progress chart. The schedule shall indicate the percentage for each work element of the total contract price.

b. The approved Progress Schedule shall be used to measure the progress of the work.

c. If the schedule of work changes significantly, the Contractor may be required to submit an updated progress schedule.

3-4 PROGRESS REPORTS

a. The Contractor shall complete and submit for approval an AF Form 3065, Progress Report, the first working day following each month on the Progress Schedule.

b. If, in the opinion of the 47 CES/CENMP and Owners Representative, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress including those that may be required by the 47 CES/CENMP and Owners Representative, without additional cost to the Government. In this circumstance, the 47 CES/CENMP and Owners Representative may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction

c. plant, and submit for approval any supplementary schedules the 47 CES/CENMP and Owners Representative deems necessary to demonstrate how the rate of progress will be regained.

d. If the Contractor fails to submit the schedule or any Progress Report within the time prescribed, the Owners Representative may withhold approval of progress payments until the required documents are received and approved.

3-5 BI-WEEKLY PARTNERING MEETINGS

a. The Government and the Contractor shall meet bi-weekly for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review upcoming planned activities. The then current and approved schedule shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the 47 CES/CENMP and Owners Representative shall attend. The bi-weekly progress meeting will address the status of RFIs, RFPs, and Submittals.

b. At bi-weekly partnering meetings, the Contractor shall provide a two-week "look-ahead" schedule including the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing activities for the next two weeks. Contractor management personnel, subcontractors and suppliers shall actively participate in the development of the schedule.

Section 01-4 WORK IN CONTROLLED AREAS

4-1 DELIVERABLES

4-1.1 TRANSMITTALS

Airfield Driver Training Records

4-1.2 CONSTRUCTION SUBMITTALS

SD-01 Preconstruction Submittals:

FAA Form 7460-1

FOD Plan

4-2 GENERAL

a. This project or portions of this project are located within Controlled Areas on base. Access to Control Areas is strictly limited.

b. The Contractor shall ensure that Contractor personnel employed on the base become familiar with and obey all special regulations for working in Controlled Areas.

c. Under no circumstances shall the Contractor, any sub-contractors, or any contractor personnel enter Controlled Areas without a Government escort.

d. The Contractor shall remain strictly within the limits of work inside Controlled Areas.

e. The Contractor shall not take photographs inside of Controlled Areas without written authorization from the 47 CES/CENMP and Owners Representative. Individuals authorized to take photos should have a copy the of letter granting permission on their person at all times while taking pictures. Individuals taking photos without authorization or proof of authorization may be subject to legal action. Cameras and/or phones used to take unauthorized photos may be confiscated and any film, video, or other media destroyed by Security Forces.

4-3 SCHEDULING AND COORDINATING ESCORTS

a. The Government will provide escorts to facilitate construction in Controlled Areas. The Contractor shall be responsible for planning and coordinating with the 47 CES/CENMP and Owners Representative to ensure that escorts are provided as needed. The Contractor shall adhere to the following guidelines for scheduling and coordination of escorts:

(1) The Contractor shall request access to Controlled Areas in writing at least 5 days in advance. For long term projects, the Contractor shall include requests for escorts in their two week look-ahead schedule provided at partnering meetings.

(2) Requests must include the time the Contractor will arrive at the Controlled Area and duration of time the Contractor will work inside the Controlled Area.

(3) Escorts will meet the Contractor at the Controlled Area as scheduled. The Contractor shall arrive on time. If the Contractor is more than 15 minutes late, escorts will leave the site, and it will be the responsibility of the Contractor to reschedule access to the Controlled Area.

(4) Escorts will only be scheduled for the duration of time requested by the Contractor. Time extensions will only be granted for emergencies.

b. No time extensions, cost additions, change orders, or allowances will be granted for project schedule delays due to lack of sufficient escorts, if determined by the 47 CES/CENMP and Owners Representative that the delays are a result of lack of scheduling and coordination by the Contractor.

Section 01-5 PROJECT SAFETY REQUIREMENTS

5-1 DELIVERABLES

5-1.1 TRANSMITTALS

Digging Permit

Welding Permit

Welding Certificates

5-1.2 CONSTRUCTION SUBMITTALS

SD-01 Preconstruction Submittals:

Contractor's Safety Plan

SD-07 Certificates:

Certificate of Contractor Safety Compliance

5-2 GENERAL

a. Contractor shall take safety and health measures in performing work under this Contract and is subject to applicable Federal, state, and local laws, regulations, ordinances, codes, and orders relating to safety and health in effect on the date of this contract.

b. During the performance of work under this contract, the Contractor shall comply with procedures prescribed for control and safety of persons visiting the project site. Contractor is responsible for his personnel and for familiarizing each of his subcontractors with safety requirements. Contractor shall advise the 47 CES/CENMP and Owners Representative of any special safety restriction he has established so that Government personnel can be notified of these restrictions.

5-3 CONTRACTOR'S SAFETY PLAN

a. Contractor shall submit a safety plan to the 47 CES/CENMP and Owners Representative for approval prior to start of construction at project site.

b. Safety plan shall include, as a minimum, the following:

(1) Safety program objectives.

(2) Methods to attain safety objectives.

(3) Responsibility of key personnel for the Contractor.

(4) Procedure for safety meetings, surveys, inspections, and reports.

(5) Disaster and emergency programs.

(6) Lists of key personnel to be contacted in times of emergency.

(7) Program to show compliance with Federal OSHA Safety and Health Standards 29 CFR 1910 and 29 CFR 1926.

(8) Methods to comply with the requirement for immediate reporting of mishaps to the 47 CES/CENMP and Owners Representative.

(9) Hazardous material control procedures for minimizing the use of hazardous materials and the generation of hazardous waste and procedures for proper handling, storage, labeling, and transportation of all hazardous materials. Section 01-9 Environmental Protection addresses the use of hazardous materials.

(10) Procedures for emergency actions to be taken to secure dangerous conditions, to protect personnel, and secure work areas in the event of accident or an act of nature.

(11) Procedures for securing the mishap site so that the area remains secure until arrival of a safety investigator. Mishap site will remain secured until released by the 47 CES/CENMP and Owners Representative.

5-4 CERTIFICATE OF CONTRACTOR SAFETY COMPLIANCE

In addition to the Safety Plan, the Contractor shall submit a signed statement stating that the Contractor is committed to the Safety Plan and will not invalidate the integrity of safety systems throughout the life of this contract.

5-5 OSHA INSPECTIONS

The Contractor shall be subject to no-notice inspections under OSHA (Occupational Safety and Health Act) Program by inspectors of the Department of Labor, where the Contractor could be found personally liable for any violation of the OSHA Regulations. While on this installation the Contractor and all employees and subcontractors that work in any capacity for the Contractor shall adhere to and follow all safety and health requirements as established in the U.S. ARMY CORPS OF ENGINEERS MANUAL EA. 385-1-1 Dated OCT 1987 and/or the latest version/edition.

5-6 BASE EMERGENCY SERVICES

The base emergency phone number is 911. This number provides emergency police, fire and medical service. Ambulance service is dispatched from Val Verde Regional Medical Center at the request of the base Fire Department. When dialing "911" from a cellular phone, inform operator that individual is calling from a cellular phone and that the emergency is at Laughlin Air Force Base. For non-emergency security business, 24 hours a day, 7 days a week, call (830) 298-5100.

5-7 LOCKOUT/TAGOUT PROCEDURES

5-7.1 GENERAL SAFETY REQUIREMENTS

a. Contractor shall ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

b. The Contractor shall apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on.

c. No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section.

d. No person shall work on any equipment that requires a lockout/tagout tag unless he, his immediate supervisor, project leader, or a subordinate has in his possession the stubs of the required lockout/tagout tags.

e. Only qualified personnel shall perform work on electrical circuits.

f. A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.

g. Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

h. Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks.

i. Pressurized or vacuum systems shall be vented to relieve differential pressure completely.

j. Vent valves shall be tagged open during the course of the work.

k. Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

5-7.2 TAG PLACEMENT

a. Lockout/tagout tags shall be completed in accordance with the regulations printed on the back of the tag and attached to any device which, if operated, could cause an unsafe condition to exist.

b. If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached.

c. When it is required that certain equipment be tagged, the Government will review the characteristics of the various systems involved that affect the safety of the operations and

d. the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

5-7.3 TAG REMOVAL

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Quality Control or Safety Manager. That group or individual's lockout/tagout tags on equipment may then be removed on authorization by the Quality Control or Safety Manager.

5-8 ACCIDENT TREATMENT AND RECORDS

Contractor shall post emergency first aid and ambulance information at project site.

5-9 UNDERGROUND UTILITIES

5-9.1 SURFACE PENETRATION, DIGGING, AND EXCAVATION

a. The Contractor shall be responsible for securing digging permits for all projects prior to breaking ground. No less than 30 calendar days prior to construction, the Contractor shall submit an AF Form 103 with drawings delineating the areas affected by the construction, a brief description of the work, and the scheduled dates for excavation to CES Customer Service (830-298-5488). The approval process may take up to 30 calendar days. Once approved, the Contractor shall provide one copy of the signed permit and attached drawings to the 47 CES/CENMP and Owners Representative.

b. Once the utilities have been marked the Contractor is responsible for maintaining the marking and verifying all utilities marked by the dig permit. If the site or job conditions change, a new permit is required.

c. Contractor shall notify the 47 CES/CENMP and Owners Representative 48 hours prior to the start of excavation work or surface penetration, to enable the 47 CES/CENMP and Owners Representative to review measures being taken to prevent hazard to employees and possible damage to subsurface utilities. Where emergency conditions preclude the 48 hours advance notification, the Contractor shall immediately inform the 47 CES/CENMP and Owners Representative of his intention to initiate work prior to actual start of activity.

d. After obtaining clearance from the 47 CES/CENMP and Owners Representative, the Contractor shall proceed with excavating work or other surface penetration work. Contractor shall temporarily halt any machine excavation work or other surface penetration when within 4 feet of an existing utility line until the Contractor has exposed the utility line by hand excavation. Once the line is located, further digging is at the contractor's risk, so appropriate discretion in digging method shall be used.

e. The Contractor shall be responsible for any and all damages to accurately marked utilities resulting from its operations and subcontractors. This also applies to all lines after they are located/exposed by the contractor. Further, the Contractor shall be held liable for all costs associated with such damages. Such costs include not only the cost to properly repair the damaged utility, but any direct costs incurred by the Government to provide emergency response to the site, as well as for any other monetary losses. Such loss may also include the value of loss of productivity experienced by the Government due to loss of power and/or facility evacuation arising from the utility damage.

5-9.2 Use of Manholes

a. Safety clearance from the 47 CES/CENMP and Owners Representative is required before any Contractor personnel enter a manhole. Contractor shall contact the 47 CES/CENMP and Owners Representative for support services by calling at least 24 hours in advance.

b. Contractor shall be responsible for removing water and debris before commencement and during execution of work in manholes.

5-10 Fire Prevention and Protection

5-10.1 General Safety Requirements

a. The Contractor shall provide temporary fire protection equipment for the protection of personnel and property during construction as required.

b. The Contractor shall remove debris and flammable materials weekly to minimize potential hazards.

c. Open-flame heating devices will not be permitted except by approval in writing from the 47 CES/CENMP and Owners Representative. Approval for the use of open fires and open-flame heating devices will not relieve the Contractor from the responsibility for any damage incurred because of fires.

d. Burning trash, brush, or wood on the project site shall not be permitted.

5-10.2 Cutting and Welding

a. Welding, cutting, brazing, or open flame use anywhere on base will be coordinated with the base Fire Prevention Officer prior to performance. A burn (welding/brazing) permit shall be obtained from the Fire Prevention Office (298-5037) before any hot work operations or activity. Allow 5 calendar days to obtain the permit. Provide a copy of the welding permit to the 47 CES/CENMP and Owners Representative.

b. The Fire Prevention Office determines the permit's expiration and can revoke the permit if safety guidelines are not followed.

c. The Contractor will ensure all combustible vegetation, ignition sources, or materials are removed from hot work site. All fires or sparks must be immediately extinguished using the

d. proper fire fighting equipment (e.g., extinguisher, shovels). Contractor shall discontinue burning, welding, or cutting operations 1 hour prior to the end of the normal work day.

e. Only authorized personnel will operate welding equipment. The Contractor shall provide the 47 CES/CENMP and Owners Representative copies of welding certification for all personnel who will accomplish welding on the project.

f. Welding and open flames will not be permitted within 50 feet of flammable or explosive materials. When removal of flammable material is impractical, a suitable fire resistant shield and/or welding blanket will be placed between the flammable material and the welding operation and a fire watch will be performed during and for 1 hour after all operations are complete.

g. At the welding location the Contractor shall have spark arrestor equipment and fire extinguisher within reach.

Section 01-6 CONTRACTOR QUALITY CONTROL

6-1 DELIVERABLES

6-1.1 TRANSMITTALS

Design Quality Control Checklist

Daily QC reports

QC Managers Punch List

6-1.2 CONSTRUCTION SUBMITTALS

SD-01 Preconstruction Submittals:

Quality Control Plan

Quality Control Manager Qualifications

6-2 GENERAL

The Contractor is responsible for quality control (QC) and shall establish and maintain an effective quality control system for construction. The quality control system shall consist of plans, procedures, testing, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both on site and off site, and shall be keyed to the proposed construction sequence.

6-3 QUALITY CONTROL PLAN

6-3.1 GENERAL REQUIREMENTS

a. The Contractor shall furnish a QC plan for review by the Government. Acceptance of the Contractor's QC plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his plans and operations including removal of personnel, as necessary, to obtain the quality specified.

b. The Contractor's QC plan will not be approved until the Government has approved the qualifications of the QC Manager.

c. After acceptance of the QC Plan, the Contractor shall notify the 47 CES/CENMP and Owners Representative in writing of any proposed change including changes in personnel. Proposed changes are subject to acceptance by the 47 CES/CENMP and Owners Representative.

6-3.2 CONTENT OF QC PLAN

The QC plan shall include, at a minimum:

a. A description of the quality control program with a chart showing lines of authority and acknowledgement.

b. The duties, responsibilities, and authorities of each person assigned a QC function.

c. Procedures for reviewing and certifying submittals.

d. Procedures for tracking construction deficiencies from identification through acceptable corrective action.

6-4 PERSONNEL REQUIREMENTS AND QUALIFICATIONS

a. The requirements for the QC organization are a QC Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance.

b. The QC Manager, or alternate, shall be a separate individual from the site superintendent, be present at the site at all times while work is being done, and have complete authority and responsibility to take any action necessary to ensure contract compliance.

c. The QC Manager/alternate shall be subject to acceptance by the 47 CES/CENMP and Owners Representative and shall have a minimum of 5 years work experience on similar projects.

d. The Contractor shall submit the name and qualifications (in resume format) of the QC Manager accompanied by a copy of a letter to the QC Manager signed by an authorized official of the firm which delegates sufficient authorities to adequately perform the functions of the QC Manager, including the authority to stop work. The resume shall clearly indicate that QC Manager is qualified as required above.

6-5 DAILY REPORTS

The Contractor shall maintain current records providing factual evidence that required QC activities and/or tests have been performed. One paper and one digital copy in PDF format of these records, in report form, shall be furnished to the Government weekly. All calendar days shall be accounted for throughout the life of the contract.

6-5.1 CONTENT OF DAILY REPORTS

These records shall include the work of subcontractors and suppliers and shall include, at a minimum, the following information:

a. Work performed each day. Include description of trades working on the project, the number of personnel working, weather conditions, and any delays.

b. Tests performed including results and references to specifications.

c. List of deficiencies noted, along with corrective action.

d. Quantity of materials received with statement as to acceptability of the material.

e. Job safety evaluations and corrective actions.

f. Conflicts in plans and/or specifications.

g. A statement signed by the QC Manager that equipment and materials incorporated in the work and workmanship comply with the contract statement.

6-6 TESTS

The Contractor shall perform all required tests to verify that work and/or products conform to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for testing by the Government.

6-6.1 TESTING PROCEDURE

The Contractor shall perform the following activities:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record the results of all tests taken, both passing and failing, and submit to the 47 CES/CENMP and Owners Representative. Include the date of the test, specification paragraph reference, and location where tests were taken. Failure to submit timely test reports may result in nonpayment for related work performed and disapproval of the test facility for this contract.

6-6.2 TESTING LABORATORIES

a. The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

b. If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $500 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

6-7 NOTIFICATION OF NON-COMPLIANCE

The 47 CES/CENMP and Owners Representative will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the 47 CES/CENMP and Owners Representative may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor

Section 01-7 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS

7-1 DELIVERABLES

7-1.1 TRANSMITTALS

Temporary Utility Meter Readings

7-1.2 CONSTRUCTION SUBMITTALS

SD-01 Preconstruction Submittals

Construction Site Plan

Traffic Control Plan

Temporary Trailer Information

7-2 CONSTRUCTION SITE PLAN

The Contractor shall submit for approval a Construction Site Plan including:

a. Locations of site trailers, trash dumpsters, and temporary sanitary facilities.

b. Detailed layouts (including location and dimensions) of construction fences and material storage areas.

c. Identification of any areas which will be graveled.

d. Haul routes, including routes of ingress/egress to the lay-down yard.

e. Parking areas.

7-3 TEMPORARY TRAFFIC CONTROL

Erect and maintain temporary barricades to limit public access to hazardous areas. 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 pedestrian traffic, barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

Maintain and protect traffic on all affected roads during the construction period. 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 erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction.

7-3.1 TRAFFIC CONTROL PLAN

The Contractor shall submit for approval a Traffic Control Plan detailing how traffic will be safely routed during all phases of construction. At a minimum, the Traffic Control Plan shall include

drawings showing:

a. The construction site and all haul routes and access points.

b. All runways, taxiways, roads, driveways, sidewalks, building and hangar entrances, etc., that will be blocked during construction.

c. Alternate routes for aircraft, vehicles, and pedestrians that will be used during construction, if required.

d. Location, nomenclature, size, and type of all signs used to direct traffic.

e. Location, size, and type of all barricades that will be used to close roads, driveways, sidewalks, or building entrances.

f. For projects with Free Zone requirements, the location, size, and types of all barricades and other markings that will be used to mark haul routes and the limits of construction.

g. Location of flaggers, if applicable.

h. Location of FOD check points, if applicable.

7-4 WORKING AREA: CONDITIONS AND CLEAN UP

a. The contractor will be allowed to use a working area on LAFB. The contractor will confine generations, including material storage to the area identified by LAFB 47 CES/CENMP.

b. Only those routes designated by the 47 CES/CENMP and Owners Representative shall be utilized by the Contractor for access to work sites.

c. Parking of Contractor vehicles shall be restricted to the area determined by the 47 CES/CENMP and Owners Representative. The company name and logo shall be prominently displayed on all Contractor-owned vehicles.

d. The Contractor is responsible for maintaining the construction site in a clean and orderly condition from the start of the project to completion. DAILY CLEAN-UPS ARE REQUIRED. The Contractor shall have a dumpster on site or remove and dispose of debris daily. The Contractor shall arrange for transport of debris from the base to an approved disposal site. In addition, the Contractor shall completely enclose the lay down yard with a 6-foot-tall chain link fence with brown privacy slats and a sign shall be erected adjacent to the storage area displaying the company name and phone number. The Contractor shall maintain the grass and weeds surrounding the site, trailer, and lay-down yard, and all materials shall be neatly stacked at all times.

e. All equipment and materials are the responsibility of the Contractor. The Contractor shall ensure all equipment and materials are properly secured at the end of the work day. Any work area found by Security Forces or Civil Engineering to be unsecured will be checked for intruders and the responsible contract superintendent will be called in to secure the areas/equipment.

f. At the completion of the project, the entire working area shall be left in a condition that is as good as or better than the condition that existed before work started. All equipment, including dumpsters, portable toilets, etc., shall be removed. All excess material including dirt, rock, vegetation, broken concrete or asphalt, etc., shall be hauled off the grounds and disposed of in accordance with applicable state and local regulations. Grass areas shall be raked clean of debris. Damage to landscaping including trees, plants, and/or grass (including tire ruts) shall be repaired or replaced if damaged.

7-5 TEMPORARY SIGNAGE

Immediately upon beginning work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the 47 CES/CENMP and Owners Representative. Locate the bulletin board in a conspicuous place easily accessible to all employees, as approved by the 47 CES/CENMP and Owners Representative.

7-6 TEMPORARY UTILITIES

a. Notwithstanding the provisions of contract clause FAR 52.236-14, Availability and Use of Utility Services, all reasonable required amounts of water, electricity, etc., essential to contract performance shall be made available at no cost to the Contractor from existing systems, outlets, and supplies.

b. NOT USED

c. At the Contractor's expense and in a manner satisfactory to the 47 CES/CENMP and Owners Representative, provide and maintain necessary temporary connections and distribution lines required to measure the amount of each utility used.

d. The Contractor shall provide metering for utilities and connections to include labor and materials for hookup. The Contractor shall provide meter readings on the last day of each month to 47 CES Energy Manager. Meter readings shall be e-mailed to the Base Energy Manager and the CES Project Manager and shall include the previous reading, current reading, and meter multiplier. Copies of the e-mail of meter readings shall be provided to the 47 CES/CENMP and Owners Representative.

e. The Contractor will be required to participate in Government energy conservation programs. For the purpose of this contract, the Government will furnish utilities such as water, electricity, etc., at no cost to the Contractor.

f. If the Contractor chooses to set up a trailer, the only utility provided in the contractor storage area is electricity. Local/ long distance and Defense Switched Network (DSN) telephone service will not be provided.

g. Cell phone use is encouraged and the Contractor should be aware that all communications with DOD organizations are subject to COMSEC review. Contractor personnel will be aware the telecommunications networks are continually subject to intercept by unfriendly

h. intelligence organizations. The DOD has authorized the military departments to conduct COMSEC monitoring and recording of telephone calls originating from or terminating at DOD organizations. Therefore, civilian contractor personnel are advised that any time they place a call to or receive a call from a military organization, they are subject to COMSEC procedures.

i. Before completion of the work and final acceptance of the work by the Government, notify the 47 CES/CENMP and Owners Representative, in writing, 5 working days before temporary utility termination is desired. The Government will take a final meter reading and disconnect service. Then remove all the temporary distribution lines, meters, and associated paraphernalia.

j. Prior to final acceptance on any Contract, all temporary cords, lines, or other equipment shall be removed and the existing outlets and lines restored to the condition existing prior to the start of work.

7-7 LIGHTING FOR NIGHT WORK

a. The Contractor shall be responsible for providing all lighting fixtures and power sources.

b. Lighting for night work is subject to approval by the 47 CES/CENMP and Owners Representative. If in the opinion of the 47 CES/CENMP and Owners Representative proper light is not provided for safe and/or quality work, the Contractor shall be required to provide additional light.

7-8 SANITATION

a. The Contractor shall provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities.

b. The exterior of the unit shall match the base standard color.

c. The Contractor shall locate the facility behind the construction fence or out of the public view.

d. Units shall be ventilated to control odors and fumes and emptied and cleaned at least once a week or more often if required by the 47 CES/CENMP and Owners Representative.

e. Temporary toilets shall be removed at the completion of construction and the adjacent area restored to the condition existing prior to the start of construction. All costs incurred in connection with the temporary toilets shall be borne by the Contractor.

7-9 REQUIREMENTS FOR TEMPORARY FIELD OFFICES

a. Only Temporary Field Offices (trailers) that are in good condition and compatible with base color schemes will be approved for use on base. (Acceptable colors include: Federal Standard Color #23617 and #37769.)

b. Prior to placement of a trailer the Contractor shall submit to the 47 CES/CENMP and Owners Representative the color of the trailer and skirting, the dimensions of the trailer, and a picture of the trailer in its current condition. The trailer shall not be brought on base until the submittal is approved by the 47 CES/CENMP and Owners Representative.

c. The Contractor shall maintain the trailer and surrounding area in a neat and orderly condition and shall adhere to the following requirements:

(1) Provide metal or fiberglass skirting completely around the trailer within 30 days after placement of the trailer on the lot and after being approved by the CO.

(2) Painting must be done within 72 hours after installing the trailer skirt and be approved by the CO.

(3) Trash shall be picked up daily.

(4) Grass and weeds shall be cut weekly or as needed to a height not to exceed two inches.

(5) Provide adequate outside security lighting at the Contractor's temporary facilities.

(6) If materials or equipment are to be stored at the trailer and/or surrounding area, the area shall be enclosed by a six-foot tall chain link fence.

d. TEMPORARY FACILITIES/FIELD OFFICE

(1) Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

(2) Common-Use Field Office: of sufficient size to accommodate needs of 47/CES/CENMP, County Representative, RPR and construction personnel office activities and accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

a. A lockable office space for RPR.

b. Furniture required for Project documents including lockable file cabinets, plan tables, plan racks, bookcases, and seating,

c. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles with no fewer thank one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot square tack and marker boards.

d. Drinking water and private toilet.

e. Coffee machine and supplies.

f. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 degree F.

g. Lighting Fixtures capable of maintaining average illumination of 20 fc at desk height.

h. High Speed Internet Connection for RPR, compatible with Microsoft Windows 10.

7-10 WEATHER PROTECTION OF TEMPORARY FACILITIES AND STORED MATERIALS

a. Take necessary precautions to ensure that temporary facilities and stored materials are protected during rain or other inclement weather.

b. Close and weatherproof existing areas exposed to the weather during construction prior to leaving the site each day. The Contractor shall be required to repair at no cost to the Government any damage that is caused by inclement weather making its way through the Contractor's protective measures.

c. In the event of a severe storm warning, the Contractor shall:

(1) Secure outside equipment and materials and place materials that could be damaged in protected areas.

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

(3) Ensure that temporary erosion controls are adequate.

(4) The Contractor shall secure debris of all sizes to prevent the spread of FOD throughout the base.

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Special requirements for waste management during construction and demolition operations.
a. Protect the environment, both on-site and off-site, during construction and demolition operations.
b. Prevent environmental pollution and damage.
c. Maximize source reduction, reuse and recycling of solid waste.

B. Related Sections:
1. 01 51 00 – Construction Facilities and Temporary Controls
2. 01 74 19.10 – Construction Waste Management Plan

1.2 REFERENCE STANDARDS
A. NOT USED.

1.3 QUALITY ASSURANCE

A. Maximize use of source reduction and recycling procedures.

1.4 PRECONSTRUCTION MEETING

A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner and Engineer to discuss the proposed Waste Management Plan and to develop mutual understanding relative to details of environmental protection.

1.5 SUBMITTALS

A. Construction Waste Management Action Plan: Prior to the generation of construction or demolition waste, prepare and submit a Construction Waste Management Action Plan including, but not limited to, the following:
1. List of the recycling facilities, reuse facilities, municipal solid waste landfills and other disposal area(s) to be used. Include:
a. Name, location, and phone number.
b. Copy of permit or license for each facility.
2. Identify materials that cannot be recycled or reused. Provide explanation or justification.
3. Revise and resubmit Plan as required by Owner.

a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations and referenced standards.

B. Progress Documentation:
With each Application for Payment, submit weight tickets, receipts, and invoices specifically identifying the Project waste material, recycling location or landfill, weight of material, and date. For co-mingled hauls, provide a monthly report of diversion rates for the receiving recycling facility:

1. All weight tickets, receipts and invoices shall be legible.
2. All weight tickets, receipts and invoices for recycled waste materials shall clearly state that the materials were recycled.

PART 2 – PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

A. Develop and implement a waste management program in accordance with ASTM E1609 and as specified herein.
   a. The City of Del Rio does not accept construction waste in a comingled container.
   b. Contractor to provide separate containers for all materials to be recycled and for general construction debris.

B. Collection: Implement a recycling/reuse program that includes separate collection of waste materials of the following types as appropriate to the project waste and to the available recycling and reuse programs in the project area:
   1. Metal
   2. Cardboard and Paper
   3. Gypsum Board
   4. Wood
   5. Concrete
   6. Plastic

      a. Type 1: Polyethylene Terephthalate (PET, PETE).

      b. Type 2: High Density Polyethylene (HDPE).

      c. Type 3: Vinyl (Polyvinyl Chloride or PVC).

      d. Type 4: Low Density Polyethylene (LDPE).
      e. Type 5: Polypropylene (PP).
      f. Type 6: Polystyrene (PS).
      g. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

7. General Waste.
8. Others as appropriate.

C. Handling:
1. Clean materials that are contaminated prior to placing in collection containers. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process).
2. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
3. Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

END OF SECTION

Section 01-8 ENVIRONMENTAL PROTECTION

8-1 DELIVERABLES

8-1.1 TRANSMITTALS

Preconstruction Environmental Survey

Completed Permits and Notices of Intent

Solid Waste Disposal Report

Storm Water Best Management Practices Inspection Reports

Recycling Statistics

Hazardous Material Usage Data Sheet

Summary of Hazardous Material Usage

Hazardous Waste Disposal Manifests (If Applicable)

Spill Documentation (If Applicable)

8-1.2 CONSTRUCTION SUBMITTALS

Environmental Protection Plan

MSDS Sheets

Hazardous Waste Disposal Documentation

8-2 CONTACT INFORMATION

Laughlin Air Force Base Environmental Section (47CES/CEIE)
Daniel Gallegos
Chief, Environmental Section
47 CES/CEIE
251 Fourth Street
Laughlin, AFB, TX 78843
(830)298-5694

Laughlin Air Force Base Hazardous Material Office (47 CES/HAZMO)
Hazardous Materials Representative
(830)298-4351

Hazardous Waste Manager
(830)298-4353

Hazardous Waste Handler
(830)298-5457

8-3 ENVIRONMENTAL COMPLIANCE

a. The Contractor shall plan for and provide environmental protective measures during the life of the contract.

b. The Contractor shall comply with all applicable Federal, State, and local laws and regulations pertaining to the environment, including water, air, solid waste, hazardous waste, and noise pollution. These include, but are not limited to, the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation and Liability Act, Toxic Substances Control Act, Federal Insecticide Fungicide and Rodenticide Act, Coastal Zone Management Act, Endangered Species Act, National Historic Preservation Act, Safe Drinking Water Act, Emergency Planning and Community Right-to-Know Act, Oil Pollution Act, Archeological Resources Protection Act, Pollution Prevention Act and National Pollution Discharge Elimination System (NPDES), Executive Order11739, Executive Order 13148, 29 Code of Federal Regulations (CFR), 40 CFR, and 49 CFR. Contractor has the duty to determine for himself/herself where such laws and regulations apply. Although Contractor may request assistance from the 47 CES/CENMP and Owners Representative in delineating applicable environmental laws and regulations, the Contractor has an independent responsibility to make his/her own determination and to do so in a timely fashion.

c. The Contractor is responsible for all Federal, State and local Regulatory Notification requirements and shall in accordance with the "Permits and Responsibilities" FAR Clause obtain in Contractor's name and at no additional expense to the Government all permits, coordination, certifications and other regulatory authorization necessary to perform and complete the work required by this Contract. No permits will be obtained by the 47 CES/CENMP and Owners Representative. As part of the Environmental Protection Plan, the Contractor shall submit in draft all applications for permits, notices and manifests, and all supporting data to the 47 CES/CENMP and Owners Representative. The Contractor shall not submit these to appropriate agencies until the drafts are approved by Laughlin AFB. Upon receiving approval from the base 47 CES/CENMP and Owners Representative, the Contractor shall submit all documents with the required fees to the appropriate agencies for approval. Once approved by the appropriate state agencies or otherwise completed, the Contractor shall provide copies of all completed/approved permits, notices, and manifests to 47 CES/CEIE, 47 CES/CENMP, and Owners Representative. All permits shall be approved as required by law prior to commencement of work activities.

d. The Contractor shall be responsible for obtaining qualified personnel, at no additional cost to the Government, to perform inspections and certifications required for environmental compliance. When required, the Contractor will obtain a Professional Engineer (PE), registered in the State of Texas. Where a PE is not required, the individual must be otherwise qualified by other current State licensure, specific training and prior experience (minimum 5 years).

e. The Contractor shall be responsible for paying any fines or penalties assessed against Laughlin Air Force Base or the installation for environmental violations resulting from acts or omissions of the Contractor or its employees, subcontractors, or agents. This obligation is in addition to any fines or penalties that may be assessed against the Contractor for the same conduct.

f. The Contractor agrees to hold harmless and indemnify Laughlin Air Force Base for any and all damages of any kind resulting from environmentally harmful activities by the Contractor, Contractor's employees or agents or subcontractors. "Damages" include, but are not limited to, personal injury, property damage (including diminution of value), death, environmental restoration and response costs, natural resource damages, expert witness and attorney's fees, and reimbursement of any and all expenses incurred to obtain permits as a result of Contractor's failure to identify or obtain permits for itself or Laughlin Air Force Base.

g. Disposal of lead, asbestos, polychlorinated biphenyl (PCB), and/or ozone depleting chemicals are not anticipated on this project. Additionally, it is not anticipated that the Contractor will encounter contaminated soil and groundwater, munitions related materials, historical/archeological relics, or endangered species. If the Contractor encounters any of these materials or situations, the Contractor shall immediately notify the 47 CES/CENMP and Owners Representative. The Contractor shall await instructions from the 47 CES/CENMP and Owners Representative before proceeding with work or disposal.

8-4 PRECONSTRUCTION ENVIRONMENTAL SURVEY

Perform a Preconstruction Environmental Survey of the project site with the Project Manager, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report of the survey including photographs to the 47 CES/CENMP and Owners Representative for record.

8-5 ENVIRONMENTAL PROTECTION PLAN

a. The Contractor shall submit for approval an Environmental Protection Plan detailing how the Contractor will limit pollution and damage to the environment. On the cover sheet of the plan, indicate that the Storm Water Pollution Prevention Plan (SWPPP) is included as part of the Environmental Protection Plan.

b. At a minimum, the Environmental Protection Plan shall include:

(1) A table of contents clearly delineating each sub-plan included within the Environmental Protection Plan

(2) The name and qualifications of the person within the Contractor's organization responsible for adherence to the Environmental Protection Plan.

(3) The name and qualifications of the person within the Contractor's organization responsible for training the Contractor's personnel in environmental protection.

(4) Description of the Contractor's environmental protection training program.

(5) A description of the method and procedures the Contractor will use to ensure that all for all Federal, State and local Regulatory Notification requirements (including permits, notices, and manifests) are complete and/or obtained prior to the start of construction.

(6) A list of and draft copies of all required permits, notices, and manifests that will be required to complete this project. Include those required for the disposal of hazardous waste.

(7) The name, appropriate professional registration or license number, address, and telephone number of the professionals or other qualified persons who will be performing inspections and certifications for each environmental permit required to complete the work.

(8) A Solid Waste Management Plan including:

i. Estimates of the type and quantity of solid waste/debris that is anticipated to be generated by construction.

ii. Location and methods for storing waste prior to disposal.

iii. Size, type, and location of any roll-off containers or dumpsters.

iv. Methods the Contractor will use for ensuring no regulated waste or recyclable material is placed in roll-off containers or dumpsters.

v. Locations where various types of waste will be disposed or recycled.

vi. Letters of acceptance from the disposal facilities.

(9) A Dust Control Plan including:

i. Methods the Contractor will use for controlling dirt, debris, and dust at the construction site and lay down yard and along the haul route.

ii. Identification of subcontractor responsible for dust control (if applicable).

iii. List of equipment that will be used for dust control.

(10) A Land Resources Protection Plan including:

i. A list of landscaping features that are likely to be damaged during construction and methods for returning them to their original condition.

ii. Name and qualifications of personnel or subcontractor responsible for trimming and pruning trees (if applicable).

iii. Methods the Contractor will use for protecting trees during construction (if applicable).

(11) The contractor shall develop a Storm Water Pollution Prevention Plan (SWPPP) that meets the requirement of the EPA and the Texas Commission on Environmental Quality under General Permit TXR150000 Part III Section F, and the TCEQ Plan Worksheets for storm water discharges from construction sites. The SWPPP must be approved by Laughlin's Storm Water Program Manager (SWPM) before sending any notices to State agencies. An appropriate SWPPP template can be found at: www.epa.gov/npdes/swppguide. In addition to complying with all requirements as defined in the TCEQ General Permit, the contractor shall submit the following:

i. For projects that will create a footprint larger than 1 acre, a copy of the Notice of Intent, Notice of Change (if applicable) and Notice of Termination (except for the effective date) that the Contractor intends to submit to the State. The contractor will not be allowed to begin work until provisional coverage under the TCEQ general permit is effective. If mailed, provisional coverage must be verified with the TCEQ prior the start of work. The Contractor shall plan accordingly to ensure that the Notice of Intent does not delay the start of work, keeping in mind that the Government may take up to 14 days to review submittals and approve or reject the submitted SWPPP.

ii. A copy of the Best Management Practices (BMPs) Inspection Report Template for the project. Install, inspect and maintain best management practices (BMPs) as required by the general permit. Provide 47 CES/CEIE, 47 CES/CENMP, and Owners Representative a copy of all BMP Inspection Reports within five days of the date of inspection.

iii. A certification statement signed by the CEO, President or Owner of the Contracted Company with the following language is required at the beginning of the SWPPP: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

(12) A Recycling Plan including:

i. Plans for recycling construction debris such as concrete, asphalt, or wood.

ii. Methods the Contractor will use to assure adherence to Green Procurement Program.

(13) A Pollution Prevention Plan including:

i. Methods the Contractor will use to conserve energy.

ii. Methods the Contractor will use to prevent materials or particles from becoming airborne during transportation.

(14) A Hazardous Waste Plan including:

i. Methods the Contractor will use to minimize the use of hazardous materials and the generation of hazardous waste in association with completing this contract.

ii. Methods the Contractor will use to ensure that hazardous materials are properly stored.

iii. A list of the type and quantity of hazardous waste that is anticipated to be generated on Laughlin AFB as a result of this project.

iv. Methods the Contractor will use to ensure that all hazardous waste is properly identified, tracked, and disposed of.

8-6 SOLID WASTE MANAGEMENT

8-6.1 GENERAL

a. The Contractor shall plan for and properly dispose of all non-hazardous wastes generated on the facility as a result of this Contract.

b. The Contractor shall remove all solid waste from Government property and dispose offsite at an approved landfill. Solid waste disposal offsite must comply with most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

c. The Contractor shall pick up solid wastes and place in covered containers which are regularly emptied.

d. Prevent contamination of the site or other areas when handling and disposing of wastes.

e. No preparation or cooking of food is allowed at the project site.

8-6.2 SOLID WASTE DISPOSAL REPORT

a. Within 14 days of the end of the project, provide a Solid Waste Disposal Report to 47 CES/CEIE, 47 CES/CENMP, and Owners Representative. The report shall include, at a minimum:

(1) The classification, amount, disposal location, and name of the business receiving each type of solid waste generated as part of this contract.

(2) The waste handling facilities' telephone numbers, business addresses, tax identification numbers, and business, EPA, or State registration numbers.

(3) Waste handling facilities' weight tickets and receipts or a statement from the Contractor which contains all the information listed above and is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm.

(4) The type of material and quantity (pounds) of all recycled material associated with this contract.

b. Solid wastes retained by the Contractor for his own use shall be included in the Solid Waste Disposal Report. In these cases, the Contractor firm shall be designated as the "waste handling facility."

c. Prices paid or received will not be reported to the 47 CES/CENMP and Owners Representative unless required by other provisions or specifications of this Contract or public law.

8-7 DUST CONTROL

a. The Contractor shall keep dust down at the construction site and lay-down yard and along the haul route at all times, including nonworking periods.

b. Acceptable methods for dust control include water sprinklers, vacuuming, and wet mopping. Dry power brooming will not be permitted.

c. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

8-8 PROTECTION OF LAND RESOURCES

a. It is intended that the land resources affected by work performed under this contract be preserved in their present condition or be restored to an equal or better condition after construction is complete.

b. The Contractor shall limit construction activities to areas defined by the drawings, specifications, or the 47 CES/CENMP and Owners Representative. Except in areas identified to be cleared, the Contractor shall not deface, remove, cut, injure or destroy trees or shrubs without specific written authority.

c. All landscape features scarred or damaged by the Contractor's equipment or operations shall be restored to the original or superior condition at the Contractor's expense.

d. All trimming or pruning shall be performed in an approved manner by experienced landscape personnel. Tree trimming with axes shall not be permitted.

e. Trees designated to be saved shall be protected from excavation and backfilling within the root zone.

f. No ropes, cables, or guys shall be fastened or attached to any existing trees for anchorage.

g. All scars made on trees not designated on the plans to be removed by equipment construction operations, or by the removal of limbs larger than one inch in diameter shall be coated immediately with an approved tree wound dressing.

h. Trees that are to remain, either within or outside established clearing limits, that are subsequently removed or damaged by the Contractor and are beyond saving in the opinion of the 47 CES/CENMP and Owners Representative, shall be immediately removed and replaced with a nursery-grown tree of the same species unless identified otherwise by the 47 CES/CENMP and Owners Representative.

8-9 PROTECTION OF WATER RESOURCES

a. The Contractor shall not pollute storm drainage, streams, lakes, or reservoirs with fuels, oils, bituminous materials, calcium chloride, acids, construction wastes, or other harmful materials or pollutants.

b. The Contractor shall use industry-recognized best management practices to ensure that surface drainage from the construction site which contains harmful amounts of sediment shall not be allowed to drain onto adjacent areas or into adjacent bodies of water.

c. The Contractor shall take special measures to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides, cement, and surface drainage from entering public waters. In the event of a spill, the Base Fire Department, CES Environmental Section, 47 CES/CENMP, and the Owners Representative shall be notified immediately.

d. Water used in aggregate processing, concrete curing, foundation, and concrete lift clean-up and other waste water shall not be allowed to enter the storm drainage system.

e. The Contractor must receive written approval from the 47 CES/CENMP and Owners Representative prior to putting additional waste into the waste water ponds. Approval will not be given until 47 CES/CEIE has confirmed the waste water safe to enter the waste water ponds. The Contractor may be required to submit laboratory test results of the waste.

8-10 RECYCLING

a. Materials used in this contract shall be, to the greatest extent practicable and consistent with financial prudence, made of recycled materials or of materials that are recyclable.

b. The Contractor shall take advantage of opportunities to recycle construction debris such as concrete or asphalt or wood.

c. On the last day of each month, the Contractor shall provide 47 CES/CEIE with a list of materials that were recycled that month. The list shall include the type of material and

d. quantity (in pounds) recycled. A copy of the list should be provided to the 47 CES/CENMP and Owners Representative.

8-10.1 GREEN PROCUREMENT

a. In order to comply with the affirmative procurement requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA) and Executive Orders 13101 and 13148 (Green Procurement Program (GPP)), the Contractor shall use recycled and recovered materials and products identified in the USEPA's Comprehensive Procurement Guidelines (CPG).

b. The latest CPG product list, and the specific recycled-content requirements for each product, can be found on the USEPA's website (www.epa.gov/cpg).

c. The Contractor shall provide EPA-designated products containing recovered material unless the item cannot be acquired:

   (1) Competitively within a reasonable time frame.

   (2) Meeting the appropriate performance standards.

   (3) At a reasonable price.

d. Items identified in the USEPA's CPG shall be viewed as the minimum that can be considered when evaluating recycled/reused materials. Other materials and products not listed, but commonly used in industry outside of the Government, shall also be considered.

e. Material and product submittals for all recycled-content items shall list the recycled and recovered materials used and the percentage content listed.

8-11 POLLUTION PREVENTION

The Contractor shall perform all work IAW State and Federal Environmental Regulations in a manner minimizing pollution of air, water, and land, as required. In addition, the following requirements shall be mandatory:

a. Inform the 47 CES/CENMP and Owners Representative of any processes that would cause air pollution and obtain/coordinate all required permits and prior notification to the State.

b. Participate in energy conservation.

c. Prevent materials or particles from becoming airborne during transportation on and offsite. Earth materials shall be wetted or otherwise protected. Gravel, sand, and concrete shall be contained within vehicles to prevent spillage.

d. Refrain from burning of any material.

e. Prevent fuels, oils, bituminous materials, acids, excess sediment and other harmful materials from entering stream beds, lakes, drainage ways, sanitary and storm sewers, etc.

f. Dispose of excess mortar, plaster or drywall materials off of Laughlin Air Force Base grounds.

g. Dispose of water utilized for plastering or drywall equipment according to the instructions of the 47 CES/CENMP and Owners Representative. In no instance shall such water be disposed of in areas which are planted or scheduled to be planted.

h. Flush concrete trucks off of Laughlin Air Force Base grounds.

i. Plan in advance to find materials that will minimize the creation of waste, especially hazardous waste.

8-12 HAZARDOUS MATERIALS

8-12.1 GENERAL

a. Hazardous materials include all materials that are classified as hazardous by Federal or State environmental regulations and any material that could create potentially hazardous conditions. They include, but are not limited to, lead, asbestos, polychlorinated biphenyl (PCB), ozone depleting chemicals, oil and latex based painting and caulking products, solvents, adhesives, aerosol, petroleum products, pesticides, herbicides, rodenticides, and their containers.

b. The Contractor shall minimize the use of hazardous materials and the generation of hazardous waste in association with completing this contract.

c. **THE USE OF HAZARDOUS MATERIALS MUST BE APPROVED BY LAUGHLIN AFB BEFORE ANY MATERIAL IS AUTHORIZED TO COME ON BASE.** Products containing lead, asbestos, polychlorinated biphenyl (PCB), and/or ozone depleting chemicals are strictly prohibited from use.

d. The proper storage, labeling, handling, use, and disposal of hazardous materials in accordance with all Federal, State, and Air Force regulations is the responsibility of the Contractor. At a minimum:

(1) All hazardous materials must be properly labeled and stored with secondary containment.

(2) Hazardous material must always be secured and closed unless opening the container to add or remove waste.

(3) A Material Safety Data Sheet for each hazardous material brought on base shall be readily available and easily accessed at the construction site at all times.

e. All hazardous materials that are not used on the project but is still in usable condition must be removed from the base by the Contractor upon completion of the project.

f. At project completion, the Contractor shall ensure no hazardous wastes are left behind, including all materials that are residue from Contractor-furnished supplies and materials. The Contractor shall manifest, pack, ship, and dispose of hazardous waste in accordance with the generating facilities status under the Recourse Conservation and Recovery Act. The Contractor is responsible for all sampling and all payment of fees.

8-12.2 REQUIRED DOCUMENTATION FOR USE OF HAZARDOUS MATERIALS AND DISPOSAL OF HAZARDOUS WASTE

The Contractor shall provide the 47 CES/CENMP and Owners Representative with the following information and documents for use of hazardous materials and disposal of hazardous waste:

a. Include in the Environmental Protection Plan EPA and State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

b. Material Safety Data Sheets (MSDSs) accompanied with an estimated quantity of use for each hazardous material that will be brought on base shall submitted to the 47 CES/CENMP and Owners Representative in a single submittal with a signed AF From 3000. These will be routed for Government approval. The Contractor shall not bring any hazardous materials on base without a signed and approved AF Form 3000 for the MSDS submittal of those materials. The Contractor shall pay close attention to any comments on the AF Form 3000 and shall not bring any material on base that the comments indicate is not permitted. If the submittal is disapproved, the Contractor shall not bring any hazardous materials on base until a revised submittal has been approved.

c. The Contractor shall fill out a Hazardous Material Usage Data Sheet and transmit it to the 47 CES/HAZMO and provide a copy to the 47 CES/CENMP and Owners Representative once every month. (For contracts lasting less than 60 days, the Contractor Hazardous Material Usage Data sheet only has to be submitted once, after construction is complete.)

d. At the end of the project, provide 47 CES/HAZMO and the 47 CES/CENMP and Owners Representative with a Summary of Hazardous Material Usage. For each hazardous material used, provide the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. Include a signed statement from the Contractor certifying that all hazardous materials have been removed from Laughlin AFB.

e. Prior to taking any hazardous waste off base, the Contractor shall submit Hazardous Waste Disposal Documentation to the 47 CES/CENMP and Owners Representative for approval. Hazardous Waste Disposal Documentation shall ensure that waste material can be tracked from generation through ultimate disposal as required by the Environmental Protection Agency under the Resource Conservation and Recovery Act. Waste Disposal Documentation shall be provided for all oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and their containers and all abrasive/sand blasting debris. At minimum, the Contractor shall provide:

(1) Waste Determination forms for all Contractor-derived wastes generated. The use of Material Safety Data Sheets (MSDSs) by themselves is not adequate for waste determination. Base the waste determination upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA-approved analytical data, or laboratory analysis. All unknown waste shall be chemically identified. Waste stream determinations are required at the point of generation and must sufficiently document whether the waste will be a solid waste, hazardous waste, or Resource Conservation and Recovery Act (RCRA) exempt waste. Attach all supporting documentation (including laboratory test results) along with a written rational for classification to each Waste Determination form. The Contractor will bear the cost of all required testing. The 47 CES/CENMP and Owners Representative reserves the right to request waste stream determinations on questionable waste streams.

(2) Manifests for the disposal of any hazardous or toxic wastes. These manifests will be reviewed and, if approved, signed by a representative of 47 CES/CEIE.

(3) A letter from the Contractor certifying that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 26.

(4) A hazardous waste summary sheet, documenting the waste type, quantity, location, and personnel/contractor/agency responsible for proper disposal.

f. The Contractor shall send the original 'white' copy of all manifests signed by 47CES/CEIE for hazardous waste disposal to 47 CES/CEIE within 30 days of the date that it was signed by 47CES/CEIE. A copy of the 'white' copy should be sent to the 47 CES/CENMP and Owners Representative.

8-13 SPILLS

a. The Contractor shall exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, and hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law.

b. The Contractor shall contain and clean up these spills at no additional cost to the Government.

c. The Contractor shall maintain spill cleanup equipment and materials at the work site.

d. In the event of any releases of hazardous substances the Contractor shall immediately (within 5 minutes) notify the Base Fire Department, 47 CES/CENMP, and Owners Representative.

e. The Contractor shall take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of any spill/release.

f. Spill response will be in accordance with 40 CFR 300 and applicable State and local regulations.

g. If the Contractor has not begun spill cleanup procedure within one hour of spill or the Government determines that the Contractor's spill cleanup is not adequately abating a life threatening situation or threat to environmentally sensitive areas, the Government may respond. If this should occur, the Contractor will be required to reimburse the Government for spill response assistance and analysis.

h. The Contractor is responsible for verbal and written notifications as required by the Federal 40 CFR 355, State, and local regulations. Provide copies of the written notification and documentation that all notifications were made as required to 47 CES/CEIE, 47 CES/CENMP and the Owners Representative.

8-13.1 PETROLEUM PRODUCTS

a. Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation.

b. Manage all used oil generated onsite in accordance with 40 CFR 279.

c. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense.

d. Used oil mixed with a hazardous waste will also be considered a hazardous waste.

e. Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters.

8-14 STORAGE OF PETROLEUM PRODUCTS ON BASE

The Contractor shall adhere to the following requirements for storage of petroleum products, including fuel tanks, on Laughlin Air Force Base:

a. Contractor shall not store more than a 30-day supply of petroleum products and lubricants on Laughlin AFB grounds. Fuel tanks shall not exceed 500 gallons.

b. Storage and refilling practices shall comply with 40 CFR Part 112.

c. Secondary containment shall be provided and be no less than 110 percent of the tank volume plus five inches of freeboard. If a secondary berm is used for containment then the berm shall be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

d. All storage containers shall be covered during inclement weather.

e. “No Smoking" signs will be posted on all sides of the fuel tanks. Dry chemical fire extinguishers shall be readily available in the direct vicinity of storage tanks.

8-14.1 OZONE-DEPLETING SUBSTANCES

a. "Class I Substance", as used in this clause, means any substance designated as Class I by the EPA (40 CFR Part 82), including, but not limited to, chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform. "Class II Substance", as used in this clause, means any substance designated as Class II by EPA (40 CFR Part 82), including, but not limited to, hydrochlorofluorocarbons.

b. The Contractor shall not bring any Class 1 ozone-depleting substances onto Laughlin Air Force Base grounds.

c. As required by 42 USC 767j(b), (c), and (d) and 40 CFR, Part 82, Subpart E, the Contractor shall label products which contain Class II ozone-depleting substances or are manufactured with a process that uses Class II ozone-depleting substances, and their containers, as follows:

> "WARNING: Contains (or manufactured with, if applicable) _____*_____, (a) substance(s) which harm(s) public health and the environment by destroying ozone in the upper atmosphere."
> *The Contractor shall insert the name of the substance(s).

8-14.2 PESTICIDES

The Contractor shall not use or apply pesticides (such as herbicides or weed-killers, insecticides, or rodenticides) without the specific written approval from the 47 CES/CENMP and Owners Representative.

8-15 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted.

8-16 CUSTOMER SERVICE INSPECTIONS FOR WATER SERVICE

a. Per Texas Administrative Code (TAC) §290.46(j), the Contractor shall complete a customer service inspection certificate prior to providing continuous water service to new construction, on any existing service either when the water purveyor has reason to believe that cross-connections or other potential contaminant hazards exist, or after any material improvement, correction, or addition to water distribution facilities.

b. Per TAC, individuals with the following credentials shall be recognized as capable of conducting a customer service inspection certification: (a) Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners (TSBPE), and (b) Customer service inspectors who have completed a commission-approved course, passed an examination administered by the executive director, and hold current professional license as a customer service inspector.

c. The completed Customer Service Inspection Certificate shall be submitted to the 47 CES/CENMP and Owners Representative.

Section 01-9 CLOSEOUT PROCEDURES

9-1 DELIVERABLES

9-1.1 TRANSMITTALS

QC Manager's Punch List

9-1.2 SUBMITTALS

SD-11 Closeout Submittals

As-Built Drawings

Construction Warranty Management Plan

DD Form 1354 Draft

DD Form 1354 Final

9-2 AS-BUILT DRAWINGS

a. The Contractor shall update the As-Built drawings every month. Payment, or a portion of the payment, including final payment, may be withheld until the Record Drawings have been updated and accepted by the 47 CES/CENMP and Owners Representative. Final payment of this contract will not be made until the As-Built Drawings are approved by the 47 CES/CENMP and Owners Representative.

b. The Contractor shall comply with the following standards for As-Built Drawing submittal:

(1) Submit 1 paper copy, 1 digital copy in PDF Format, and 1 digital copy in AutoCAD Format to the 47 CES/CENMP and Owners Representative for review and approval.

(2) Paper copies shall be 11 x 17 inches.

(3) AutoCAD drawings shall comply with A/E/E CADD Standard Release 4.0 or the latest published version listed on the https://cadbim.usace.army.mil/cad website. The Datum shall be North American 1983 (NAD83), local State Plane Texas South Central 4204 coordinate system. The drawings shall be to scale with applicable survey control points, monuments and marks listed. Any buried utility shall be identified by type, material composition, size, and elevation.

(4) All drawings shall clearly indicate (by "red line" markings) any and all deviations from the contract drawings.

(5) All lines, letters, and details shall be sharp, clear, and legible.

(6) Additions and corrections to the drawings shall be drawn to the scale of the original drawing.

9-3 CONSTRUCTION WARRANTY MANAGEMENT PLAN

a. All warranty periods shall begin on the same date as project acceptance and shall continue for the full product warranty period.

b. The Contractor shall comply with the following standards for the Construction Warranty Management Plan:

(1) Submit 1 paper copy and 1 digital copy (in PDF Format) to the 47 CES/CENMP and Owners Representative for review and approval.

(2) The paper shall be bound in a three ring binder and include a cover sheet, label for the binder spine, and a table of contents.

(3) A signed warranty letter guaranteeing all work associated with this Contract for 1 year shall be included. The letter shall include the start date and end date of the warranty period.

(4) The plan shall include an equipment product warranty list. For each item, the Contractor shall provide the specification section applicable to the equipment/product, duration of the warranty, start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty.

(5) Written warranties for equipment/products furnished under the contract shall be included in the plan.

9-4 DD FORM 1354

a. Submit to the 47 CES/CENMP and Owners Representative a draft copy of the DD Form 1354, "Transfer and Acceptance of Military Real Property," 14 days prior to final acceptance of the work. A pre-final inspection will not be scheduled until the draft DD Form 1354 has been received. The final DD Form 1354 shall be submitted simultaneous with the final inspection. The Government is prevented by AFI 32-9005 from taking Beneficial Occupancy of a facility until a DD Form 1354 is signed by the Government.

b. A blank DD Form 1354 (fill-able) in Adobe (PDF) may be obtained at the following website: http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf

c. A completed Checklist Form for the DD1354 shall be attached to the draft and final DD Form 1354.

d. Contact the 47 CES/CENMP and Owners Representative for any project specific information necessary to complete the DD Form 1354.

e. Submit 1 paper copy and 1 digital copy (in PDF Format) of the draft and final DD 1354.

9-5 COMPLETION INSPECTION

a. Prior to requesting a Pre-Final Inspection, the QC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and submitted to the 47 CES/CENMP and Owners Representative. Once the QC Manager has assured that all punch list items have been corrected, the Contractor shall notify the Government and request a Pre-Final Inspection.

b. The Government will perform the Pre-Final Inspection to verify that all work is complete and meets specified requirements. The Contractor's QC Manager and superintendent shall be in attendance at the Pre-Final Inspection. If the Government identifies items that do not conform to specified requirements, a Pre-Final punch list will be developed. The QC Manager shall ensure all items on this list have been corrected prior to the Contractor requesting Final Inspection.

c. The Contractor shall submit a request for Final Inspection to the 47 CES/CENMP and Owners Representative. The request shall include the Contractor's assurance that all items on the Pre-Final punch list will be completed at the time of the Final Inspection. The Contractor's QC Manager and superintendent shall be in attendance at the Final Inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection may be cause for the Owners Representative to bill the Contractor for the Government's additional inspection cost. All inspections' deficiency corrections required shall be accomplished within the performance period for the project

T-6 PREFABRICATED AIRCRAFT SUN SHADES
AT LAUGHLIN AIR FORCE BASE
CIVIL SPECIFICATIONS

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STATE OF TEXAS
CARL BAIN
56996
REGISTERED
PROFESSIONAL ENGINEER

11/22/2016

BAINMEDINABAIN
ENGINEERS&SURVEYORS

• 7073 San Pedro Avenue • San Antonio, TX 78216 • TBPE Registered Firm Number F-1712

SECTION 31 00 00

EARTHWORK
08/08

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	2015) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm(18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600	(2010) Installation of Ductile-Iron Water Mains and Their Appurtenances

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA P5	(2015) Standard for Waterborne Preservatives

ASTM INTERNATIONAL (ASTM)

ASTM A139/A139M	(2016) Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4 and over)
ASTM A252	(2010) Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates

ASTM C150/C150M	Standard Specifications for Hydraulic Cement
ASTM C979/C979M	Standard Specifications for Pigments for Integrally Colored Concrete
ASTM D1140	(2014) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D1883	(2016) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D2167	(2015) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2434	(1968; R 2006) Permeability of Granular Soils (Constant Head)
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2937	(2010) Density of Soil in Place by the Drive-Cylinder Method
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	(2015) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

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

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-203	(Rev C; Notice 3) Paper, Kraft, Untreated

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.

SD-01 Preconstruction

SD-03 Product Data

Low Strength Concrete Backfill (Flowable Fill)
Utilization of Excavated Materials; G
Colored Concrete (Red)

SD-06 Test Reports

Testing

Within 24 hours of conclusion of physical tests, submit 3 copies of test results, including calibration curves and results of calibration tests.

SD-07 Certificates

Testing

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Provide polyethylene plastic and warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 6 inches 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 (intended service) 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

2.1.1 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 0.004 inch, and a minimum strength of 1500 psi lengthwise.

2.2 FLOWABLE FILL (LOW STRENGTH CONCRETE)

ASTM C150/C150M Low Strength Concrete. Concrete shall have a compressive strength of 150 psi conforming to TXDOT Item 421 Hydraulic Cement Concrete Type “D”.

2.3 COLORED CONCRETE

Pigmented concrete in accordance with ASTM C979/C979M shall be used as bedding cover and initial back around conduits to a minimum height of 6” inches above highest conduit. Pigment color shall be selected by Contracting Officer.

PART 3 EXECUTION

3.1 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. Dispose all surplus 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 other approved areas selected by the Contractor as specified.

3.1.1 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. Provide trench excavation protection for depths greater than 5 feet. Give special attention to slopes which may be adversely affected by weather or moisture content.

3.1.1.1 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members. 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.

3.1.2 Underground Utilities

The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.2 TRENCH EXCAVATION PROTECTION

3.2.1 General Requirements

Submit a Trench Excavation Protection Plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for protection of excavations. Excavation protection shall be provided as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove trench excavation protection as excavations are backfilled, in a manner to prevent caving.

3.2.2 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 protection 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.

3.3 GROUND SURFACE PREPARATION

3.3.1 General Requirements

Scarify the surface to a depth of 6 inches 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 6 inches, 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 12 inches and compact it as specified for the adjacent fill.

3.4 BURIED TAPE AND DETECTION WIRE

3.4.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inches below top of subgrade.

3.5 BACKFILLING AND COMPACTION

3.5.1 Trench Backfill

Trench backfill shall consist of ASTM C150/C150M Low Strength Concrete (Flowable fill). Concrete shall be placed in a manner not to displace piping. Concrete shall be and pigmented from the bottom of the trench to a point 6 inches above the conduit(s) or piping. Concrete shall be placed for the segmented area and allow to settle before consequent material is placed. Low Strength Concrete shall be placed to the bottom of the base or concrete elevation and allowed to cure a minimum of 3 days, or until 80% of its design strength is achieved, whichever is greater.

3.5.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been installed, place backfill in such a manner that the structure is not be 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.

3.6 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 0.1 foot of the grades and elevations of the surrounding ground. 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.

3.7 PLACING TOPSOIL

On areas to receive topsoil, prepare the compacted subgrade soil to 2 inches depth for bonding of top soil with subsoil. Spread topsoil evenly to a thickness of 2 inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively wet or dry. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas.

3.8 DISPOSITION OF SURPLUS MATERIAL

Remove surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber from Government property and delivered to a licensed/permitted facility or to a location approved by the Contracting Officer.

-- End of Section --

SECTION 32 01 11.51

RUBBER AND PAINT REMOVAL FROM AIRFIELD PAVEMENTS
05/16

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.

ETL 97-17 “PAINT AND RUBBER REMOVAL FROM ROADWAY AND AIRFIELD PAVEMENTS

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

29 CFR 1910 Occupational Safety and Health Standards

1.2 ADMINISTRATIVE REQUIREMENTS

Submit a schedule of work to the Contracting Officer. Describe the work to be accomplished; noting the location of work, distances from the ends of runways, taxiways, buildings, and other structures; and indicating dates and hours during which the work will be accomplished. Schedule the work to conform to aircraft operating schedules. The Government will try to schedule aircraft operations so as to permit the maximum amount of time for the Contractor's work. However, in the event of any emergency, intense operational demands, adverse wind conditions, and other unforseen difficulties, discontinue all work at locations in the aircraft operational area. Keep the approved schedule of work current and notify the Contracting Officer of any changes prior to beginning each day's work.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.

SD-01 Preconstruction Submittals

Schedule of work; G

Rubber and Paint Removal Process Plan; G

Waste Collection, Identification and Disposal Plan; G

SD-03 Product Data

Mechanical rubber and paint removal equipment

Chemical rubber and paint removal equipment

Rubber and Paint Removal Detergents or Chemicals including MSDS; G

SD-06 Test Reports

Test Section Results

1.4 MECHANICAL REMOVAL EQUIPMENT

Submit product data for mechanical rubber and paint removal equipment including area of coverage per pass, range of water pressures, and water tank capacity.

Mechanical removal equipment includes waterblasting, grinding or scarifying, or other approved non-chemical systems. The equipment used on asphalt or tar concrete to remove rubber and paint accumulations while minimizing disturbances to asphalt or tar mixtures. The equipment used on portland cement concretes to remove rubber and paint accumulations and prevent removal of hardened paste from the concrete. Basic hand tools and the following major types of mechanical equipment are considered acceptable for this project:

a. Waterblasting Equipment.

b. Grinding or Scarifying Equipment.

1.4.1 Waterblasting Equipment

Provide mobile waterblasting equipment capable of producing a pressurized stream of water that effectively removes rubber and paint from the pavement surface without significantly damaging the pavement. Provide equipment, tools, and machinery which are safe and in good working order at all times. Provide equipment interlocks to prohibit high pressure water discharge when the vehicle or cleaning head is stationary (not moving forward or side to side).

1.4.2 Grinding or Scarifying Equipment

Provide equipment capable of removing surface contaminates, paint build-up, or extraneous markings from the pavement surface without leaving any residue.

1.5 CHEMICAL REMOVAL EQUIPMENT

Submit product data for chemical rubber and paint removal equipment. Use chemical equipment capable of applying and removing chemicals from the pavement surface while leaving only non-toxic biodegradable residue.

1.6 TEST SECTION

Prior to the start of work, remove rubber and paint on designated test areas not less than 50 feet in length. Use procedures, water pressures, nozzle height, nozzle spacings, nozzle angle, and equipment movement rate to achieve the required degree of rubber and paint removal in accordance with Paragraph RUBBER AND PAINT REMOVAL. Methods included in paragraph COMPLIANCE TESTING will be used to determine if the rubber and paint was successfully removed from the test section. The test will examine seven random locations within the test section. Submit the test section results before conducting any further removal work. Provide photos of seven random locations within the test area taken before and after the removal. Provide photos of four random locations at joint seals within the test area taken before and after removal.

1.7 DELIVERY, STORAGE, AND HANDLING

Deliver required materials in original manufacturer's containers labeled with appropriate EPA, OSHA, or other agency warnings, if applicable, and Material Safety Data Sheets. Protect materials from degrading until their use is required during execution of the work.

1.8 PROJECT/SITE CONDITIONS

1.8.1 Environmental Requirements

Ensure pavement surface is free of snow, ice or slush. Ensure surface temperature is at least 40 degrees F and rising at the beginning of operations. Cease operation during thunder and lightning storms. Cease operation during rainfall except for waterblasting and removal of previously applied chemicals. Cease waterblasting where surface water accumulation alters the effectiveness of material removal.

1.8.2 Airfield Traffic Control

Coordinate performance of all work in the controlled zones of the airfield with the Contracting Officer and with the [Flight Operations Officer or Airfield Manager] [control tower]. Neither equipment nor personnel can use any portion of the airfield or taxiway without permission of these officers unless the runway is closed.

1.8.3 Radio Communication

No personnel or equipment will be allowed in the controlled zones of the airfield until radio contact has been made with the control tower and permission is granted by the control tower. A radio for this purpose [will be provided by the Government. The Contractor is responsible for the radio and must reimburse the Government for repair or replacement of the radio if it is lost, damaged, or destroyed. Maintain contact with the control tower at all times during work in vicinity of the airfield. Notify the control tower when work is completed and all personnel, equipment and materials have been removed from all aircraft operating surfaces.

1.8.4 Emergency Landing and Takeoff

Emergencies take precedence over all operations. Upon notification from the Control Tower of an emergency landing or imminent takeoff, stop all operations immediately and evacuate all personnel and equipment to an area not utilized for aircraft traffic which is at least 250 feet measured perpendicular to and away from the near edge of the runway unless otherwise authorized by the Contracting Officer or the Contracting Officer's Representative. Equipment and chemicals or detergents as well as excess water must be able to clear the work area within 3 minutes.

1.8.5 Water

Water to be used for high-pressure water equipment will be made available from Government hydrant[s] as shown on the drawings, within 2000 feet of all points of the work area. Furnish equipment and labor for delivery of water from the hydrant to the job site. Notify the Contracting Officer on location of fire hydrant[s] to be used and the respective times of use.

The Contracting Officer will notify the Fire Department of fire hydrants to be used and designated times of use. Connections to a fire hydrant will be subject to the Contracting Officer's inspection and approval. The Contractor must provide and use a backflow prevention device for filling water tanks. The Contractor is responsible for testing, treating, and filtering the water to ensure it will not interfere with the rubber removal or damage or clog the rubber removal equipment.

1.10 SAFETY

Comply with OSHA 29 CFR 1910.

PART 2 PRODUCTS

2.1 RUBBER AND PAINT REMOVAL DETERGENTS OR CHEMICALS INCLUDING MSDS

The use of environmentally acceptable detergents or chemical agents must be considered on a case-by-case basis. Use of any detergents or chemicals in the rubber and paint removal process must be approved in advance by the Contracting Officer. The Government specifically reserves the right to reject the use of any process which the Contracting Officer determines may pose unnecessary risks to human health, the environment, the pavement, aircraft or NAVAIDS due to corrosion or foreign object damage (FOD) potential as a result of its use, storage, or disposal.

PART 3 EXECUTION

3.1 RUBBER AND PAINT REMOVAL

Prior to any work being completed, submit a Rubber and Paint Removal Process Plan for approval by the Contracting Officer.

a. The pavement surface type is portland cement concrete as indicated.

b. Remove 90 percent of all visible rubber on portland cement concrete pavements and 85 percent of all visible rubber on asphaltic concrete pavements. Remove all paint that is loose, flaking, chalky, or not to be re-marked or does not comply with size or pattern standards.

c. Chemical methods used must be compatible with pavement materials, the environment and working personnel.

d. Exercise close control of water pressure and blasting time/duration to prevent damage to joints, existing markings that are not intended for removal, or the wearing surface.

e. Demonstrate the ability to remove rubber at an area selected by the Contracting Officer. Rubber removal must not damage the pavement surface. The surface texture of the cleaned demonstration area will be compared to that of non-rubber traffic areas to determine satisfactory completion of the removal operation.

f. After approval of the Contractor's operations by the Contracting Officer, the cleaned sample area will become the standard for rubber removal and final surface texture for the remainder of work.

g. Compliance testing for the amount of rubber and paint to be removed must conform to the requirements in paragraph COMPLIANCE TESTING.

3.2 RATE OF REMOVAL

Do not permit high-pressure water application to remove the existing pavement surface, joint seals or crack seals.

3.3 WATER PRESSURE

Provide water pressure impact upon the indicated pavement areas sufficient to remove the designated rubber and paint to the required degree of removal without damaging the existing pavement, joint sealant, or other airfield appurtenances. The Contractor is responsible for repairing any damage caused by the removal work.

3.4 CLEANUP AND WASTE DISPOSAL

Keep the worksite clean of by-products, debris and waste from rubber and paint removal operations. Perform cleanup operations continuously. Residue will be removed from the pavement by Contractor using approved vacuum sweeper. Notify the Contracting Officer for coordination. Remove all residue from the pavement. Obtain the approval of residue removal and disposal method from the Contracting Officer prior to beginning work. Submit a Waste Collection, Identification and Disposal Plan describing proposed actions regarding waste collection, control, identification, and disposal to the Contracting Officer's Representative for approval prior to the start of work. The plan will address disposal methods and requirements for hazardous and non-hazardous wastes.

3.5 COMPLIANCE TESTING

a. Compliance with the rubber and paint removal requirements must be determined by direct testing within the designated work area.

b. Divide each work area designated for rubber and paint removal into at least four equal zones for the purpose of compliance testing. The layout of each zone must be approved by the Contracting Officer. Within each zone, a minimum of seven random locations must be evaluated. The amount of rubber and paint removed at each of the randomly selected test locations within each zone must meet the requirement described in paragraph RUBBER AND PAINT REMOVAL. Evaluate each zone independently. A zone not meeting the required percentage must be recleaned by the Contractor at the Contractor's expense.

c. Deposits of rubber or rubber buildup and paint are defined as any surface deposit that can be removed by scratching the deposit with a flat sharp object (such as a pocket knife) without damaging the pavement surface. Stains are defined as materials in the pavement surface microtexture that cannot be removed without damaging the pavement surface. Stain is generally embedded in the surface of the pavement below the horizontal plane of the surface texture. The Contractor is not responsible for stain removal.

3.6 DAMAGE REPAIR

Repair any damage to the pavement surface, joint, joint and crack seals, or other Government property caused during the performance of the work at the Contractor's expense. Submit a repair plan to include methods and material to the Contracting Officer's Representative for approval prior to performance of the repairs. Complete the repairs within the performance period of the Contract.

-- End of Section --

SECTION 32 01 19

FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS
08/08

PART 1 GENERAL

1.2 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 C1016	(2014) Standard Test Method for Determination of Water Absorption of Sealant Backing (Joint Filler) Material
ASTM D5893/D5893M	(2010) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D6690	(2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D789	(2015) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 525	(1989) Corps of Engineers Test Method for Evaluation of Hot-Applied Joint Sealants for Bubbling Due to Heating

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS SS-S-200	(Rev E; Am 1; Notice 1) Sealant, Joint, Two-Component, Jet-Blast-Resistant,Cold-Applied, for Portland Cement Concrete Pavement

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.

SD-03 Product Data

Manufacturer's Recommendations
Equipment; G

SD-04 Samples

Materials; G

SD-06 Test Reports

Certified Copies of the Test Reports; G

1.4 QUALITY ASSURANCE

Submit samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval. No material will be allowed to be used until it has been approved.

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the job site for defects, unload, and store them with a minimum of handling to avoid damage. Provide storage facilities at the job site for maintaining materials at the temperatures and conditions recommended by the manufacturer.

1.6 ENVIRONMENTAL REQUIREMENTS

The ambient air temperature and the pavement temperature within the joint wall shall be a minimum of 60 degrees F and rising at the time of application of the materials. Do not apply sealant if moisture is observed in the joint.

PART 2 PRODUCTS

2.1 SEALANTS

Materials for sealing cracks in the various paved areas indicated on the drawings shall be as follows:

Area	Sealing Material
Pavements / Concrete	ASTM D6690, Type II
Pavements / Concrete	ASTM D6690, Type III
Concrete Aprons	FS SS-S-200 Type M
Concrete Structure	ASTM D5893/D5893M]

2.2 PRIMERS

When primers are recommended by the manufacturer of the sealant, use them in accordance with the recommendation of the manufacturer.

PART 3 EXECUTION

3.1 EXECUTING EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, to be used on the project.

3.1.1 Joint Cleaning Equipment

3.1.1.1 Tractor-Mounted Routing Tool

Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

3.1.1.2 Concrete Saw

Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified or for refacing joints or cleaning sawed joints where sandblasting does not provide a clean joint.

3.1.1.3 Waterblasting Equipment

Include with the waterblasting equipment a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. Provide water tank and auxiliary resupply equipment of sufficient capacity to permit continuous operations. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. Adjust the height, angle of inclination and the size of the nozzle as necessary to obtain satisfactory results. A pressure gauge mounted at the pump shall show at all times the pressure in psi at which the equipment is operating.

3.1.1.4 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

3.1.2 Sealing Equipment

3.1.2.1 Hot-Poured Sealing Equipment

The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive

temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

3.1.2.2 Two-Component, Cold-Applied, Machine Mix Sealing Equipment Provide equipment used for proportioning, mixing, and installing FS SS-S-200 Type M joint sealants designed to deliver two semifluid components through hoses to a portable mixer at a preset ratio of 1 to 1 by volume using pumps with an accuracy of plus or minus 5 percent for the quantity of each component. The reservoir for each component shall be equipped with mechanical agitation devices that will maintain the components in a uniform condition without entrapping air. Incorporate provisions to permit thermostatically controlled indirect heating of the components, when required. However, immediately prior to proportioning and mixing, the temperature of either component shall not exceed 90 degrees F. Provide screens near the top of each reservoir to remove any foreign particles or partially polymerized material that could clog fluid lines or otherwise cause misproportioning or improper mixing of the two components. Provide equipment capable of thoroughly mixing the two components through a range of application rates of 10 to 60 gallons per hour and through a range of application pressures from 50 to 1500 psi as required by material, climatic, or operating conditions. Design the mixer for the easy removal of the supply lines for cleaning and proportioning of the components. The mixing head shall accommodate nozzles of different types and sizes as may be required by various operations. The dimensions of the nozzle shall be such that the nozzle tip will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval.

3.1.2.3 Cold-Applied, Single-Component Sealing Equipment

The equipment for installing ASTM D5893/D5893M single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

3.2 PREPARATION OF JOINTS

Immediately before the installation of the sealant, thoroughly clean the joints to remove all laitance, curing compound, filler, protrusions of hardened concrete, and old sealant from the sides and upper edges of the joint space to be sealed.

3.2.1 Existing Sealant Removal

Cut loose the in-place sealant from both joint faces as specified in paragraph EQUIPMENT. Depth shall be sufficient to accommodate new sealant to be installed. Prior to further cleaning operations, remove all loose old sealant remaining in the joint opening by blowing with compressed air. Hand tools may be required to remove sealant from random cracks. Chipping, spalling, or otherwise damaging the concrete will not be allowed.

3.2.2 Sawing

3.2.2.1 Refacing of Joints

Accomplish facing of joints using a concrete saw as specified in paragraph EQUIPMENT [to remove all residual old sealant and a minimum of concrete from the joint face to provide exposure of newly cleaned concrete, and, if required, to enlarge the joint opening until the joint is clean and open to the full specified width and depth. Thoroughly clean, immediately following the sawing operation, the joint opening using a water jet to remove all saw cuttings and debris.

3.2.2.2 Refacing of Random Cracks

Accomplish sawing of the cracks using a power-driven concrete saw as specified in paragraph EQUIPMENT. The saw blade shall be 6 inches or less in diameter to enable the saw to follow the trace of the crack. Stiffen the blade, as necessary, with suitable dummy (or used) blades or washers. Immediately following the sawing operation, thoroughly clean the crack opening using a water jet to remove all saw cuttings and debris.

3.4 PREPARATION OF SEALANT

3.4.1 Hot-Poured Sealants

Do not heat sealants conforming to ASTM D6690 in excess of the safe heating temperature recommended by the manufacturer as shown on the sealant containers. Withdraw and waste sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation.

3.4.2 Type M Sealants

Inspect the FS SS-S-200 Type M sealant components and containers prior to use. Reject any materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory. Settlement of constituents in a soft mass that can be readily and uniformly remixed in the field with simple tools will not be cause for rejection. Prior to transfer of the components from the shipping containers to the appropriate reservoir of the application equipment, thoroughly mix the materials to ensure homogeneity of the components and incorporation of all constituents at the time of transfer. When necessary for remixing prior to transfer to the application equipment reservoirs, warm the components to a temperature not to exceed 90 degrees F. by placing the components in heated storage or by other approved methods but in no case shall the components be

heated by direct flame, or in a single walled kettle, or a kettle without an oil bath.

3.4.3 Single-Component, Cold-Applied Sealants

Inspect the ASTM D5893/D5893M sealant and containers prior to use. Reject any materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory. Settlement of constituents in a soft mass that can be readily and uniformly remixed in the field with simple tools will not be cause for rejection.

3.5 INSTALLATION OF SEALANT

3.5.1 Time of Application

Seal joints immediately following final cleaning of the joint walls and following the placement of the separating or backup material. Open joints, that cannot be sealed under the conditions specified, or when rain interrupts sealing operations shall be recleaned and allowed to dry prior to installing the sealant.

3.5.2 Sealing Joints

Immediately preceding, but not more than 50 feet ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 inch plus or minus 1/16 inch below the pavement surface. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Contracting Officer. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

3.6 INSPECTION

3.6.1 Joint Cleaning

Inspect joints during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Cleaned joints will be approved prior to installation of the separating or back-up material and joint sealant.

3.6.2 Joint Sealant Application Equipment

Inspect the application equipment to ensure conformance to temperature requirements, proper proportioning and mixing (if two-component sealant) and proper installation. Evidences of bubbling, improper installation, failure to cure or set will be cause to suspend operations until causes of the deficiencies are determined and corrected.

3.6.3 Joint Sealant

Inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified herein at no additional cost to the Government.

3.7 CLEAN-UP

Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

-- End of Section --

SECTION 32 11 16.16

BASE COURSE FOR RIGID AND FLEXIBLE PAVING
11/11

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 C117	(2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131/C131M	(2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C29/C29M	(2016) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D1883	(2016) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D2940/D2940M	(2015) Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D5106	(2015) Steel Slag Aggregates for Bituminous Paving Mixtures
ASTM D6155	(2015) Nontraditional Coarse Aggregate for Bituminous Paving Mixtures

ASTM D6270	(2008; R 2012) Use of Scrap Tires in Civil Engineering Applications
ASTM D6938	(2015) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED NC	(2009) Leadership in Energy and Environmental Design(tm) New Construction Rating System

1.2 RELATED SECTIONS

Section 32 12 10 BITUMINOUS TACK AND PRIME COATS, in addition to this section.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.

SD-03 Product Data

Materials;
Geotextile;

Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product.

SD-05 Design Data
Gradation curve

SD-06 Test Reports

Bearing ratio
Liquid limit
Plasticity index
Dry weight of slag
Percentage of wear
Gradation tests
Density tests

SD-07 Certificates

Source

Location and name.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site and store aggregates in a manner that will prevent segregation and contamination.

1.5 CONSTRUCTION EQUIPMENT

Subject to approval of the Contracting Officer, special equipment as dictated by local conditions may be used. Calibrated equipment, such as scales, batching equipment, spreaders, and other similar equipment, shall have been calibrated by a calibration laboratory approved by the Contracting Officer within 6 months of commencing work.

1.6 ENVIRONMENTAL REQUIREMENTS

Do not construct course when atmospheric temperature is below 35 degrees F or when weather conditions could detrimentally affect quality of finished course. When temperature falls below 35 degrees F, protect areas of completed course against freezing.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

2.1.2 Graded-Crushed Aggregate Base Course

Graded-crushed aggregate (GCA) base course is well graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction. GCA is similar to ABC, but it has more stringent requirements and it produces a base course with higher strength and stability.

2.1.3 Gradation

Material shall have a liquid limit of not more than 40 and a plasticity index of not more than 12 in accordance with ASTM D4318. Gradation of the final composite mixture shall conform to the following:

Sieve Size (Square Openings)	Design Range (Percent Passing)
2 inch	100
1 1/2 inch	70-100
1 inch	45 - 80
1/2 inch	30 - 60
No. 4	20-50
No. 40	5 - 25
No. 200	0-8

PART 3 EXECUTION

3.1 GRADE CONTROL

Provide line and grade stakes for control. Place grade stakes in lanes parallel to centerline of areas to be paved and space for string lining or other control methods.

3.2 COMPACTING AND FINISHING

Compact each layer to at least 95 percent of the maximum laboratory density determined in accordance with ASTM D1557. Compact material inaccessible to rolling equipment by mechanical tamping. Finish surface of the layer by blading and rolling. Blade, roll, and tamp until surface is smooth and free from waves and irregularities.

3.3 FIELD QUALITY CONTROL

3.3.1 Testing

3.3.1.1 Field Density Tests

ASTM D6938. Take one field density test for each 50 square yards of each layer of course.

3.5 MAINTENANCE

After construction is completed, protect and maintain all areas of course against detrimental effects. Apply prime coat to seal base course in accordance to Section 32 12 10 Bituminous Tack and Prime Coat.

-- End of Section --

SECTION 32 12 10

BITUMINOUS TACK AND PRIME COATS
08/08

PART 1 GENERAL

1.2 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 M 226	(1980; R 2008) Standard Specification for Viscosity-Graded Asphalt Cement
AASHTO M 81	(1992; R 2012) Standard Specification for Cutback Asphalt (Rapid-Curing Type)
AASHTO M 82	(1975; R 2012) Standard Specification for Cutback Asphalt (Medium-Curing Type)
AASHTO T 102	(2009; R 2013) Standard Method of Test for Spot Test of Asphaltic Materials
AASHTO T 40	(2002; R 2006) Sampling Bituminous Materials

ASTM INTERNATIONAL (ASTM)

ASTM D1250	(2008) Standard Guide for Use of the Petroleum Measurement Tables
ASTM D140/D140M	(2015) Standard Practice for Sampling Bituminous Materials
ASTM D2026/D2026M	(2015) Cutback Asphalt (Slow-Curing Type)
ASTM D2027/D2027M	(2013) Cutback Asphalt (Medium-Curing Type)
ASTM D2028/D2028M	(2015) Cutback Asphalt (Rapid-Curing Type)
ASTM D2397/D2397M	(2013) Standard Specification for Cationic Emulsified Asphalt
ASTM D2995	(1999; R 2009) Determining Application Rate of Bituminous Distributors
ASTM D3381/D3381M	(2013) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D946/D946M	(2015) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D977	(2013; E 2014) Emulsified Asphalt

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.

SD-03 Product Data

Prime Coat; G

Tack Coat; G

SD-06 Test Reports

Sampling and Testing

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.5 ENVIRONMENTAL REQUIREMENTS

Apply bituminous coat only when the surface to receive the bituminous coat is dry. Apply bituminous coat only when the atmospheric temperature in the shade is 60 degrees F or above and when the temperature has not been below 40 degrees F for the 12 hours prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.2.1 PRIME COAT

Provide asphalt conforming to AASHTO M 81.

2.2.2 Cutback Asphalt

Provide cutback asphalt conforming to ASTM D2027/D2027M, Grade MC-30.

2.2.3 Emulsified Asphalt

Provide emulsified asphalt conforming to ASTM D977, Type SS-1 SS1h.

2.3 TACK COAT

Provide asphalt conforming to AASHTO M 81.

2.3.1 Cutback Asphalt

Provide cutback asphalt conforming to ASTM D2027/D2027M, Grade MC-30.

2.3.2 Emulsified Asphalt

Provide emulsified asphalt conforming to ASTM D2397/D2397M, Type CSS-1.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a vacuum sweeper. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Apply bituminous material for the tack coat in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Apply bituminous material for the prime coat in quantities of not less than 0.10 gallon nor more than 0.20 gallon per square yard of pavement surface.

3.3 APPLICATION

Prime coat application on flowable fill concrete will not be required. Tack coat will be required on surface and saw cut edges.

3.3.1 General

Following preparation and subsequent inspection of the surface, apply the bituminous prime or tack coat with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots missed by the distributor with the hand spray. Until the succeeding layer of pavement is placed, maintain the surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment are permitted within 15 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.3.2 Prime Coat

Apply a prime coat at locations shown on the Drawings. The prime coat is required if it will be at least 7 days before the surfacing (Asphalt cement hot mix concrete) layer is constructed on the underlying (base course, etc.) compacted material. The type of liquid asphalt and application rate will be as specified herein. Protect the underlying from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven days, the choice of protection measures or actions to be taken is at the Contractor's option.

Repair (recompact or replace) damage to the underlying material caused by lack of, or inadequate, protection by approved methods at no additional cost to the Government. If the Contractor opts to use the prime coat, apply as soon as possible after consolidation of the underlying material.] Apply the bituminous material uniformly over the surface to be treated at a pressure range of 25 to 75 psi; the rate shall be as specified above in paragraph APPLICATION RATE. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application remove and destroy the building paper.

3.3.3 Tack Coat

Apply tack coat at the locations shown on the drawings. Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate as specified above in paragraph APPLICATION RATE. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.4 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material.

3.6 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --

SECTION 32 12 17

HOT MIX BITUMINOUS PAVEMENT
04/08

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 M 156	(2013) Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO M 320	(2010; 2015) Standard Specification for Performance-Graded Asphalt Binder

ASPHALT INSTITUTE (AI)

AI MS-2	(2015) Asphalt Mix Design Methods

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	(2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C128	(2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C131/C131M	(2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C188	(2014) Standard Test Method for Density of Hydraulic Cement
ASTM C29/C29M	(2016) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

ASTM C88	(2013) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D1073	(2016) Fine Aggregate for Bituminous Paving Mixtures
ASTM D1188	(2007; E 2010) Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D140/D140M	(2015) Standard Practice for Sampling Bituminous Materials
ASTM D2041/D2041M	(2011) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2172/D2172M	(2011) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D242/D242M	(2009; R 2014) Mineral Filler for Bituminous Paving Mixtures
ASTM D2726/D2726M	(2014) Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3381/D3381M	(2013) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3666	(2013) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4867/D4867M	(2009; R 2014) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D546	(2010) Sieve Analysis of Mineral Filler for Bituminous Paving Mixtures
ASTM D692/D692M	(2015) Coarse Aggregate for Bituminous Paving Mixtures
ASTM D6927	(2015) Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D70	(2009; E 2009) Specific Gravity and Density of Semi-Solid Bituminous Materials (Pycnometer Method)
ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates
ASTM D854	(2014) Specific Gravity of Soil Solids by Water Pycnometer

ASTM D946/D946M	(2015) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979/D979M	(2015) Sampling Bituminous Paving Mixtures

1.2 SUBMITTALS

Design Data

Job-mix formula

Submit a job-mix formula, prepared specifically for this project, for approval by the Government prior to preparing and placing the bituminous mixture. Formulas shall indicate physical properties of the mixes as shown by tests made by a commercial laboratory approved by the Contracting Officer, using materials identical to those to be provided on this project. Submit formulas with material samples. Job-mix formula for each mixture shall be in effect until modified in writing by the Contractor and approved by the Contracting Officer. Provide a new job-mix formula for each source change. Submittal shall include all tests indicated in MIX DESIGN section of this specification.

ASPHALT CEMENT BINDER

MIX DESIGN

SD-06 Test Reports

Specific gravity test of asphalt

Coarse aggregate tests

Weight of slag test

Percent of crushed pieces in gravel

Fine aggregate tests

Specific gravity of mineral filler

Bituminous mixture tests

Aggregates tests

Bituminous mix tests

Pavement courses

1.3 QUALITY ASSURANCE

1.3.3 Required Data

Job-mix formula shall show the following:

a. Source and proportions, percent by weight, of each ingredient of the mixture;

b. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture;

c. Amount of material passing the No. 200 sieve determined by dry sieving;

d. Number of blows of hammer compaction per side of molded specimen;

e. Temperature viscosity relationship of the asphalt cement;

f. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight;

g. Asphalt absorption by the aggregate;

h. Effective asphalt content as percent by weight of total mix;

i. Temperature of the mixture immediately upon completion of mixing;

j. Asphalt performance grade [viscosity grade] [penetration range]; and

k. Curves for the [leveling] [binder] [and] wearing course[s].

1.4 DELIVERY, STORAGE, AND HANDLING

NOT USED

1.5 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature is greater than 60degrees F.

1.6 CONSTRUCTION EQUIPMENT

Provide equipment capable to spread, roll and compact to the design depth and density. Calibrated equipment, such as scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory approved by the Contracting Officer within 12 months of commencing work.

1.6.1 Paving Equipment

1.6.1.1 Spreading Equipment

Self-propelled electronically controlled type, unless other equipment is authorized by the Contracting Officer. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

1.6.1.2 Rolling Equipment

Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair deressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

1.6.1.3 Hand Tampers

Minimum weight of 25 pounds with a tamping face of not more than 50 square inches.

1.6.1.4 Mechanical Hand Tampers

Commercial type, operated by pneumatic pressure or by internal combustion.

PART 2 PRODUCTS

2.1 AGGREGATES

Grade and proportion aggregates and filler so that combined mineral aggregate conforms to specified grading.

2.1.1 Coarse Aggregates

ASTM D692/D692M, except as modified herein. At least 75 percent by weight of aggregate retained on the No. 4 sieve shall have two or more fractured faces. Percentage of wear, Los Angeles test, except for slag, shall not exceed 40 in accordance with ASTM C131/C131M. Weight of slag shall not be less than 70 pounds per cubic foot. Soundness test is required in

accordance with ASTM C88; after 5 cycles, loss shall not be more than 12 percent when tested with sodium sulfate or 18 percent when tested with magnesium sulfate.

2.1.2 Fine Aggregate

ASTM D1073, except as modified herein. Fine aggregate shall be produced by crushing stone, slag or gravel that meets requirements for wear and soundness specified for coarse aggregate. Where necessary to obtain the gradation of aggregate blend or workability, natural sand may be used. Quantity of natural sand to be added shall be approved [by the Contracting Officer] and shall not exceed 15 percent of weight of coarse and fine aggregate and material passing the No. 200 sieve.

2.1.3 Mineral Filler

Nonplastic material meeting the requirements of ASTM D242/D242M.

2.1.4 Aggregate Gradation

The combined aggregate gradation shall conform to gradations specified in Table I, gradation 3, when tested in accordance with ASTM C136/C136M and ASTM C117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table I. Aggregate Gradations

	Gradation 1	Gradation 2	Gradation 3
Sieve Size, inch	Percent Passing by Mass	Percent Passing by Mass	Percent Passing by Mass
1/2	68 – 88	76 – 96	98 - 100
3/8	60-82	69-89	85 - 100
No.4	45-67	53-73	50 – 70
No.8	32-54	38-60	35 - 46
No.30	15-35	18-38	15 - 29
No.50	9-25	11-27	7 - 20
No.200	3-6	3-6	2-7

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to AASHTO M 320 Performance Grade (PG) 64 - 22. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting OfficerEngineer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer Engineer may sample and test the binder at the mix plant at any time before or during mix production. Samples for this verification testing shall be obtained by the Contractor in accordance with ASTM D140/D140M and in the presence of the Contracting Officer Engineer. These samples shall be furnished to the Contracting Officer Engineer for the verification testing, which shall be at no cost to the Contractor. Samples of the asphalt cement specified shall be submitted for approval not less than 14 days before start of the test section.

2.3 MIX DESIGN

The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved.

2.3.1 JMF Requirements

The job mix formula shall be submitted by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

a. Percent passing each sieve size.

b. Percent of asphalt cement.

c. Percent of each aggregate and mineral filler to be used.

d. Asphalt viscosity grade, penetration grade, or performance grade.

e. Laboratory mixing temperature.

f. Lab compaction temperature.

g. Temperature-viscosity relationship of the asphalt cement.

h. Specific gravity and absorption of each aggregate.

i. Percent natural sand.

j. Percent flat or elongated particles (in coarse aggregate).

k. Tensile Strength Ratio.

l. Antistrip agent (if required) and amount.

m. List of all modifiers and amount.

n. Percentage and properties (asphalt content, binder properties, and aggregate properties) of RAP in accordance with paragraph RECYCLED HOT-MIX ASPHALT, if RAP is used.

2.3.2 Adjustments to JMF

The JMF for each mixture shall be in effect until a new formula is approved in writing by the Contracting Officer. Should a change in sources of any materials be made, a new mix design shall be performed and a new JMF approved before the new material is used.

PART 3 EXECUTION

3.1 PLACEMENT

3.1.1 Machine Spreading

The range of temperatures of the mixtures at the time of spreading shall be between 250 degrees F and 300 degrees F. Bituminous concrete having temperatures less than minimum spreading temperature when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device of not less than 10 feet in length and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the speed of placing as needed to permit proper rolling.

3.1.2 Shoveling, Raking, and Tamping After Machine-Spreading

Shovelers and rakers shall follow the spreading machine. Add or remove hot mixture and rake the mixture as required to obtain a course that when completed will conform to requirements specified herein. Broadcasting or fanning of mixture over areas being compacted is prohibited. When segregation occurs in the mixture during placing, suspend spreading operation until the cause is determined and corrected. Correct irregularities in alignment left by the spreader by trimming directly behind the machine. Immediately after trimming, compact edges of the course by tamping laterally with a metal lute or by other approved methods. Distortion of the course during tamping is prohibited.

3.1.3 Hand-Spreading in Lieu of Machine-Spreading

In areas where the use of machine spreading is impractical, spread mixture by hand. The range of temperatures of the mixtures when dumped onto the area to be paved shall be between 250 and 300 degrees F. Mixtures having temperatures less than minimum spreading temperature when dumped onto the area to be paved will be rejected. Spread hot mixture with rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade, thickness, and smoothness. During hand spreading, place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. Do not place mixture by throwing or broadcasting from a shovel. Do not dump loads any faster than can be properly handled by the shovelers and rakers.

3.2 COMPACTION OF MIXTURE

Compact mixture by rolling. Begin rolling as soon as placement of mixture will bear rollers. Delays in rolling freshly spread mixture shall not be permitted. Start rolling longitudinally at the extreme sides of the lanes and proceed toward center of pavement, or toward high side of pavement with a one-way slope. Operate rollers so that each trip overlaps the previous adjacent strip by at least one foot. Alternate trips of the roller shall be of slightly different lengths. Conduct tests for conformity with the specified crown, grade and smoothness immediately after initial rolling. Before continuing rolling, correct variations by removing or adding materials as necessary. If required, subject course to diagonal rolling with the steel wheeled roller crossing the lines of the previous rolling while mixture is hot and in a compactible condition. Speed of the rollers shall be slow enough to avoid displacement of hot mixture. Correct displacement of mixture immediately by use of rakes and fresh mixture, or remove and replace mixture as directed. Continue rolling until roller marks are eliminated and course has a density of at least ____95___ percent but not more than 100 percent of that attained in a laboratory specimen of the same mixture prepared in accordance with ASTM D6927. During rolling, moisten wheels of the rollers enough to prevent adhesion of mixture to wheels, but excessive water is prohibited. Operation of rollers shall be by competent and experienced operators. Provide sufficient rollers for each spreading machine in operation on the job and to handle plant output. In places not accessible to the rollers, compact mixture thoroughly with hot hand tampers. Skin patching of an area after compaction is prohibited. Remove mixture that becomes mixed with foreign materials or is defective and replace with fresh mixture compacted to the density specified herein. Roller shall pass over unprotected edge of the course only when laying of course is to be discontinued for such length of time as to permit mixture to become cold.

3.3 JOINTS

Joints shall present the same texture and smoothness as other portions of the course, except permissible density at the joint may be up to 2 percent less than the specified course density. Carefully make joints between old and new pavement or within new pavements in a manner to ensure a thorough and continuous bond between old and new sections of the course. Vertical contact surfaces of previously constructed sections that are coated with dust, sand, or other objectionable material shall be painted with a thin uniform coat of emulsion or other approved bituminous material just before placing fresh mixture.

3.3.1 Transverse

Roller shall pass over unprotected end of freshly laid mixture only when laying of course is to be discontinued. Except when an approved bulkhead is used, cut back the edge of previously laid course to expose an even, vertical surface for the full thickness of the course. When required, rake fresh mixture against joints, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll. Transverse joints in adjacent lanes shall be offset a minimum of 2 feet.

3.3.2 Longitudinal Joints

Space 6 inches apart. Do not allow joints to coincide with joints of existing pavement or previously placed courses. Spreader screed shall overlap previously placed lanes 2 to 3 inches and be of such height to permit compaction to produce a smooth dense joint. With a lute, push back mixture placed on the surface of previous lanes to the joint edge. Do not scatter mix. Remove and waste excess material. When edges of longitudinal joints are irregular, honeycombed, or poorly compacted, cut back unsatisfactory sections of joint and expose an even vertical surface for the full thickness of the course. When required, rake fresh mixture against joint, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll while hot.

3.4 FIELD QUALITY CONTROL

3.4.1 Testing

3.4.1.1 Pavement Courses

Perform the following tests:

a. Density: For each 50 tons of bituminous mixture placed, the laboratory representative shall perform 3 in place density tests (ASTM D2950).

b. Thickness: Determine thickness of wearing courses from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness.
Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

c. Smoothness: Straightedge test the compacted surface of wearing course[s] as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Unevenness of course[s] shall not vary more than 1/4 inch in 10 feet; variations in the wearing course shall not vary more than 1/8 inch in 10 feet. Correct each portion of the pavement showing irregularities greater than that specified.

3.5 PROTECTION

Do not permit vehicular [and aircraft] traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 100 degrees F. Measure surface temperature by approved surface thermometers or other satisfactory methods.

-- End of Section --

SECTION 32 13 13.06

PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES
11/11

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 CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 301	(2010; ERTA 2015) Specifications for Structural Concrete
ACI 305.1	(2014) Specification for Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 325.12R	(2002; R 2013) Guide for Design of Jointed Concrete Pavements for Streets and Local Roads
ACI 330R	(2008) Guide for the Design and Construction of Concrete Parking Lots

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C215	(2010) Extruded Polyolefin Coatings for the Exterior of Steel Water Pipelines

ASTM INTERNATIONAL (ASTM)

ASTM A184/A184M	(2006; E2011) Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A775/A775M	(2016) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A966/A966M	(2015) Standard Test Method for Magnetic Particle Examination of Steel Forgings Using Alternating Current

ASTM A1064	Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement Plan and Deformed for Concrete
ASTM C1077	(2016) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C1157/C1157M	(2011) Standard Specification for Hydraulic Cement
ASTM C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C143/C143M	(2015a) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2016) Standard Specification for Portland Cement
ASTM C1549	(2009; R 2014) Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C171	(2016) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2014a) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231/C231M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2015a; E 2016) Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates
ASTM C494/C494M	(2015a) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2016) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C78/C78M	(2015b) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C94/C94M	(2016) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2014) Standard Specification for Slag Cement for Use in Concrete and Mortars

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-250-01FA	(2004) Pavement Design for Roads, Streets, Walks, and Open Storage Areas

1.2 DESIGN

This materials and construction specification is intended to be used on projects where the design was completed using UFC 3-250-01FA Pavement Design for Roads, Streets, Walks, and Open Storage Areas, ACI 330R, Guide for the Design and Construction of Concrete Parking Lots or ACI 325.12R, Guide for Design of Jointed Concrete Pavements for Streets and Local Roads, or equivalent.

1.3 RELATED SECTIONS

Portland cement concrete pavement shall use Section 32 11 16.16 BASE COURSE FOR RIGID AND FLEXIBLE PAVING, in addition to this section.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.

SD-03 Product Data

Curing Materials; G

Admixtures; G

Dowel; G

Reinforcement; G

Submit a complete list of materials including type, brand and applicable reference specifications.

SD-05 Design Data

Concrete Mix Design; G

Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Provide mix proportion data 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. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Obtain acknowledgement of approvals prior to concrete placement. Submit a new mix design for each material source change.

SD-06 Test Reports

Aggregate Tests; G

Concrete Slump Tests; G

Air Content Tests; G

Flexural Strength Tests; G

Cementitious Materials; G

SD-07 Certificates

Ready-mixed Concrete Plant; G

Batch Tickets; G

Cementitious Materials; G

1.5 DELIVERY, STORAGE, AND HANDLING

ASTM C94/C94M.

1.6 QUALITY ASSURANCE

1.6.1 Ready-mixed Concrete Plant Certification

Unless otherwise approved by the Contracting Officer, ready mixed concrete shall be produced and provided by a National Ready-Mix Concrete Association (NRMCA) certified plant. If a volumetric mobile mixer is used to produce the concrete, rather than ready-mixed concrete, the mixer(s) must conform to the standards of the Volumetric Mixer Manufacturers Bureau (VMMB). Verification shall be made by a current VMMB conformance plate affixed to the volumetric mixer equipment.

1.6.2 Contractor Qualifications

Unless waived by the Contracting Officer, the Contractor shall meet one of the following criteria:

a. Contractor shall have at least one National Ready Mixed Concrete Association (NMRCA) certified concrete craftsman and at least one American Concrete Institute (ACI) Flatwork Finisher Certified craftsman on site, overseeing each placement crew during all concrete placement.

b. Contractor shall have no less than three NRMCA certified concrete installer sand at least two American Concrete Institute (ACI) Flatwork Finisher Certified installers, who shall be on site working as members of each placement crew during all concrete placement.

1.6.3 Required Information

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cementitious materials, aggregates, and admixtures. Provide maximum nominal aggregate size, combined aggregate gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Sampling and testing of materials, concrete mix design, sampling and testing in the field shall be performed by a commercial testing laboratory which conforms to ASTM C1077. The laboratory shall be approved in writing by the Government.

1.6.4 Batch Tickets

ASTM C94/C94M. Submit mandatory batch ticket information for each load of ready-mixed concrete.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cementitious materials in concrete mix shall be 20 to 50 percent slag by weight. [Provide test data demonstrating compatibility and performance of concrete satisfactory to Contracting Officer.]

2.1.1.1 Cement

ASTM C150/C150M, Type I or II or ASTM C595/C595M.

2.1.1.2 Fly Ash and Pozzolan

ASTM C618, Type F, or N. Fly ash certificates shall include test results in accordance with ASTM C618.

2.1.1.3 Ultra Fine Fly Ash and Ultra Fine Pozzolan

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) shall conform to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age shall be at least 95 percent of the control specimens.

b. The average particle size shall not exceed 6 microns.

2.1.1.4 Slag

ASTM C989/C989M, Slag Cement (formerly Ground Granulated Blast Furnace Slag) Grade 100 or 120. Certificates shall include test results in accordance with ASTM C989/C989M.

2.1.1.5 Supplementary Cementitious Materials (SCM) Content

The concrete mix shall always contain one of the SCMs listed in Table 1 within the range specified therein, whether or not the aggregates are found to be reactive in accordance with the paragraph entitled, "Alkali Silica Reactivity".

TABLE 1
SUPPLEMENTARY CEMENTITIOUS MATERIALS CONTENT

Supplementary Cementitious Material	Minimum Content (percent)	Maximum Content (percent)
Class N Pozzolan and Class F Fly Ash		
$SiO_2 + Al_2O_3 + Fe_2O_3 > 70$ percent	25	35
$SiO_2 + A1_2O_3 + Fe_2O_3 > 80$ percent	20	35
$SiO_2 + A1_2O_3 + Fe_2O_3 > 90$ percent	15	35
UFFA and UFP	7	16
GGBF Slag	40	50

2.1.2 Water

Water shall conform to ASTM C1602/C1602M. Hot water shall not be used unless approved by the Contracting Officer.

2.1.3 Aggregate

Coarse aggregate shall consist of crushed or uncrushed gravel, crushed stone, or a combination thereof. Aggregates, as delivered to the mixers, shall consist of clean, hard, uncoated particles. Coarse aggregate shall be washed. Washing shall be sufficient to remove dust and other coatings. Fine aggregate shall consist of natural sand, manufactured sand, or a

combination of the two, and shall be composed of clean, hard, durable particles. Both coarse and fine aggregates shall meet the requirements of ASTM C33/C33M.

2.1.3.1 Fine

Aggregates ASTM

C33/C33M.

2.1.3.2 Coarse

Aggregates ASTM

C33/C33M.

2.1.4 Admixtures

ASTM C494/C494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Where not shown or specified, the use of admixtures is subject to written approval of the Contracting Officer.

ASTM C260/C260M: Air-entraining.

2.1.5 Reinforcement

2.1.5.1 Dowel Bars

Bars shall conform to ASTM A615/A615M, Grade 60 for plain billet-steel bars of the size and length indicated. Remove all burrs and projections from the bars.

2.1.5.2 Tie Bars

Bars shall be billet or axle steel deformed bars and conform to ASTM A615/A615M Grade 60.

2.1.5.3 Reinforcement

Bar reinforcement shall conform to ASTM A615/A615M Grade 60. Welded Wire Fabric ASTM A1064.

2.1.6 Curing Materials

2.1.6.1 Liquid Membrane-Forming Compound

ASTM C309, white pigmented, Type 2, Class B, free of paraffin or petroleum.

2.1.6.3 Liquid Chemical Sealer-Hardener Compound

Compound shall be magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing, or other material applied to concrete.

2.1.7 Joint Fillers and Sealants

New joints shall match existing alignment.

2.2 CONCRETE PAVEMENT

2.2.1 Joint Layout Drawings

If jointing requirements on the project drawings are not compatible with the contractor's placement sequence, the contractor shall submit a joint layout plan shop drawing to the Contracting Officer for approval. No work shall be allowed to start until the joint layout plan is approved. The joint layout plan shall indicate and describe in the detail the proposed jointing plan for contraction joints, expansion joints, and construction joints, in accordance with the following:

a. Align joints of adjacent panels.

2.3 CONTRACTOR-FURNISHED MIX DESIGN

Contractor-furnished mix design concrete shall be designed in accordance with ACI 211.1 except as modified herein, and the mix design shall be as specified herein. The concrete shall have a minimum compressive strength of 3000 pounds per square inch at 28 days. The concrete may be air entrained. If air entrainment is used the air content shall be 5.0. Maximum size aggregate for slip forming shall be 1.5 inches. The slump shall be 1 to 3 inches. For slipformed pavement, at the start of the project, select a maximum allowable slump which will produce in-place pavement meeting the specified tolerances for control of edge slump. The selected slump shall be applicable to both pilot and fill-in lanes.

If the cementitious material is not sufficient to produce concrete of the compressive strength required it shall be increased as necessary, without additional compensation under the contract. The cementitious factor shall be calculated using cement, Class F fly ash, and or GGBF slag. The mix shall use a SCM material by weightper Table 1 in "Supplementary Cementitious Materials (SCM) Content"

PART 3 EXECUTION

3.1 FORMS

3.1.1 Construction

Construct forms to be removable without damaging the concrete.

3.1.2 Coating

Before placing the concrete, coat the contact surfaces of forms [except existing pavement sections where bonding is required,] with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bondbreaker before concrete is placed.

3.1.3 Grade and Alignment

Check and correct grade elevations and alignment of the forms immediately before placing the concrete.

3.2 REINFORCEMENT

3.2.1 Dowel Bars

Install bars accurately aligned, vertically and horizontally, at indicated locations and to the dimensions and tolerances indicated. Before installation thoroughly grease the sliding portion of each dowel. Dowels must remain in position during concrete placement and curing.

3.2.2 Tie Bars

Install bars, accurately aligned horizontally and vertically, at indicated locations.

3.2.3 Setting Slab Reinforcement

Reinforcement shall be positioned on suitable chairs prior to concrete placement. At expansion, contraction and construction joints, place the reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other foreign materials. Place reinforcement accurately and wire securely. The laps at splices shall be 12 inches minimum and the distances from ends and sides of slabs and joints shall be as indicated.

3.3 MEASURING, MIXING, CONVEYING, AND PLACING CONCRETE

3.3.1 Measuring

ASTM C94/C94M.

3.3.2 Mixing

ASTM C94/C94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, place concrete within 60 minutes. With the approval of the Contracting Officer, a hydration stabilizer admixture meeting the requirements of ASTM C494/C494M Type D, may be used to extend the placement time to 90 minutes. Additional water may be added to bring slump within required limits as specified in Section 11.7 of ASTM C94/C94M, provided that the specified water-cement ratio is not exceeded.

3.3.3 Conveying

ASTM C94/C94M.

3.3.4 Placing

Follow guidance of ACI 301, except as modified herein. Do not exceed a free vertical drop of 5 feet from the point of discharge. Deposit concrete either directly from the transporting equipment or by conveyor on to the pre-wetted subgrade or subbase, unless otherwise specified. Do not place concrete on frozen subgrade or subbase. Deposit the concrete between the

forms to an approximately uniform height. Place concrete continuously at a uniform rate, with minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If this occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.

3.3.5 Vibration

Immediately after spreading concrete, consolidate concrete with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs 6 inches or more in thickness. Limit duration of vibration to that necessary to produce consolidation of concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Contracting Officer may be used to consolidate concrete in unreinforced pavement slabs less than 6 inches thick.

3.3.5.1 Vibrating Equipment

Operate equipment, except hand-manipulated equipment, ahead of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount units on a frame that is capable of vertical movement and, when necessary, radial movement, so vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. Clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. Distance between end of vibrating tube and side form shall not exceed 2 inches. For pavements less than 10 inches thick, operate vibrators at mid-depth parallel with or at a slight angle to the subbase. For thicker pavements, angle vibrators toward the vertical, with vibrator tip preferably about 2 inches from subbase, and top of vibrator a few inches below pavement surface. Vibrators may be pneumatic, gas driven, or electric, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. Amplitude of vibration shall be such that noticeable vibrations occur at 1.5 foot radius when the vibrator is inserted in the concrete to the depth specified.

3.3.6 Cold Weather

Except with authorization, do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 and 80 degrees F. Methods of heating materials are subject to approval of the Contracting Officer. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306.1.

3.3.7 Hot Weather

Maintain required concrete temperature in accordance with Figure NRMCA NOMOGRAPH FOR ESTIMATING EVAPORATION RATE ON THE BASIS OF MENZEL FORMULA in ACI 305.1 to prevent evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. After placement, use fog spray, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when surface of fresh concrete is sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing concrete. Follow practices found in ACI 305.1.

3.4 PAVING

Pavement shall be constructed with paving and finishing equipment utilizing fixed forms.

3.4.1 Consolidation

The paver vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.

3.4.2 Placing Reinforcing Steel

Reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement.

3.4.3 Placing Dowels and Tie Bars

Dowels shall be installed with alignment and as indicated on drawings. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement.

3.4.3.1 Contraction Joints

Shall match existing joint patterns established.

3.4.3.2 Dowels Installed in Hardened Concrete

Installation shall be by bonding the dowels into holes drilled into the hardened concrete. Holes approximately 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete. Dowels shall be bonded in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel shall not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or

plastic collar fitted around the dowel. The vertical alignment of the dowels shall be checked by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel.

3.4.3.3 Expansion Joints

Dowels in expansion joints shall be installed by the bonded-in-place method or by bonding into holes drilled in hardened concrete, using procedures specified above.

3.5 FINISHING CONCRETE

Start finishing operations immediately after placement of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse bridge. Provide hand finishing equipment for use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.

3.5.1.1 Hand Finishing

Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated and finished pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template.

3.5.2 Texturing

Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described herein. Following initial texturing on the first day of placement, the Placing Foreman, Contracting Officer representative, and a representative of the Using Agency shall inspect the texturing for compliance with design requirements. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris. The concrete in areas of recesses for tie-down anchors, lighting fixtures, and other outlets in the pavement shall be finished to provide a surface of the same texture as the surrounding area.

3.5.2.2 Brooming

Finish the surface of the slab by brooming the surface with a new wire broom at least 18 inches wide. Gently pull the broom over the surface of the pavement from edge to edge just before the concrete becomes non-plastic. Slightly overlap adjacent strokes of the broom. Broom perpendicular to centerline of pavement so that corrugations produced will be uniform in character and width, and not more than 1/16 inch in depth. Broomed surface shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface.

3.5.3 Edging

At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of one-eighth inch. When brooming is specified for the final surface finish, edge transverse joints before starting brooming, then operate broom to obliterate as much as possible the mark left by the edging tool without disturbing the rounded corner left by the edger. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. Remaining edges shall be smooth and true to line.

3.5.4 Repair of Surface Defects

Follow guidance of ACI 301.

3.6 CURING AND PROTECTION

Protect concrete adequately from injurious action by sun, rain, flowing water, [frost,] mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use liquid membrane-forming compound. Maintain temperature of air next to concrete above 40 degrees F for the full curing periods.

3.6.1 Liquid Membrane-Forming Compound Curing

Apply compound immediately after surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment.Total coverage for the two coats shall be at least one gallon of undiluted compound per 200 square feet. Compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of compound immediately to areas where film is defective.Respray concrete surfaces that are subject to heavy rainfall within 3 hours after curing compound has been applied in the same manner.

3.6.2.1 Protection of Treated Surfaces

Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours.Foot traffic is allowed after 24 hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately.

3.7 FIELD QUALITY CONTROL

3.7.1 Sampling

The Contractor's approved laboratory shall collect samples of fresh concrete in accordance with ASTM C172/C172M during each working day as required to perform tests specified herein. Make test specimens in accordance with ASTM C31/C31M.

3.7.2 Consistency Tests

The Contractor's approved laboratory shall perform concrete slump tests in accordance with ASTM C143/C143M. Take samples for slump determination from concrete during placement. Perform tests at the beginning of a concrete placement operation and and for each batch (minimum) or every 20 cubic yards (maximum) of concrete to ensure that specification requirements are met. In addition, perform tests each time test beams and cylinders are made.

3.7.3 Strength Tests

The Contractor's approved laboratory shall test for compressive strength in accordance with ASTM C78/C78M. Make four test specimens for each set of tests. Test two specimens at 7 and 14 days, and the other two at [28] days. Concrete strength will be considered satisfactory when the minimum of the 28-day test results equals or exceeds the specified 28-day compressive strength, and no individual strength test is less than 3000 pounds per square inch. If the ratio of the 7 28-day strength test to the specified 28-day strength is less than 65 percent, make necessary adjustments for conformance. Frequency of compressive tests on concrete cylinders shall be not less than four test cylinders for each 50 cubic yards of concrete, or fraction thereof, placed. Concrete which is determined to be defective, based on the strength acceptance criteria therein, shall be removed and replaced with acceptable concrete.

3.7.4 Air Content Tests

Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with ASTM C231/C231M on samples taken during placement of concrete in forms.

3.8 WASTE MANAGEMENT

Dispose of excess material in accordance with the Waste Management Plan.

-- End of Section --

SECTION 32 16 13

CONCRETE SIDEWALKS AND CURBS AND GUTTERS
04/08

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 M 182	(2005; R 2012) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2016a) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C143/C143M	(2015a) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C171	(2016) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2014a) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2015a; E 2016) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants

ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D5893/D5893M	(2010) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

INTERNATIONAL CODE COUNCIL (ICC)

ICC A117.1 COMM	(2009) Standard And Commentary and Usable Buildings and Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only.

SD-03 Product Data Concrete

SD-06 Test Reports

Field Quality Control

1.3 ENVIRONMENTAL REQUIREMENTS

1.3.1 Placing During Cold Weather

Do not place concrete when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F.

1.3.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 32 13 13.06 PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE UTILITIES except as otherwise specified. Concrete shall have a minimum compressive strength of 3000 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches. Submit copies of certified delivery tickets for all concrete used in the construction.

2.1.1 Reinforcement Steel

Reinforcement bars shall conform to ASTM A615/A615M. Wire mesh reinforcement shall conform to ASTM A1064/A1064M.

2.2 CONCRETE CURING MATERIALS

2.2.1 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Expansion Joint Filler, Premolded

Expansion joint filler, premolded, shall conform to ASTM D1751 or ASTM D1752, 1/2 inch thick, unless otherwise indicated.

2.5 JOINT SEALANTS

Joint sealant, cold-applied shall conform to ASTM C920 or ASTM D5893/D5893M.

2.6 FORM WORK

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Section 32 11 16.6 Base Course for Rigid and Flexible Paving.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall

be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope as indicated with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Place concrete in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated by tamping and spading or with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.2 Curb and Gutter Finishing

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by tooled joint or by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant. Joint sealant shall be gray or stone in color. Joints shall be sealed as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

a. Contraction joints shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 30 feet nor greater than 120 feet. Expansion joints shall be provided in non-reinforced concrete gutter at locations indicated. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Joints shall be sealed as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary

precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. Repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.7.4 Protective Coating

Protective coating, of linseed oil mixture, shall be applied to the exposed-to-view concrete surface after the curing period, if concrete will be exposed to de-icing chemicals within 6 weeks after placement. Concrete to receive a protective coating shall be moist cured.

3.7.4.1 Application

Curing and backfilling operation shall be completed prior to applying two coats of protective coating. Concrete shall be surface dry and clean before each application. Coverage shall be by spray application at not more than 50 square yards/gallon for first application and not more than 70 square yards/gallon for second application, except that the number of applications and coverage for each application for commercially prepared mixture shall be in accordance with the manufacturer's instructions. Coated surfaces shall be protected from vehicular and pedestrian traffic until dry.

3.8 FIELD QUALITY CONTROL

Submit copies of all test reports within 24 hours of completion of the test.

3.8.1 General Requirements

Provide batch ticket indicating strength of concrete temperature. Perform the inspection described.

3.8.2 Concrete Testing

3.8.3 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

-- End of Section --

SECTION 32 17 23

PAVEMENT MARKINGS
08/16

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 the basic designation only.

ENGINEERING TECHNICAL LETTER (ETL) 04-2 CHANGE 1, “STANDARD AIRFIELD PAVEMENT MARKING SCHEMES”

AETC T-6 PROP ARC MEMORANDUM

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 247	(2013) Standard Specification for Glass Beads Used in Pavement Markings
AASHTO M 248	(1991; R 2012) Standard Specification for Ready-Mixed White and Yellow Traffic Paints
AASHTO M 249	(2012; R2016) Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form)
AASHTO C979/c979M	Standard Specification for Pigments for Integrally Colored Concrete

ASTM INTERNATIONAL (ASTM)

ASTM D1652	(2011; E 2012) Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	(2007; R2013) Standard Test Methods for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	(2015) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D2621	(1987; R 2011) Infrared Identification of Vehicle Solids from Solvent-Reducible Paints
ASTM D2697	(2003; R 2014) Volume Nonvolatile Matter in Clear or Pigmented Coatings
ASTM D3335	(1985a; R 2014) Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D3718	(1985a; R 2015) Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy

ASTM D3924	(2016) Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials
ASTM D3960	(2005; R 2013) Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4060	(2014) Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4061	(2013) Standard Test Method for Retroreflectance of Horizontal Coatings
ASTM D4280	(2012) Extended Life Type, Nonplowable, Raised, Retroreflective Pavement Markers
ASTM D4383	(2012) Standard Specification for Plowable, Raised Retroreflective PavementMarkers
ASTM D4505	(2012) Preformed Retroflective Pavement Marking Tape for Extended Service Life
ASTM D4541	(2009; E 2010) Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D471	(2016) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D476	(2015) Dry Pigmentary Titanium Dioxide Pigments
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D6628	(2003; R 2015) Standard Specification for Color of Pavement Marking Materials
ASTM D695	(2010) Standard Test Method for Compressive Properties of Rigid Plastics
ASTM D711	(2010; R 2015) No-Pick-Up Time of Traffic Paint
ASTM D7234	(2012) Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
ASTM D823	(1995; E 2012; R 2012) Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels.
ASTM E1347	(2006; R 2011) Color and Color Difference Measurement by Tristimulus (Filter) Colorimetry
ASTM E1710	(2011) Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer

ASTM E2177	(2011) Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (RL) of Pavement Markings in a Standard Condition of Wetness
ASTM E2302	(2003; R 2016) Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable ReflectometerASTM G154(2012a) Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)

ICRI 03732	(1997) Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

MASTER PAINTERS INSTITUTE (MPI)

MPI 32	(2005) Standard for Alkyd Traffic Marking Paint
MPI 97	(2015) Traffic Marking Paint, Latex

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 150/5370-10	(2014; Rev G; Errata 1 2015; Errata 2 2016) Standards for Specifying Construction of Airports

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009) Manual on Uniform Traffic Control Devices

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	(Rev C; Notice 1) Colors Used in Government Procurement
FS TT-B-1325	(Rev D; Notice 1) Beads (Glass Spheres) Retro-Reflective (Metric)
FS TT-P-1952	(2015; Rev F) Paint, Traffic and Airfield Markings, Waterborne

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.

SD-03 Product Data

Surface Preparation Equipment List; G

Application Equipment List; G

Exterior Surface Preparation

Material Safety Data Sheets (MSDS) for proposed materials; G

Reflective media for airfields; G

Reflective media for roads; G

Waterborne Paint; G

Solventborne Paint; G

Thermoplastic compound; G

Raised Pavement Markers Primers and Adhesives; G

SD-06 Test Reports

Reflective Media for Airfields; G

Reflective Media for Roads; G

Waterborne Paint; G

Solventborne Paint; G

High Build Acrylic Coating (HBAC); G

Thermoplastic Compound; G

Raised Pavement Markers Primers and Adhesives; G

Test Reports

SD-07 Certificates

Qualifications; G

Waterborne Paint

Reflective Media for Roads

Waterborne Paint

Solventborne Paint

Volatile Organic Compound, (VOC); G

Thermoplastic Compound

SD-08 Manufacturer's Instructions Waterborne

Paint; G

Solventborne Paint; G

Thermoplastic Compound; G

1.3 QUALITY ASSURANCE

1.3.1 Regulatory Requirements

Submit certificate stating that the proposed pavement marking paint meets the Volatile Organic Compound, (VOC) regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located. Submit Material Safety Data Sheets (MSDS) for each product.

1.3.2 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of applicable chemicals. The documentation should include experience on five projects of similar size and scope with references for all personnel.

1.3.3 Qualifications For Airfield Marking Personnel

Submit documentation of qualifications in resume format before pavement marking work is to be performed showing personnel who will be performing the work have experience working on airfields, operating mobile self-powered marking, cleaning, and paint removal equipment and performing these tasks. Include with resume a list of references complete with points of contact and telephone numbers. Provide certification for pavement marking machine operator and Foreman demonstrating experience successfully completing a minimum of two airfield pavement marking projects of similar size and scope. Provide documentation demonstrating personnel have a minimum of two years of experience operating similar equipment and performing the same or similar work in similar environments, similar in size and scope of the planned project. The Contracting Officer reserves the right to require additional proof of competency or to reject proposed personnel.

1.4 DELIVERY AND STORAGE

Deliver paint materials, thermoplastic compound materials, and reflective media in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer.

Provide storage facilities at the job site, for maintaining materials at temperatures recommended by the manufacturer.

1.5 PROJECT/SITE CONDITIONS

1.5.1 Environmental Requirements

1.5.1.1 Weather Limitations for Application

Apply pavement markings to clean, dry surfaces, and unless otherwise approved, only when the air and pavement surface temperature is at least 5 degrees F above the dew point and the air and pavement temperatures are within the limits recommended by the pavement marking manufacturer. Allow pavement surfaces to dry after water has been used for cleaning or rainfall has occurred prior to striping or marking. Test the pavement surface for moisture before beginning work each day and after cleaning. Do not commence marking until the pavement is sufficiently dry and the pavement condition has been approved by the Contracting Officer.

1.6.1 Traffic Controls

Place warning signs conforming to MUTCD near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Place small markers along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation.

When traffic must be rerouted or controlled to accomplish the work, provide necessary warning signs, flag persons, and related equipment for the safe passage of vehicles.

1.6.2 Airfield Traffic Control

Coordinate performance of all work in the controlled zones of the airfield with the Contracting Officer and with the Flight Operations Officer or Airfield Manager and control tower. Neither equipment nor personnel can use any portion of the airfield without permission of these officers unless the runway is closed.

1.6.3 Airfield Radio Communication

No personnel or equipment will be allowed in the controlled zones of the airfield until radio contact has been made with the control tower and permission is granted by the control tower. A radio for this purpose will be provided by the Government. The Contractor is responsible for the radio and must reimburse the Government for repair or replacement of the radio if it is lost, damaged, or destroyed. Maintain contact with the control tower at all times during work in vicinity of the airfield. Notify the control tower when work is completed and all personnel, equipment and materials have been removed from all aircraft operating surfaces.

1.6.4 Airfield Emergency Landing and Takeoff

Emergencies take precedence over all operations. Upon notification from the control tower of an emergency landing or imminent takeoff, stop all operations immediately and evacuate all personnel and equipment to an area not utilized for aircraft traffic which is at least 250 feet measured perpendicular to and away from the near edge of the runway unless otherwise authorized by the Contracting Officer. Equipment and chemicals or detergents as well as excess water must be able to clear the work area within 3 minutes.

PART 2 PRODUCTS

2.1 EQUIPMENT

Submit a surface preparation equipment list by serial number, type, model, and manufacturer. Include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation. Mobil equipment must allow for removal of markings without damaging the pavement surface or joint sealant. Maintain machines, tools, and equipment used in the performance of the work in satisfactory operating condition. Paint removal shall conform to the provisions of Section 32 01 11.51 Rubber and Paint Removal from Airfield Pavements.

2.1.2 Application Equipment

Submit application equipment list appropriate for the material(s) to be used. Include manufacturer's descriptive data and certification for the planned use that indicates area of coverage per pass, pressure adjustment range, tank and flow capacities, and all safety precautions required for operating and maintaining the equipment. Provide and maintain machines, tools, and equipment used in the performance of the work in satisfactory operating condition, or remove them from the work site. Provide mobile and maneuverable application equipment to the extent that straight lines can be followed and normal curves can be made in a true arc.

2.1.2.1 Paint Application Equipment

2.1.2.1.1 Hand-Operated, Push-Type Machines

Provide hand-operated push-type applicator machine of a type commonly used for application of water based paint or two-component, chemically curing paint, thermoplastic, or preformed tape, to pavement surfaces for small marking projects, such as legends and cross-walks, parking areas, or surface painted signs. Provide applicator machine equipped with the necessary tanks and spraying nozzles capable of applying paint uniformly at coverage specified. Hand operated spray guns may be used in areas where push-type machines cannot be used.

2.1.2.1.2 Self-Propelled or Mobile-Drawn Spraying Machines

Provide self-propelled or mobile-drawn spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. Provide machine having a speed during application capable of applying the stripe widths indicated at the paint coverage rate specified herein and of even uniform thickness with clear-cut edges.

2.1.2.1.2.1 Road Marking

Provide equipment used for marking roads capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines, or a combination of solid and intermittent lines using a maximum of three different colors of paint as specified.

2.1.2.1.2.2 Airfield Marking

Provide self-propelled or mobile-drawn spraying machine for applying the paint for airfield pavements with an arrangement of atomizing nozzles capable of applying the specified line width in a single pass. Provide

paint applicator with paint reservoirs or tanks of sufficient capacity and suitable gages to apply paint in accordance with requirements specified. Equip tanks with suitable mechanical agitators. Equip spray mechanism with quick-action valves conveniently located, and include necessary pressure regulators and gages in full view and reach of the operator. Install paint strainers in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator must be readily adaptable for attachment of a dispenser for the reflective media approved for use.

2.1.2.1.2.3 Hand Application

Provide spray guns for hand application of paint in areas where the mobile paint applicator cannot be used.

2.1.2.3 Reflective Media Dispenser

Attach the dispenser for applying the reflective media to the paint dispenser and designed to operate automatically and simultaneously with the applicator through the same control mechanism. The bead applicator must be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION.

2.1.2.4 Preformed Tape Application Equipment

Provide and use mechanical application equipment for the placement of preformed marking tape which is a mobile pavement marking machine specifically designed for use in applying pressure-sensitive pavement marking tape of varying widths. Equip the applicator with rollers, or other suitable compaction device to provide initial adhesion of the material with the pavement surface. Use additional tools and devices as needed to properly seat the applied material as recommended by the manufacturer.

2.2 MATERIALS

Use reflectorized waterborne paint for airfield markings. Use reflectorized waterborne paint for roads. The maximum allowable VOC content of pavement markings is 150 grams per liter. Color of markings are indicated on the drawings and must conform to ASTM D6628 for roads and parking areas and FED-STD-595 for airfields. Provide materials conforming to the requirements specified herein.

2.2.1 Waterborne Paint

White	37925
Yellow	33538
Black	37038
Red	31135

Colors shall conform to FED STD 595 chip number and approved by the Contracting Officer before use.

2.2.2 Reflective Media

2.2.2.1 Reflective Media for Airfields

FS TT-B-1325, Type IV, Gradation A.

2.2.2.2 Reflective Media for Roads

FS TT-B-1325, Type IV, Gradation A.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Testing for Moisture

Test the pavement surface for moisture before beginning pavement marking after each period of rainfall, fog, high humidity, or cleaning, or when the ambient temperature has fallen below the dew point. Do not commence marking until the pavement is sufficiently dry and the pavement condition has been approved by the Contracting Officer or authorized representative.

3.1.2 Surface Preparation Demonstration

Perform a demonstration removal of pavement marking in an area designated by the Contracting Officer. Approved demonstration area establishes the standard for the remainder of the work.

3.1.3 Test Stripe Demonstration

Prior to paint application, demonstrate test stripe application within the work area using the proposed materials and equipment. Apply separate test stripes in each of the line widths and configurations required herein using the proposed equipment. Make the test stripes long enough to determine the proper speed and operating pressures for the vehicle(s) and machinery, but not less than 50 feet long.

3.1.4 Application Rate Demonstration

During the Test Stripe Demonstration, demonstrate compliance with the application rates specified herein. Document the equipment speed and operating pressures required to meet the specified rates in each configuration of the equipment and provide a copy of the documentation to the Contracting Officer prior to proceeding with the work.

3.1.5 Retroreflective Value Demonstration

After the test stripes have cured to a "no-track" condition, demonstrate compliance with the average retroreflective values specified herein. Take a minimum of ten readings on each test stripe with a Retroreflectometer with a direct readout in millicandelas per square meter per lux (mcd/m2/lx). Conform testing per ASTM D4061, ASTM E1710, ASTM E2177, and ASTM E2302.

3.1.6 Level of Performance Demonstration

The Contracting Officer will be present at the application demonstrations to observe the results obtained and to validate the operating parameters of the vehicle(s) and equipment. If accepted by the Contracting Officer, the test stripe is the measure of performance required for this project. Do not proceed with the work until the demonstration results are satisfactory to the Contracting Officer.

3.3 APPLICATION

3.3.1 Paint

Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a deficiency in drying of the markings, painting operations must cease until the cause of the slow drying is determined and corrected.

3.3.1.1 Waterborne Paint

3.3.1.1.1 Airfields

For non-reflectorized and reflectorized pavement marking, apply TT-P-1952 Type I paint at a rate of 121 plus or minus 6 square feet per gallon. Apply FS TT-B-1325 Type IV beads at rate of 7 plus or minus 0.5 pounds of glass spheres per gallon.

3.3.1.1.2 Roads

For non-reflectorized and reflectorized pavement marking, apply TT-P-1952 Type I paint at a rate of 121 plus or minus 6 square feet per gallon. Apply FS TT-B-1325 Type IV beads at rate of 7 plus or minus 0.5 pounds of glass spheres per gallon.

3.3.1.1.3 Cleanup and Waste Disposal

Keep the worksite clean and free of debris and waste from the removal and application operations. Dispose of debris at approved sites.

3.4 FIELD QUALITY CONTROL

3.4.1 Sampling and Testing

As soon as the paint materials and reflective media are available for sampling, obtain by random selection from the sealed containers, two quart samples of each batch in the presence of the Contracting Officer. Two quarts will be for sampling and testing by the Contractor and two quarts will be for retention by the Government. Accomplish adequate mixing prior to sampling to ensure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly

identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved.

At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.]

3.4.2 Material Inspection

Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance. A certificate of compliance shall be accompanied by test results substantiating conformance to the specified requirements.

3.4.3 Dimensional Tolerances

Apply all markings in the standard dimensions provide in the drawings. New markings may deviate a maximum of 10 percent larger than the standard dimension. The maximum deviation allowed when painting over an old marking is up to 20 percent larger than the standard dimensions.

3.4.4 Bond Failure Verification

Inspect newly applied markings for signs of bond failure based on visual inspection and comparison to results from Test Stripe Demonstration paragraph.

3.4.5 Reflective Media and Coating Application Verification

Use a wet film thickness gauge to measure the application of wet paint. Use a microscope or magnifying glass to evaluate the embedment of glass beads in the paint. Verify the glass bead embedment with approximately 50 percent of the individual bead spheres embedded and 50 percent of the individual bead spheres exposed.

3.4.6 Retroreflective Markings

Collect and record readings for white and yellow retroreflective markings at the rate of one reading per 1000 linear feet. The minimum acceptable average for white markings is 200 millicandelas per square meter per lux (mcd/m2/lx) (measured with Retroreflectometer). The minimum acceptable average for yellow markings is 175 millicandelas per square meter per lux (mcd/m2/lx). Compute readings by averaging a minimum of 10 readings taken within the area at random locations. Re-mark areas not meeting the retroreflective requirements stated above.

3.4.7 Material Bond Verification and Operations Area Cleanup for Airfields

Vacuum sweep the aircraft operating area before it is opened for aircraft operations to preclude potential foreign object damaged to aircraft engines. Visually inspect the pavement markings and the material captured by the vacuum. Verify that no significant loss of reflective media has occurred to the pavement marking due to the vacuum cleaning.

-- End of Section --

SECTION 34 73 13

MOORING AND GROUNDING POINTS FOR AIRCRAFT
04/08

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 D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A436	(1984; R 2011) Standard Specification for Austenitic Gray Iron Castings
ASTM A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM B371/B371M	(2008; R 2013) Standard Specification for Copper-Zinc-Silicon Alloy Rod
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM C94/C94M	(2016) Standard Specification for Ready-Mixed Concrete
ASTM C579	Standard test method for Compressive Strength of chemical resistant mortars, grouts, monolithic surfacing and polymer concretes.
ASTM C1059	Standard Specification for Latex Agents for bonding fresh to hardened concrete.
ASTM C1064	Standard Specification for carbon-steel wire and welded wire reinforcement plain and reformed for concrete.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 407	(2017) Standard for Aircraft Fuel Servicing

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 300 (1990) Specifications for Membrane-Forming Compounds for Curing Concrete

UNDERWRITERS LABORATORIES (UL)

UL 467 (2013) Grounding and Bonding Equipment

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only.

SD-02 Shop Drawings

Shop Drawings; G

SD-06 Test Reports

Concrete; G

Tests

SD-07 Certificates

Mooring Devices; G

Grounding Rods; G

Grounding Connectors; G

Copper Conductors; G

Concrete Bonding Adhesive; G

High Strength Epoxy Grout; G

1.3 SHOP DRAWINGS

Submit Shop Drawings that provide current factual information, including deviations from and amendments to the drawings and changes in the work, concealed and visible. Shop Drawings to include detail assembly to be installed.

PART 2 PRODUCTS

2.1 METALS

Do not use combination of materials that forms an electrolytic couple, which accelerates corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such metals.

2.2 MOORING DEVICES

Mooring devices shall be cast in ductile iron 80-55-06 conforming to ASTM A436, unless otherwise indicated. The device shall be as shown in the contract drawings. Submit certificates of compliance on the devices stating that the mooring devices meet the specified requirements.

2.3 GROUNDING RODS

Grounding rods, unless otherwise indicated, shall conform to UL 467 and shall be made of copper-clad steel. The rods shall be not less than 3/4 inch in diameter and not less than 10 feet long. The copper cladding shall conform to the applicable requirements of ASTM B371/B371M, Copper Alloy UNS No's. c 69400, c 69430, c 69440 or c 69450. The copper cladding shall be not less than 0.010 inches thick at any point and shall comply with adherence requirements and the banding requirements of UL 467. Submit certificates of compliance stating that the grounding rods meet the specified requirements. Rods shall be provided with a closed eye or shepherd's hook bend having an inside diameter of not less than 1-1/4 inches.

2.4 COPPER CONDUCTORS

Copper conductors shall be bare number 4 AWG copper wire conforming to ASTM B8. Submit certificates of compliance stating that the copper conductors meet the specified requirements.

2.5 GROUNDING CONNECTORS

Grounding connectors shall comply with UL 467 for the required application. Submit certificates of compliance stating that the grounding connectors meet the specified requirements.

2.6 CONCRETE

Submit complete concrete mix design including all cement, aggregate, and concrete tests and compliance certificates. Concrete shall be in accordance with Section 32 13 13.06 Portland Cement Concrete Pavement for Roads and Site Facilities ASTM C94/C94M. The concrete shall be air entrained and have a minimum compressive strength of 3000 psi.

2.7 REINFORCING STEEL

Reinforcing steel shall be new billet steel and conform to ASTM A615/A615M Grade 60. Welded wire fabric shall conform to ASTM A1064. Submit certificates of compliance stating that the reinforcing steel meets the specified requirements.

2.8 EPOXY’S AND GROUT

a. High strength Epoxy and Grout ASTM C579.
b. Concrete Bonding Adhesive ASTM C1059.

PART 3 EXECUTION

3.1 MOORING POINTS IN EXISTING RIGID PAVEMENTS

Install the mooring points, unless otherwise indicated, 6 plus or minus 1/2 inch diameter holes cored through the pavement. The core holes shall be drilled within plus or minus 1-1/2 inches of the location shown in the contract drawings. The mooring device and attached grounding rod shall be installed within plus or minus 1/2 inch of the center of the core hole. The top of the mooring device shall be installed within 1/4 inch of the surrounding pavement surfaces, but not higher.

3.1.1 Coring Requirements

Core the holes using rotary, non-percussion drilling techniques. The sides of the core hole shall be perpendicular to the pavement surface. Once the pavement is cored, the base course shall be excavated as shown in the drawings. The sides of the core hole shall be cleaned and vertical. Place the concrete around the mooring device. The surface of the concrete shall be finished and textured to match the adjacent pavement surface and elevation. White pigmented curing compound meeting the requirements of COE CRD-C 300 shall be uniformly applied at a coverage of not more than 200 square feet per gallon.

3.1.2 Cleanup

Control all operations to minimize the amount of dust, dirt, debris and laitance in the work area. Clean all dirt, dust, debris, or laitance from coring or concreting operations, from the pavement surfaces prior to final acceptance.

3.2 MOORING POINTS INSTALLED IN DRILLED PIERS

NOT USED

3.2.1 Government Inspection

The Contracting Officer will inspect each core drilled. Concrete shall not be placed until the excavation has been approved.

3.2.2 Installation Procedures

Core drill thru concrete to the depths and dimensions shown. Bottoms of core shall be cleaned of loose or soft material and leveled. Excavated material shall be disposed of in accordance with Section 31 00 00 EARTHWORK. Perform the following:

a. Install the mooring device within plus or minus 1 inch of the center of the drilled pier. The top of the mooring device shall be within 1/4 inch of the top of the existing surface, but not higher.

b. Provide protection around top of the excavation to prevent debris from being dislodged into the excavation and concrete.

3.3 GROUNDING POINTS

Locate the grounding points as shown on the contract drawings to within plus or minus 2 inches.

3.3.1 Pavement Recess

The top of the grounding rod shall be set at or not more than 1/4 inch below the pavement surface grade. A recess 2-3/4 inches wide, and not more than 6 inches long, with a smooth rounded edge shall be provided in the pavement around the grounding point anchor eye to permit the entrance of lines into the eye and to allow for attachment of the grounding cable. The depth of the recess shall be no deeper than the bottom of the opening of the grounding point eye.

3.3.2 Installation

3.3.2.1 Existing Rigid Pavement

Install grounding rods in holes cored through the rigid pavement using rotary, non-percussion drilling techniques. The core holes shall have a minimum diameter of 6 inches. The grounding rod shall be installed by pushing or driving the rod through the pavement base courses and subgrade. The installation technique chosen shall not damage the grounding rod or the pavement. Installation shall be completed by placing concrete around the grounding rod in two lifts with each lift consolidated with spud vibrators.

3.3.3 Interconnection

Grounding rods within aircraft hangars shall be electrically interconnected to the hangar electrical grounding system with not less than a number 4 AWG bare copper conductor. Grounding rods installed at fueling hydrant outlets shall be electrically interconnected with the fuel piping with not less than a number 4 AWG bare copper conductor.

3.4 TESTS

Submit an independent testing agency's certified reports of inspections and tests, including analysis and interpretation of test results. Each report shall be properly identified. Describe Test methods and standards used. Measure resistance to ground tests as specified in NFPA 407. Submit test results to the Contracting Officer. Report to the Contracting Officer, immediately, any ground rods that have more than 10,000 ohms of resistance.

-- End of Section --

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26 05 00.00 40	COMMON WORK RESULTS FOR ELECTRICAL
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DIVISION 33 - UTILITIES

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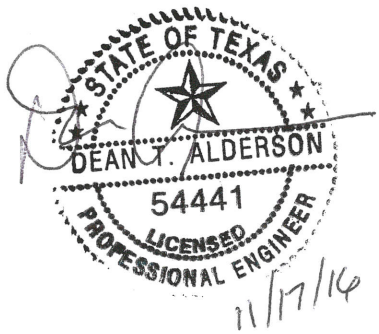
-- End of Project Table of Contents --



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SECTION 26 00 00.00 20

BASIC ELECTRICAL MATERIALS AND METHODS
07/06

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 the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 1 2012; INT 1-4 2012; Errata 2 2013; INT 5-7 2013; INT 8-10 2014; INT 11 2015) National Electrical Safety Code
IEEE C57.12.28	(2014) Standard for Pad-Mounted Equipment - Enclosure Integrity
IEEE C57.12.29	(2014) Standard for Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2014) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 26 and 33, ELECTRICAL and UTILITIES, of this project specification unless specified otherwise in the individual sections. This section has been incorporated into, and thus, does not apply to, and is not referenced in the following sections.

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM
Section 26 56 00 EXTERIOR LIGHTING
Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION
Section 33 82 00 TELECOMMUNICATIONS OUTSIDE PLANT (OSP)

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.4.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.4.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.5 QUALITY ASSURANCE

1.5.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.5.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same

class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.5.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.5.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.6 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.7 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

c. Safety precautions.

d. The procedure in the event of equipment failure.

e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.8 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.9 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment

enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.10 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

a. When the enclosure integrity of such equipment is specified to be in accordance with IEEE C57.12.28 or IEEE C57.12.29, such as for pad-mounted transformers and pad-mounted SF6 switches, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPSO710D72 or approved equal.

b. When such equipment is guarded by a fence, mount signs on the fence. Provide metal signs having nominal dimensions of 14 by 10 inches with the legend "DANGER HIGH VOLTAGE KEEP OUT" printed in three lines of nominal 3 inch high white letters on a red and black field.

1.11 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.12 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in Section 09 90 00 PAINTS AND COATINGS.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

-- End of Section --

SECTION 26 05 00.00 40

COMMON WORK RESULTS FOR ELECTRICAL
08/13

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.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA 480	(1981) Toggle Switches

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI Z535.1	(2006; R 2011) American National Standard for Safety--Color Code
ANSI/NEMA OS 1	(2013) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA FB 1	(2012) Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
NEMA KS 1	(2013) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2013) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint Jul 2012) Standard for Flexible Metal Conduit
UL 1242	(2006; Reprint Mar 2014) Standard for Electrical Intermediate Metal Conduit -- Steel

UL 489	(2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 6	(2007; reprint Nov 2010) Electrical Rigid Metal Conduit-Steel
UL 797	(2007; Reprint Dec 2012) Electrical Metallic Tubing -- Steel
UL 870	(2008; Reprint Feb 2013) Standard for Wireways, Auxiliary Gutters, and Associated Fittings

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

Material, Equipment, and Fixture Lists; G

SD-03 Product Data

Conduits and Raceways; G

Wire and Cable; G

Splices and Connectors; G

Switches; G; G,

Outlets, Outlet Boxes, and Pull Boxes; G

Circuit Breakers; G

SD-07 Certificates

Certification; G

SD-08 Manufacturer's Instructions

Manufacturer's Instructions; G

1.3 QUALITY ASSURANCE

Submit certification required to install equipment components and system packages.

PART 2 PRODUCTS

Submit manufacturer's instructions including special provisions required to install equipment components and system packages. Special provisions detail impedances, hazards and safety precautions.

2.1 EQUIPMENT

Provide the standard cataloged materials and equipment of manufacturers regularly engaged in the manufacture of the products. For material, equipment, and fixture lists submittals, show manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site.

2.1.1 Conduits And Raceways

2.1.1.1 Rigid Steel Conduit

Ensure rigid steel conduit complies with UL 6 and is galvanized by the hot-dip process. Use polyvinylchloride (PVC) coated rigid steel conduit in accordance with NEMA RN 1, where underground and in corrosive areas, or painted with bitumastic.

Use threaded fittings for rigid steel conduit.

Use solid gaskets. Ensure conduit fittings with blank covers have gaskets, except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

Ensure covers have captive screws and are accessible after the work has been completed.

2.1.1.2 Electrical Metallic Tubing (EMT)

Ensure EMT is in accordance with UL 797 and is zinc coated steel. Provide zinc-coated couplings and connectors that are raintight, gland compression with insulation throat. Crimp, spring, or setscrew type fittings are not acceptable.

2.1.1.3 Flexible Metallic Conduit

Ensure flexible metallic conduit is galvanized steel and complies with UL 1.

Ensure fittings for flexible metallic conduit are specifically designed for such conduit.

Provide liquidtight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

Specifically design fittings for liquidtight flexible metallic conduit for such conduit.

2.1.1.4 Intermediate Metal Conduit

Ensure intermediate metal conduit is galvanized steel and complies with UL 1242.

2.1.1.5 Rigid Nonmetallic Conduit

Ensure rigid nonmetallic conduit complies with NEMA TC 2 and NEMA TC 3 with wall thickness not less than Schedule 40.

2.1.1.6 Wireways and Auxiliary Gutters

Ensure wireways and auxiliary gutters are a minimum 4 by 4-inch trade size conforming to UL 870.

2.1.2 Wire and Cable

Use copper 600-volt type THHN for conductors installed in conduit. Ensure all conductors AWG No. 8 and larger, are stranded. All conductors smaller than AWG No. 8 are stranded.

Wire shall be No. 10 to rectifier power.

2.1.3 Switches

2.1.3.1 Safety Switches

Ensure safety switches comply with NEMA KS 1, and are the heavy-duty type with enclosure, voltage, current rating, number of poles, and fusing as indicated. Switch construction is such that, when the switch handle in the "ON" position, the cover or door cannot be opened. Cover release device is coinproof and so constructed that an external tool is used to open the cover. Make provisions to lock the handle in the "OFF" position. Ensure the switch is not capable of being locked in the "ON" position.

Provide switches of the quick-make, quick-break type. Approve terminal lugs for use with copper conductors.

Ensure safety color coding for identification of safety switches conforms to ANSI Z535.1.

2.1.3.2 Toggle Switches

Ensure toggle switches comply with EIA 480, control incandescent, mercury, and fluorescent lighting fixtures and are the heavy duty, general purpose, noninterchangeable flush-type.

Provide commercial grade toggle switches, single-pole, two-position devices rated 20 amperes at 277 volts, 60 hertz alternating current (ac) only.

Ensure all toggle switches are products of the same manufacturer.

2.1.4 Outlets, Outlet Boxes, and Pull Boxes

Ensure outlet boxes for use with conduit systems are in accordance with NEMA FB 1 and ANSI/NEMA OS 1 and are not less than 1-1/2 inches deep. Furnish all pull and junction boxes with screw-fastened covers.

2.1.5 Circuit Breakers

Ensure circuit-breaker interrupting rating is not less than those indicated and in no event less than what is indicated on the drawings. Multipole circuit breakers are the common-trip type with a single handle. Molded case circuit breakers are bolt-on type conforming to UL 489.

PART 3 EXECUTION

3.1 PREPARATION

Protect metallic materials against corrosion. Provide equipment enclosures with the standard finish by the manufacturer when used for most indoor installations. Do not use aluminum when in contact with earth or concrete and, where connected to dissimilar metal, protect by approved fittings and treatment. Provide hot-dip galvanized ferrous metals such as, but not limited to, anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous not of corrosion-resistant steel except where other equivalent protective treatment is specifically approved in writing.

3.2 INSTALLATION

3.2.1 Conduits, Raceways And Fittings

Conduit runs between outlet and outlet, between fitting and fitting, or between outlet and fitting cannot contain more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting.

Do not install crushed or deformed conduit. Avoid trapped conduit runs where possible. Take care to prevent the lodgment of foreign material in the conduit, boxes, fittings, and equipment during the course of construction. Clear any clogged conduit of obstructions or be replaced.

Conduit and raceway runs concealed in or behind walls, above ceilings, or exposed on walls and ceilings 5 feet or more above finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).

3.2.1.1 Rigid Steel Conduit

Make field-made bends and offsets with approved hickey or conduit bending machine. Use long radius conduit for elbows larger than 2-1/2 inches.

Provide all conduit stubbed-up through concrete floors for connections to free-standing equipment with the exception of motor-control centers, cubicles, and other such items of equipment, with a flush coupling when the floor slab is of sufficient thickness. Otherwise, provide a floor box set flush with the finished floor. For conduits installed for future use, terminate with a coupling and plug set flush with the floor.

3.2.1.2 Electrical Metallic Tubing (EMT)

Ground EMT in accordance with NFPA 70, using pressure grounding connectors especially designed for EMT.

3.2.1.3 Flexible Metallic Conduit

Use flexible metallic conduit to connect recessed fixtures from outlet boxes in ceilings, transformers, and other approved assemblies.

Use bonding wires in flexible conduit as specified in NFPA 70, for all circuits. Flexible conduit is not considered a ground conductor.

Make electrical connections to vibration-isolated equipment with flexible metallic conduit.

Use liquidtight flexible metallic conduit in wet and oily locations and to complete the connection to motor-driven equipment.

3.2.1.4 Intermediate Conduit

Make all field-made bends and offsets with approved hickey or conduit bending machine. Use intermediate metal conduit only for indoor installations.

3.2.1.5 Rigid Nonmetallic Conduit

Ensure rigid PVC conduit is direct buried.

Install a green insulated copper grounding conductor in conduit with conductors and solidly connect to ground at each end. Size grounding wires in accordance with NFPA 70.

3.2.1.6 Splices and Connectors

Make all splices in AWG No. 8 and smaller with approved insulated electrical type.

Make all splices in AWG No. 6 and larger with indentor crimp-type connectors and compression tools. Wrap joints with an insulating tape that has an insulation and temperature rating equivalent to that of the conductor.

3.2.2 Wiring

Color code feeder and branch circuit conductors as follows:

CONDUCTOR	COLOR AC
Phase A	Brown
Phase B	Orange
Phase C	Yellow
Neutral	White
Equipment Grounds	Green

Use conductors up to and including AWG No. 2 that are manufactured with colored insulating materials. For conductors larger than AWG No. 2, have ends identified with color plastic tape in outlet, pull, or junction boxes.

Splice in accordance with the NFPA 70. Provide conductor identification within each enclosure where a tap, splice, or termination is made and at the equipment terminal of each conductor. Match terminal and conductor identification as indicated.

Where several feeders pass through a common pullbox, tag the feeders to clearly indicate the electrical characteristics, circuit number, and panel designation.

3.2.3 Safety Switches

Securely fasten switches to the supporting structure or wall, utilizing a minimum of four 1/4 inch bolts. Do not use sheet metal screws and small machine screws for mounting. Do not mount switches in an inaccessible location or where the passageway to the switch may become obstructed. Mounting height as noted on drawings.

3.2.4 Wiring Devices

3.2.4.1 Wall Switches and Receptacles

Install wall switches and receptacles so that when device plates are applied, the plates are aligned vertically.

Bond ground terminal of each flush-mounted receptacle to the outlet box with an approved green bonding jumper when used with dry wall type construction.

-- End of Section --

SECTION 26 05 19.10 10

INSULATED WIRE AND CABLE
05/16

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.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1202	(2006; R 2012; CORR 1 2012) Flame-Propagation Testing of Wire and Cable

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-58-679	(2014) Control, Instrumentation and Thermocouple Extension Conductor Identification
ICEA T-30-520	(1986) Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input Rate of 70,000 B.T.U./Hour

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA WC 71/ICEA S-96-659	(1999) Standard for Nonshielded Cables Rated 2001-5000 Volts for use in the Distribution of Electric Energy
NEMA WC 57	(2014) Standard for Control, Thermocouple Extension, and Instrumentation Cables
NEMA WC 70	(2009) Power Cable Rated 2000 V or Less for the Distribution of Electrical Energy--S95-658
NEMA WC 74/ICEA S-93-639	(2012) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1685	(2015) UL Standard for Safety Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and

	Optical-Fiber Cables
UL 2556	(2015) UL Standard for Safety Wire and Cable Test Methods
UL 83	(2014) Thermoplastic-Insulated Wires and Cables

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. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wire and Cable; G

Conductors; G

Cable Manufacturing Data

SD-06 Test Reports

Test Report(s), Inspection Report(s), and Verification Report(s); G

1.3 DELIVERY, STORAGE, AND HANDLING

Furnish cables on reels or coils. Each cable and the outside of each reel or coil, must be plainly marked or tagged to indicate the cable length, voltage rating, conductor size, and manufacturer's lot number and reel number. Each coil or reel of cable must contain only one continuous cable without splices. Cables for exclusively dc applications, as specified in paragraph "High-Voltage Test Source," must be identified as such.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Wire Table

Furnish wire and cable in accordance with the requirements of the wire table below, conforming to the detailed requirements specified herein.

2.1.2 Rated Circuit Voltages

All power wire and cable must have minimum rated circuit voltages in accordance with NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable. Power wire and cable for circuit voltages rated 0-600 volts must be rated not less than 600 volts. Control wire and cable must have minimum rated circuit voltages in accordance with NEMA WC 57, but must be rated 600 volts if routed in raceway with other conductors that are rated 600 volts.

2.1.3 Conductors

2.1.3.1 Material for Conductors

Conductors must conform to all the applicable requirements of NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable. Copper conductors must be annealed copper material and they may be bare, or tin- or lead-alloy-coated, if required by the type of insulation used.

2.1.3.2 Size

Minimum wire size must be No. 12 AWG for power and lighting circuits; No. 10 AWG for current transformer secondary circuits; No. 14 AWG for potential transformer, relaying, and control circuits; No. 16 AWG for annunciator circuits; and No. 19 AWG for alarm circuits. Minimum wire sizes for rated circuit voltages of 2,001 volts and above must not be less than those listed for the applicable voltage in ANSI/NEMA WC 71/ICEA S-96-659 or NEMA WC 74/ICEA S-93-639, as applicable.

2.1.3.3 Stranding

Conductor stranding classes cited herein must be as defined for control conductors in NEMA WC 57 or as defined for 0-2,000 volts power conductors in NEMA WC 70, as applicable. Lighting conductors No. 10 AWG and smaller must be solid or have Class B stranding. Any conductors used between stationary and moving devices, such as hinged doors or panels, must have Class H or K stranding. All other conductors must have Class B or C stranding, except that conductors as shown, or in the schedule, as No. 12 AWG may be 19 strands of No. 25 AWG, and conductors shown as No. 10 AWG may be 19 strands of No. 22 AWG. Conductor stranding classes for circuit voltages 2,001 volts and above must be as defined in ANSI/NEMA WC 71/ICEA S-96-659 and NEMA WC 74/ICEA S-93-639, as applicable.

2.1.3.4 Conductor Shielding

Use conductor shielding conforming to NEMA WC 57 for control wire and cable as applicable. Use conductor shielding conforming to ANSI/NEMA WC 71/ICEA S-96-659 or NEMA WC 74/ICEA S-93-639, as applicable, on power cables having a rated circuit voltage above 2,000 volts.

2.1.3.5 Separator Tape

Where conductor shielding, strand filling, or other special conductor treatment is not required, a separator tape between conductor and insulation is permitted.

2.1.4 Insulation

2.1.4.1 Insulation Material

Unless specified otherwise or required by NFPA 70, wires in conduit, other than service entrance, must be 600-volt, Type THWN/THHN conforming to UL 83. Insulation for control wire and cable must meet the requirements of NEMA WC 57. Insulation requirements for wire and cable rated less than 2,000 volts must meet the requirements of NEMA WC 70. Insulation requirements for wire and cable rated 2,001-5,000 volts must meet the requirements of ANSI/NEMA WC 71/ICEA S-96-659. Insulation requirements for wire and cable rated 5,001 volts and greater must meet the requirements of

NEMA WC 74/ICEA S-93-639.

2.1.4.2 Insulation Thickness

The insulation thickness for each conductor must be based on its rated circuit voltage.

2.1.4.2.1 Power Cables, 2,000 Volts and Below

The insulation thickness for single-conductor and multiple-conductor power cables rated 2,000 volts and below must be as required by NEMA WC 70, as applicable. Some thicknesses of NEMA WC 70 will be permitted only for single-conductor cross-linked thermosetting polyethylene insulated cables without a jacket. NEMA WC 70 ethylene-propylene rubber-insulated conductors must have a jacket.

2.1.4.2.2 Single-Conductor and Multiple-Conductor Control Cables

The insulation thickness of control conductor sizes 22 AWG to 10 AWG used for control and related purposes must be as required by NEMA WC 57, as applicable. Control conductors larger than 10 AWG must be as required by NEMA WC 70.

2.1.4.3 Insulation Shielding

Unless otherwise specified, provide insulation shielding for conductors having rated circuit voltages of 2,001 volts and above. The voltage limits above which insulation shielding is required, and the material requirements, are given in ANSI/NEMA WC 71/ICEA S-96-659 or NEMA WC 74/ICEA S-93-639, as applicable. The material, if thermosetting, must meet the wafer boil test requirements as described in ANSI/NEMA WC 71/ICEA S-96-659 or NEMA WC 74/ICEA S-93-639, as applicable. The method of shielding must be in accordance with the current practice of the industry; however, the application process must include strict precautions to prevent voids or contamination between the insulation and the nonmetallic component. Voids, protrusions, and indentations of the shield must not exceed the maximum allowances specified in ANSI/NEMA WC 71/ICEA S-96-659 or NEMA WC 74/ICEA S-93-639, as applicable. The cable must be capable of operating without damage or excessive temperature when the shield is grounded at both ends of each conductor. All components of the shielding system must remain tightly applied to the components they enclose after handling and installation in accordance with the manufacturer's recommendations. Shielding systems which require heat to remove are prohibited unless specifically approved.

2.1.5 Jackets

All cables must have jackets meeting the requirements of NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, and NEMA WC 74/ICEA S-93-639, as applicable, and as specified herein. Individual conductors of multiple-conductor cables must be required to have jackets only if they are necessary for the conductor to meet other specifications herein. Jackets of single-conductor cables and of individual conductors of multiple-conductor cables, except for shielded cables, must be in direct contact and adhere or be vulcanized to the conductor insulation. Multiple-conductor cables and shielded single-conductor cables must be provided with a common overall jacket, which must be tightly and concentrically formed around the core. Repaired jacket defects found and corrected during manufacturing are permitted if the cable, including

jacket, afterward fully meets these specifications and the requirements of the applicable standards.

2.1.5.1 Jacket Material

The jacket must be one of the materials listed below. Polyvinyl chloride compounds will not be permitted.

2.1.5.1.1 General Use

Heavy-duty black neoprene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Heavy-duty chlorosulfonated polyethylene	NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Heavy-duty cross-linked (thermoset) chlorinated polyethylene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639

2.1.5.1.2 Accessible Use Only, 2,000 Volts or Less

Cables installed where they are entirely accessible, such as cable trays and raceways with removable covers, or where they pass through less than 10 feet of exposed conduit only, must have jackets of one of the materials in item "a. General Use" or one of the following:

General-purpose neoprene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Black polyethylene (MDPE)	NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Thermoplastic chlorinated polyethylene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639

2.1.5.2 Jacket Thickness

The minimum thickness of the jackets must be not less than 80 percent of the respective nominal thicknesses specified below.

2.1.5.2.1 Multiple-Conductor Cables

Thickness of the jackets of the individual conductors of multiple-conductor cables must be as required by NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable and must be in addition to the conductor insulation thickness required by the applicable respective NEMA publication for the insulation used.

Thickness of the outer jackets and associated coverings of the assembled multiple-conductor cables must be as required by NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable.

2.1.5.2.2 Single-Conductor Cables

Single-conductor cables must have a jacket thickness as specified in NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable.

2.1.6 Metal-Clad Cable

2.1.6.1 General

The metallic covering or sheath must be interlocked metal tape , conforming to the applicable requirements of NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639. The type of metal for the metallic covering must be galvanized steel. If the covering is of ferrous metal, it must be galvanized. Grounding conductor(s) conforming to NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable must be furnished for each multiple-conductor metal-clad cable. Assembly and cabling must be as specified in paragraph "Cabling." The metallic covering must be applied over an inner jacket or filler tape. The cable must be assembled so that the metallic covering will be tightly bound over a firm core.

2.1.6.2 Jackets

Metal-clad cables may have a jacket under the armor, and must have a jacket over the armor. Jackets must comply with the requirements of NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable. The outer jacket for the metal-clad cable may be of polyvinyl chloride (PVC) only if specifically approved.

2.1.7 Multiple-Conductor Cables

Grounding conductor(s) conforming to NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable must be furnished for each multiple-conductor cable. Assembly and cabling must be as specified in paragraph CABLING.

2.2 CABLE IDENTIFICATION

2.2.1 Color-Coding

Insulation of individual conductors of multiple-conductor cables must be color-coded in accordance with ICEA S-58-679, except that colored braids will not be permitted. Only one color-code method must be used for each cable construction type. Control cable color-coding must be in accordance with ICEA S-58-679,as follows:. Power cable color-coding must be black for Phase A, red for Phase B, blue for Phase C, white for grounded neutral, and green for an insulated grounding conductor, if included.

2.2.2 Shielded Cables Rated 2,001 Volts and Above

Marking must be in accordance with ANSI/NEMA WC 71/ICEA S-96-659 or NEMA WC 74/ICEA S-93-639, as applicable.

2.2.3 Cabling

Individual conductors of multiple-conductor cables must be assembled with flame-and moisture-resistant fillers, binders, and a lay conforming to NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639. Flat twin cables are prohibited. Fillers must be used in the interstices of multiple-conductor round cables with a common covering where necessary to give the completed cable a substantially circular cross section. Fillers must be non-hygroscopic material, compatible with the cable insulation, jacket, and other components of the cable. The rubber-filled or other approved type of binding tape must consist of a material that is compatible with the other components of the cable and must be lapped at least 10 percent of its width.

2.2.4 Dimensional Tolerance

The outside diameters of single-conductor cables and of multiple-conductor cables must not vary more than 5 percent and 10 percent, respectively, from the manufacturer's published catalog data.

PART 3 EXECUTION

3.1 INSTALLATION INSTRUCTIONS

Submit cable manufacturing data as requested. The following information must be provided by the cable manufacturer for each size, conductor quantity, and type of cable furnished:

a. Minimum bending radius, in inches - For multiple-conductor cables, this information must be provided for both the individual conductors and the multiple-conductor cable.

b. Pulling tension and sidewall pressure limits, in pounds.

c. Instructions for stripping semiconducting insulation shields, if furnished, with minimum effort without damaging the insulation.

d. Upon request, compatibility of cable materials and construction with specific materials and hardware manufactured by others must be stated. Also, if requested, recommendations must be provided for various cable operations, including installing, splicing, terminating, etc.

3.2 TEST REPORT(S), INSPECTION REPORT(S), AND VERIFICATION REPORT(S)

3.2.1 Cable Data

Do not begin any wire and cable fabrication until materials are submitted and approved by the Contracting Officer. Submit cable data for approval including, but not limited to, dimensioned sketches showing cable construction and sufficient additional data to show that wire and cable meet the requirements of this Section.

3.2.2 Inspection and Tests

Inspection and tests of wire and cable furnished under these specifications must be made by and at the plant of the manufacturer. The Government may require or perform further tests before or after installation. Testing in general must comply with NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable.

Specific tests required for particular materials, components, and completed cables must be as specified in the sections of the above standards applicable to those materials, components, and cable types. Tests must also be performed in accordance with the additional requirements specified below. Submit 3 certified copies of test reports.

3.2.2.1 Flame Tests

All multiple-conductor and single-conductor cable assemblies must pass either the vertical cable tray flame tests required by ICEA T-30-520 (stated in, but not required by NEMA WC 70), the vertical tray flame propagation test requirements of UL 1685 and IEEE 1202, the wire and cable burning characteristics test of the UL 2556 VW-1 Test, or (for control cables only) the flame test as required by NEMA WC 57. If such tests, however, have previously been made on identical cables, these tests need not be repeated. Instead, certified reports of the original qualifying tests must be submitted. In this case the reports furnished under paragraph "Reports," must include information, identify critical information, and verify that all of each cable's materials, construction, and dimensions are the same as those in the qualifying tests.

3.2.2.2 Independent Tests

The Government may make visual inspections, continuity or resistance checks, insulation resistance readings, power factor tests, or dc high potential tests at field test values. A cable's failure to pass these tests and inspections, or failure to produce readings consistent with acceptable values for the application, will be grounds for rejection of the cable.

3.2.2.3 Reports

Furnish results of tests. No wire or cable must be shipped until authorized. Lot number and reel or coil number of wire and cable tested must be indicated on the test reports.

-- End of Section --

SECTION 26 20 00

INTERIOR DISTRIBUTION SYSTEM
02/14

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 the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B1	(2013) Standard Specification for Hard-Drawn Copper Wire
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 1 2012; INT 1-4 2012; Errata 2 2013; INT 5-7 2013; INT 8-10 2014; INT 11 2015) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C80.1	(2005) American National Standard for Electrical Rigid Steel Conduit (ERSC)
ANSI C80.3	(2005) American National Standard for Electrical Metallic Tubing (EMT)
ANSI C80.5	(2005) American National Standard for Electrical Rigid Aluminum Conduit
NEMA 250	(2014) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA FU 1	(2012) Low Voltage Cartridge Fuses
NEMA ICS 1	(2000; R 2015) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 4	(2015) Terminal Blocks

NEMA ICS 6	(1993; R 2011) Enclosures
NEMA KS 1	(2013) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA MG 1	(2014) Motors and Generators
NEMA MG 10	(2013) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors
NEMA MG 11	(1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors
NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2015) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA WD 1	(1999; R 2005; R 2010) Standard for General Color Requirements for Wiring Devices
NEMA WD 6	(2012) Wiring Devices Dimensions Specifications
NEMA Z535.4	(2011) American National Standard for Product Safety Signs and Labels

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NFPA 70E	(2015; ERTA 1 2015) Standard for Electrical Safety in the Workplace

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-607	(2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

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

29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint Jul 2012) Standard for Flexible Metal Conduit
UL 1063	(2006; Reprint Jul 2012) Machine-Tool Wires and Cables
UL 1242	(2006; Reprint Mar 2014) Standard for Electrical Intermediate Metal Conduit -- Steel
UL 1660	(2014) Liquid-Tight Flexible Nonmetallic Conduit
UL 198M	(2003; Reprint Feb 2013) Standard for Mine-Duty Fuses
UL 20	(2010; Reprint Feb 2012) General-Use Snap Switches
UL 360	(2013; Reprint Jan 2015) Liquid-Tight Flexible Steel Conduit
UL 4248-1	(2007; Reprint Oct 2013) UL Standard for Safety Fuseholders - Part 1: General Requirements
UL 4248-12	(2007; Reprint Dec 2012) UL Standard for Safety Fuseholders - Part 12: Class R
UL 44	(2014; Reprint Feb 2015) Thermoset-Insulated Wires and Cables
UL 467	(2007) Grounding and Bonding Equipment
UL 486A-486B	(2013; Reprint Jan 2016) Wire Connectors
UL 486C	(2013; Reprint Jan 2016) Splicing Wire Connectors
UL 498	(2012; Reprint Jan 2016) Attachment Plugs and Receptacles
UL 50	(2007; Reprint Apr 2012) Enclosures for Electrical Equipment, Non-environmental Considerations
UL 506	(2008; Reprint Oct 2013) Specialty Transformers
UL 508	(1999; Reprint Oct 2013) Industrial Control Equipment
UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514B	(2012; Reprint Nov 2014) Conduit, Tubing

	and Cable Fittings
UL 6	(2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel
UL 651	(2011; Reprint May 2014) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 6A	(2008; Reprint Nov 2014) Electrical Rigid Metal Conduit - Aluminum, Red Brass, and Stainless Steel
UL 797	(2007; Reprint Dec 2012) Electrical Metallic Tubing -- Steel
UL 83	(2014) Thermoplastic-Insulated Wires and Cables
UL 870	(2008; Reprint Feb 2013) Standard for Wireways, Auxiliary Gutters, and Associated Fittings
UL 943	(2006; Reprint Jun 2012) Ground-Fault Circuit-Interrupters
UL 984	(1996; Reprint Sep 2005) Hermetic Refrigerant Motor-Compressors

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE 100.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00.

SD-02 Shop Drawings

Wireways; G

Marking strips drawings; G

SD-03 Product Data

Receptacles; G

Switches; G

Motor controllers; G

Manual motor starters; G

SD-06 Test Reports

600-volt wiring test; G

Grounding system test; G

Ground-fault receptacle test; G

SD-07 Certificates

Fuses; G

1.4 QUALITY ASSURANCE

1.4.1 Fuses

Submit coordination data as specified in paragraph, FUSES of this section.

1.4.2 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.4.3 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and:

a. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening including applications of equipment and materials under similar circumstances and of similar size.

b. Have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.

c. Where two or more items of the same class of equipment are required, provide products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.3.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.3.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable.

1.5 MAINTENANCE

1.6 WARRANTY

Provide equipment items supported by service organizations that are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.

2.2 CONDUIT AND FITTINGS

Conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

ANSI C80.1, UL 6.

2.2.1.2 Rigid Aluminum Conduit

ANSI C80.5, UL 6A.

2.2.2 Rigid Nonmetallic Conduit

PVC Type EPC-40, in accordance with NEMA TC 2,UL 651.

2.2.3 Intermediate Metal Conduit (IMC)

UL 1242, zinc-coated steel only.

2.2.4 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797, ANSI C80.3.

2.2.5 Plastic-Coated Rigid Steel and IMC Conduit

NEMA RN 1, Type 40(40 mils thick).

2.2.6 Flexible Metal Conduit

UL 1.

2.2.6.1 Liquid-Tight Flexible Metal Conduit, Steel

UL 360.

2.2.7 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings: cadmium- or zinc-coated in accordance with UL 514B.

2.2.7.1 Fittings for Rigid Metal Conduit and IMC

Threaded-type. Split couplings unacceptable.

2.2.7.2 Fittings for EMT

Die Cast compression type.

2.2.8 Fittings for Rigid Nonmetallic Conduit

NEMA TC 3 for PVC, and UL 514B.

2.2.9 Liquid-Tight Flexible Nonmetallic Conduit

UL 1660.

2.3 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.4 WIRES AND CABLES

Provide wires and cables in accordance applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Do not use wires and cables manufactured more than 12 months prior to date of delivery to site.

2.4.1 Conductors

Provide the following:

a. Conductor sizes and capacities shown are based on copper, unless indicated otherwise.

b. Conductors No. 8 AWG and larger diameter: stranded.

c. Conductors No. 10 AWG and smaller diameter: solid.

d. Conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3: stranded unless specifically indicated otherwise.

2.4.1.1 Equipment Manufacturer Requirements

When manufacturer's equipment requires copper conductors at the terminations or requires copper conductors to be provided between components of equipment, provide copper conductors or splices, splice boxes, and other work required to satisfy manufacturer's requirements.

2.4.1.2 Aluminum Conductors

Provide aluminum conductors of AA-8000 series electrical grade aluminum alloy conductors. Type EC/1350 aluminum is not acceptable. If Contractor choosees to provide aluminum for conductors No. 4 AWG and larger diameter, Contractor is responsible for increasing conductor size to have same ampacity as copper size indicated; increasing conduit and pull box sizes to accommodate larger size aluminum conductors in accordance with NFPA 70; ensuring that pulling tension rating of aluminum conductor is sufficient;

providing panelboards that are UL listed for use with aluminum, and so labeled; relocating equipment, modifying equipment terminations, resizing equipment; and resolving problems that are direct results of providing aluminum conductors in lieu of copper.

2.4.1.3 Minimum Conductor Sizes

Provide minimum conductor size in accordance with the following:

a. Branch circuits: No. 12 AWG.

b. Class 1 remote-control and signal circuits: No. 14 AWG.

c. Class 2 low-energy, remote-control and signal circuits: No. 16 AWG.

d. Class 3 low-energy, remote-control, alarm and signal circuits: No. 22 AWG.

2.4.2 Color Coding

Provide color coding for service, feeder, branch, control, and signaling circuit conductors.

2.4.2.1 Ground and Neutral Conductors

Provide color coding of ground and neutral conductors as follows:

a. Grounding conductors: Green.

b. Neutral conductors: White.

c. Exception, where neutrals of more than one system are installed in same raceway or box, other neutrals color coding: white with a different colored (not green) stripe for each.

2.4.2.2 Ungrounded Conductors

Provide color coding of ungrounded conductors in different voltage systems as follows:

a. 208/120 volt, three-phase

(1) Phase A - black

(2) Phase B - red

(3) Phase C - blue

b. 480/277 volt, three-phase

(1) Phase A - brown

(2) Phase B - orange

(3) Phase C - yellow

c. 120/240 volt, single phase: Black and red

d. On three-phase, four-wire delta system, high leg: orange, as required

by NFPA 70.

2.4.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, provide power and lighting wires rated for 600-volts, Type THWN/THHN conforming to UL 83, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits: Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.4.4 Bonding Conductors

ASTM B1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.5 SPLICES AND TERMINATION COMPONENTS

UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires: insulated, pressure-type in accordance with UL 486A-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.6 DEVICE PLATES

Provide the following:

a. UL listed, one-piece device plates for outlets to suit the devices installed.

b. For metal outlet boxes, plates on unfinished walls: zinc-coated sheet steel or cast metal having round or beveled edges.

c. For nonmetallic boxes and fittings, other suitable plates may be provided.

d. Plates on finished walls: nylon or lexan, minimum 0.03 inch wall thickness and same color as receptacle or toggle switch with which they are mounted.

e. Screws: machine-type with countersunk heads in color to match finish of plate.

f. Sectional type device plates are not be permitted.

g. Plates installed in wet locations: gasketed and UL listed for "wet locations."

2.7 SWITCHES

2.7.1 Toggle Switches

NEMA WD 1, UL 20, single pole, double pole, three-way, and four-way, totally enclosed with bodies of thermoplastic or thermoset plastic and mounting strap with grounding screw. Include the following:

a. Handles: white thermoplastic.

b. Contacts: silver-cadmium and contact arm - one-piece copper alloy.

c. Switches: rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.

2.7.2 Switch with Red Pilot Handle

NEMA WD 1. Provide the following:

a. Pilot lights that are integrally constructed as a part of the switch's handle.

b. Pilot light color: red and illuminate whenever the switch is closed or "on".

c. Pilot lighted switch: rated 20 amps and 120 volts or 277 volts as indicated.

d. The circuit's neutral conductor to each switch with a pilot light.

2.7.3 Disconnect Switches

NEMA KS 1. Provide heavy duty-type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches. Utilize Class R fuseholders and fuses for fused switches, unless indicated otherwise. Provide horsepower rated for switches serving as the motor-disconnect means. Provide switches in NEMA 1 or 3R, enclosure as indicated per NEMA ICS 6.

2.8 FUSES

NEMA FU 1. Provide complete set of fuses for each fusible switch. Coordinate time-current characteristics curves of fuses serving motors or connected in series with circuit breakers for proper operation. Submit coordination data for approval. Provide fuses with a voltage rating not less than circuit voltage.

2.8.1 Fuseholders

Provide in accordance with UL 4248-1.

2.8.2 Cartridge Fuses, Current Limiting Type (Class R)

UL 198M, Class RK-1. Provide only Class R associated fuseholders in accordance with UL 4248-12.

2.8.3 Cartridge Fuses, High-Interrupting Capacity, Current Limiting Type (Classes J, L, and CC)

UL 198M, Class J for zero to 600 amperes, Class L for 601 to 6,000 amperes, and Class CC for zero to 30 amperes.

2.8.4 Cartridge Fuses, Current Limiting Type (Class T)

UL 198M, Class T for zero to 1,200 amperes, 300 volts; and zero to 800 amperes, 600 volts.

2.9 RECEPTACLES

Provide the following:

a. UL 498, hard use (also designated heavy-duty), grounding-type.

b. Ratings and configurations: as indicated.

c. Bodies: white as per NEMA WD 1.

d. Face and body: thermoplastic supported on a metal mounting strap.

e. Dimensional requirements: per NEMA WD 6.

f. Screw-type, side-wired wiring terminals or of the solderless pressure type having suitable conductor-release arrangement.

g. Grounding pole connected to mounting strap.

h. The receptacle: containing triple-wipe power contacts and double or triple-wipe ground contacts.

2.9.1 Switched Duplex Receptacles

Provide separate terminals for each ungrounded pole. Top receptacle: switched when installed.

2.9.2 Weatherproof Receptacles

Provide receptacles, UL listed for use in "wet locations". Include cast metal box with gasketed, hinged, lockable and weatherproof while-in-use, polycarbonate, UV resistant/stabilized cover plate.

2.9.3 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Provide device capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A ground-fault circuit interrupter devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

2.10 MOTORS

Provide motors in accordance with the following:

a. NEMA MG 1.

b. Hermetic-type sealed motor compressors: Also comply with UL 984.

c. Provide the size in terms of HP, or kVA, or full-load current, or a combination of these characteristics, and other characteristics, of each motor as indicated or specified.

d. Determine specific motor characteristics to ensure provision of correctly sized starters and overload heaters.

e. Rate motors for operation on 208-volt, 3-phase circuits with a terminal voltage rating of 200 volts, and those for operation on 480-volt, 3-phase circuits with a terminal voltage rating of 460 volts.

f. Use motors designed to operate at full capacity with voltage variation of plus or minus 10 percent of motor voltage rating.

g. Unless otherwise indicated, use continuous duty type motors if rated 1 HP and above.

h. Where fuse protection is specifically recommended by the equipment manufacturer, provide fused switches in lieu of non-fused switches indicated.

2.10.1 High Efficiency Single-Phase Motors

Single-phase fractional-horsepower alternating-current motors: high efficiency types corresponding to the applications listed in NEMA MG 11. In exception, for motor-driven equipment with a minimum seasonal or overall efficiency rating, such as a SEER rating, provide equipment with motor to meet the overall system rating indicated.

2.10.2 Premium Efficiency Polyphase Motors

Select polyphase motors based on high efficiency characteristics relative to typical characteristics and applications as listed in NEMA MG 10. In addition, continuous rated, polyphase squirrel-cage medium induction motors must meet the requirements for premium efficiency electric motors in accordance with NEMA MG 1, including the NEMA full load efficiency ratings. In exception, for motor-driven equipment with a minimum seasonal or overall efficiency rating, such as a SEER rating, provide equipment with motor to meet the overall system rating indicated.

2.10.3 Motor Sizes

Provide size for duty to be performed, not exceeding the full-load nameplate current rating when driven equipment is operated at specified capacity under most severe conditions likely to be encountered. When motor size provided differs from size indicated or specified, make adjustments to wiring, disconnect devices, and branch circuit protection to accommodate equipment actually provided. Provide controllers for motors rated 1-hp and above with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage. Provide protection for motors from immediate restart by a time adjustable restart relay.

2.11 MOTOR CONTROLLERS

Provide motor controllers in accordance with the following:

a. UL 508, NEMA ICS 1, and NEMA ICS 2.

b. Provide controllers with thermal overload protection in each phase, and one spare normally open auxiliary contact, and one spare normally closed auxiliary contact.

c. Provide controllers for motors rated 1-hp and above with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage.

d. Provide protection for motors from immediate restart by a time adjustable restart relay.

e. When used with pressure, float, or similar automatic-type or maintained-contact switch, provide a hand/off/automatic selector switch with the controller.

f. Connections to selector switch: wired such that only normal automatic regulatory control devices are bypassed when switch is in "hand" position.

g. Safety control devices, such as low and high pressure cutouts, high temperature cutouts, and motor overload protective devices: connected in motor control circuit in "hand" and "automatic" positions.

h. Control circuit connections to hand/off/automatic selector switch or to more than one automatic regulatory control device: made in accordance with indicated or manufacturer's approved wiring diagram.

i. Provide selector switch with the means for locking in any position.

i. Provide a disconnecting means, capable of being locked in the open position, for the motor that is located in sight from the motor location and the driven machinery location. As an alternative, provide a motor controller disconnect, capable of being locked in the open position, to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

j. Overload protective devices: provide adequate protection to motor windings; be thermal inverse-time-limit type; and include manual reset-type pushbutton on outside of motor controller case.

k. Cover of combination motor controller and manual switch or circuit breaker: interlocked with operating handle of switch or circuit breaker so that cover cannot be opened unless handle of switch or circuit breaker is in "off" position.

2.11.1 Control Wiring

Provide control wiring in accordance with the following:

a. All control wire: stranded tinned copper switchboard wire with 600-volt flame-retardant insulation Type SIS meeting UL 44, or Type MTW meeting UL 1063, and passing the VW-1 flame tests included in those standards.

b. Hinge wire: Class K stranding.

c. Current transformer secondary leads: not smaller than No. 10 AWG.

d. Control wire minimum size: No. 14 AWG.

e. Power wiring for 480-volt circuits and below: the same type as control wiring with No. 12 AWG minimum size.

f. Provide wiring and terminal arrangement on the terminal blocks to permit the individual conductors of each external cable to be terminated on adjacent terminal points.

2.11.2 Control Circuit Terminal Blocks

Provide control circuit terminal blocks in accordance with the following:

a. NEMA ICS 4.

b. Control circuit terminal blocks for control wiring: molded or fabricated type with barriers, rated not less than 600 volts.

c. Provide terminals with removable binding, fillister or washer head screw type, or of the stud type with contact and locking nuts.

d. Terminals: not less than No. 10 in size with sufficient length and space for connecting at least two indented terminals for 10 AWG conductors to each terminal.

e. Terminal arrangement: subject to the approval of the Contracting Officer with not less than four (4) spare terminals or 10 percent, whichever is greater, provided on each block or group of blocks.

f. Modular, pull apart, terminal blocks are acceptable provided they are of the channel or rail-mounted type.

g. Submit data showing that any proposed alternate will accommodate the specified number of wires, are of adequate current-carrying capacity, and are constructed to assure positive contact between current-carrying parts.

2.11.2.1 Types of Terminal Blocks

a. Short-Circuiting Type: Short-circuiting type terminal blocks: furnished for all current transformer secondary leads with provision for shorting together all leads from each current transformer without first opening any circuit. Terminal blocks: comply with the requirements of paragraph CONTROL CIRCUIT TERMINAL BLOCKS above.

b. Load Type: Load terminal blocks rated not less than 600 volts and of adequate capacity: provided for the conductors for NEMA Size 3 and smaller motor controllers and for other power circuits, except those for feeder tap units. Provide terminals of either the stud type with contact nuts and locking nuts or of the removable screw type, having length and space for at least two indented terminals of the size required on the conductors to be terminated. For conductors rated more than 50 amperes, provide screws with hexagonal heads. Conducting parts between connected terminals must have adequate contact surface and cross-section to operate without overheating. Provide eEach connected terminal with the circuit designation or wire number placed on or near the terminal in permanent contrasting color.

2.11.3 Control Circuits

Control circuits: maximum voltage of 120 volts derived from control transformer in same enclosure. Transformers: conform to UL 506, as applicable. Transformers, other than transformers in bridge circuits: provide primaries wound for voltage available and secondaries wound for correct control circuit voltage. Size transformers so that 80 percent of rated capacity equals connected load. Provide disconnect switch on primary side. Provide one fused secondary lead with the other lead grounded.

2.11.4 Enclosures for Motor Controllers

NEMA ICS 6.

2.11.5 Multiple-Speed Motor Controllers and Reversible Motor Controllers

Across-the-line-type, electrically and mechanically interlocked. Multiple-speed controllers: include compelling relays and multiple-button, station-type with pilot lights for each speed.

2.11.6 Pushbutton Stations

Provide with "start/stop" momentary contacts having one normally open and one normally closed set of contacts, and red lights to indicate when motor is running. Stations: heavy duty, oil-tight design.

2.11.7 Pilot and Indicating Lights

Provide LED cluster lamps.

2.12 MANUAL MOTOR STARTERS (MOTOR RATED SWITCHES)

Three pole designed for surface mounting with overload protection and pilot lights.

2.12.1 Pilot Lights

Provide yoke-mounted, seven element LED cluster light module. Color: red.

2.13 LOCKOUT REQUIREMENTS

Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Comply with requirements of Division 23, "Mechanical" for mechanical isolation of machines and other equipment.

2.14 GROUNDING AND BONDING EQUIPMENT

2.14.1 Ground Rods

UL 467. Ground rods: copper-clad steel, with minimum diameter of 3/4 inch and minimum length 10 feet. Sectional ground rods are permitted.

2.15 MANUFACTURER'S NAMEPLATE

Provide on each item of equipment a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.16 FIELD FABRICATED NAMEPLATES

Provide field fabricated nameplates in accordance with the following:

a. ASTM D709.

b. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings.

c. Each nameplate inscription: identify the function and, when applicable, the position.

d. Nameplates: melamine plastic, 0.125 inch thick, white with black center core.

e. Provide red laminated plastic label with white center core where indicated.

f. Surface: matte finish. Corners: square. Accurately align lettering and engrave into the core.

g. Minimum size of nameplates: one by 2.5 inches.

h. Lettering size and style: a minimum of 0.25 inch high normal block style.

2.17 WARNING SIGNS

Provide warning signs for flash protection in accordance with NFPA 70E and NEMA Z535.4 for switchboards, panelboards, industrial control panels, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized. Provide field installed signs to warn qualified persons of potential electric arc flash hazards when warning signs are not provided by the manufacturer. Provide marking that is clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

2.18 FIRESTOPPING MATERIALS

Provide firestopping around electrical penetrations in accordance with Section 07 84 00, FIRESTOPPING .

2.19 WIREWAYS

UL 870. Material: steel epoxy painted 16 gauge for heights and depths up to 6 by 6 inches, and 14 gauge for heights and depths up to 12 by 12 inches. Provide in length required for the application with hinged-cover NEMA 1 enclosure per NEMA ICS 6.

2.20 FACTORY APPLIED FINISH

Provide factory-applied finish on electrical equipment in accordance with the following:

a. NEMA 250 corrosion-resistance test and the additional requirements as specified herein.

b. Interior and exterior steel surfaces of equipment enclosures: thoroughly cleaned followed by a rust-inhibitive phosphatizing or equivalent treatment prior to painting.

c. Exterior surfaces: free from holes, seams, dents, weld marks, loose scale or other imperfections.

d. Interior surfaces: receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice.

e. Exterior surfaces: primed, filled where necessary, and given not less than two coats baked enamel with semigloss finish.

f. Equipment located indoors: ANSI Light Gray.

g. Provide manufacturer's coatings for touch-up work and as specified in paragraph FIELD APPLIED PAINTING.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces: conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

3.1.1 Service Entrance Identification

Service entrance disconnect devices, switches, and enclosures: labeled and identified as such.

3.1.1.1 Labels

Wherever work results in service entrance disconnect devices in more than one enclosure, as permitted by NFPA 70, label each enclosure, new and existing, as one of several enclosures containing service entrance disconnect devices. Label, at minimum: indicate number of service disconnect devices housed by enclosure and indicate total number of enclosures that contain service disconnect devices. Provide laminated plastic labels conforming to paragraph FIELD FABRICATED NAMEPLATES. Use lettering of at least 0.25 inch in height, and engrave on black-on-white matte finish. Service entrance disconnect devices in more than one enclosure: provided only as permitted by NFPA 70.

3.1.2 Wiring Methods

Provide insulated conductors installed in rigid steel conduit, IMC, rigid nonmetallic conduit, or EMT, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor: separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size: 1/2 inch in diameter for low voltage lighting and power circuits. Vertical distribution in multiple story buildings: made with metal conduit in fire-rated shafts, with metal conduit extending through shafts for minimum distance of 6 inches. Firestop conduit which penetrates fire-rated walls, fire-rated partitions, or fire-rated floors in accordance with Section 07 84 00, FIRESTOPPING.

3.1.2.1 Pull Wire

Install pull wires in empty conduits. Pull wire: plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

3.1.3 Conduit Installation

Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members

where located above accessible ceilings and where conduit will be visible after completion of project.

3.1.3.1 Restrictions Applicable to Aluminum Conduit

a. Do not install underground or encase in concrete or masonry.

b. Do not use brass or bronze fittings.

c. Do not use when the enclosed conductors must be shielded from the effects of High-altitude Electromagnetic Pulse (HEMP).

3.1.3.2 Restrictions Applicable to EMT

a. Do not install underground.

b. Do not encase in concrete, mortar, grout, or other cementitious materials.

c. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.

d. Do not use in hazardous areas.

e. Do not use outdoors.

f. Do not use in fire pump rooms.

g. Do not use when the enclosed conductors must be shielded from the effects of High-altitude Electromagnetic Pulse (HEMP).

3.1.3.3 Restrictions Applicable to Flexible Conduit

Use only as specified in paragraph FLEXIBLE CONNECTIONS. Do not use when the enclosed conductors must be shielded from the effects of High-altitude Electromagnetic Pulse (HEMP).

3.1.3.4 Conduit Support

Support conduit by pipe straps, wall brackets, threaded rod conduit hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Do not exceed one-fourth proof test load for load applied to fasteners. Provide vibration resistant and shock-resistant fasteners attached to concrete ceiling. Do not cut main reinforcing bars for any holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems: supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Do not share supporting means between electrical raceways and mechanical piping or ducts. Coordinate installationwith above-ceiling mechanical systems to assure maximum accessibility to all systems. Spring-steel fasteners may be used for

lighting branch circuit conduit supports in suspended ceilings in dry locations. For conduits greater than 2 1/2 inches inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

3.1.3.5 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.3.6 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Provide locknuts with sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.3.7 Flexible Connections

Provide flexible steel conduit between 3 and 6 feet in length for recessed and semirecessed lighting fixtures. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size: 1/2 inch diameter. Provide liquidtight flexible nonmetallic conduit in wet and damp locations and in fire pump rooms for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

3.1.4 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways: cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, and when specifically indicated. Boxes in other locations: sheet steel, except that aluminum boxes may be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic sheathed cable conduit system. Provide each box with volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures: minimum 4 inches square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved. Boxes for use in masonry-block or tile walls: square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; provide readily removable fixturesfor access to boxes unless ceiling access panels are provided. Support boxes and pendants for surface-mounted fixtures on suspended ceilings independently of ceiling supports. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building

structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

3.1.4.1 Boxes

Boxes for use with raceway systems: minimum 1 1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets: minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet. Telecommunications outlets: a minimum of 4 inches square by 2 1/8 inches deep. Mount outlet boxes flush in finished walls.

3.1.4.2 Pull Boxes

Construct of at least minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

3.1.5 Mounting Heights

Mount panelboards, enclosed circuit breakers, motor controller and disconnecting switches so height of operating handle at its highest position is maximum 78 inches above floor. Mount lighting switches 18 inches above finished floor, unless otherwise indicated. Mount other devices as indicated.

3.1.6 Conductor Identification

Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, provide color coding by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, provide color coding by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves.

3.1.6.1 Marking Strips

Provide marking strips in accordance with the following:

a. Provide white or other light-colored plastic marking strips, fastened by screws to each terminal block, for wire designations.

b. Use permanent ink for the wire numbers

c. Provide reversible marking strips to permit marking both sides, or provide two marking strips with each block.

d. Size marking strips to accommodate the two sets of wire numbers.

e. Assign a device designation in accordance with NEMA ICS 1 to each device to which a connection is made. Mark each device terminal to which a connection is made with a distinct terminal marking corresponding to the wire designation used on the Contractor's schematic and connection diagrams.

f. The wire (terminal point) designations used on the Contractor's wiring diagrams and printed on terminal block marking strips may be according to the Contractor's standard practice; however, provide additional wire and cable designations for identification of remote (external) circuits for the Government's wire designations.

g. Prints of the marking strips drawings submitted for approval will be so marked and returned to the Contractor for addition of the designations to the terminal strips and tracings, along with any rearrangement of points required.

3.1.7 Splices

Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

3.1.7.1 Splices of Aluminum Conductors

Make with solderless circumferential compression-type, aluminum-bodied connectors UL listed for AL/CU. Remove surface oxides from aluminum conductors by wire brushing and immediately apply oxide-inhibiting joint compound and insert in connector. After joint is made, wipe away excess joint compound, and insulate splice.

3.1.8 Terminating Aluminum Conductors

3.1.8.1 Termination to Copper Bus

Terminate aluminum conductors to copper bus either by: (a) inline splicing a copper pigtail, of ampacity at least that of aluminum conductor, or (b) utilizing circumferential, compression-type, aluminum-bodied terminal lug UL listed for AL/CU, and steel Belleville cadmium-plated hardened steel spring washers, flat washers, bolts, and nuts. Carefully install Belleville spring washers with crown up toward nut or bolt head, with concave side of Belleville bearing on heavy-duty, wide series flat washer of larger diameter than Belleville. Tighten nuts sufficiently to flatten Belleville, and leave in position. Lubricate hardware with joint compound prior to making connection. Wire brush and apply joint compound to conductor prior to inserting in lug.

3.1.8.2 Termination to Aluminum Bus

Terminate aluminum conductors to aluminum bus by using aluminum nuts, bolts, washers, and compression lugs. Wire brush and apply joint compound to conductor prior to inserting in lug. Lubricate hardware with joint compound prior to making connection. When bus contact surface is unplated, scratch-brush and coat with joint compound, without grit.

3.1.9 Covers and Device Plates

Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 inch. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.

3.1.10 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated walls, partitions, floors, or ceilings in accordance with Section 07 84 00 FIRESTOPPING.

3.1.11 Grounding and Bonding

Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, telecommunications system grounds, and neutral conductor of wiring systems. Make ground connection at main service equipment, and extend grounding conductor to point of entrance of metallic water service. Make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water service grounding system with additional made electrode in compliance with NFPA 70. Make ground connection to driven ground rods on exterior of building. Interconnect all grounding media in or on the structure to provide a common ground potential.

In addition to the requirements specified herein, provide telecommunications grounding in accordance with TIA-607. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

3.1.11.1 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

b. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Provide tools and dies as recommended by the manufacturer. Use an embossing die code or other standard method to provide visible indication that a connector has been adequately compressed on the ground wire.

3.1.11.2 Ground Bus

Provide a copper ground bus in the electrical equipment rooms as indicated. Noncurrent-carrying metal parts of electrical equipment: effectively grounded by bonding to the ground bus. Bond the ground bus to both the entrance ground, and to a ground rod or rods as specified above having the upper ends terminating approximately 4 inches above the floor. Make connections and splices of the brazed, welded, bolted, or pressure-connector type, except use pressure connectors or bolted connections for connections to removable equipment.

3.1.11.3 Resistance

Maximum resistance-to-ground of grounding system: do not exceed 5 ohms under dry conditions. Where resistance obtained exceeds 5 ohms, contact Contracting Officer for further instructions.

3.1.12 Equipment Connections

Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications and are provided under the section specifying the associated equipment.

3.1.13 Government-Furnished Equipment

Contractor make connections to Government-furnished equipment to make equipment operate as intended, including providing miscellaneous items such as plugs, receptacles, wire, cable, conduit, flexible conduit, and outlet boxes or fittings.

3.1.14 Repair of Existing Work

Perform repair of existing work and modification of existing electrical distribution systems as follows:

3.1.14.1 Workmanship

Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.

3.1.14.2 Existing Concealed Wiring to be Removed

Disconnect existing concealed wiring to be removed from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.

3.1.15 Surge Protective Devices

Connect the surge protective devices in parallel to the power source, keeping the conductors as short and straight as practically possible. Maximum allowed lead length is 3 feet.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

3.4 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting: as specified in Section 09 90 00 PAINTS AND COATINGS.

3.5 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 working days notice prior to each test.

3.5.1 Devices Subject to Manual Operation

Operate each device subject to manual operation at least five times, demonstrating satisfactory operation each time.

3.5.2 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance: 250,000 ohms.

3.5.3 Ground-Fault Receptacle Test

Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed.

3.5.4 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

-- End of Section --

SECTION 26 24 16.00 40

PANELBOARDS
08/13

PART 1 GENERAL

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

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.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

RCBEA GUIDE	(2004) NASA Reliability Centered Building and Equipment Acceptance Guide

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA PB 1	(2011) Panelboards

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	(Rev C; Notice 1) Colors Used in Government Procurement

UNDERWRITERS LABORATORIES (UL)

UL 489	(2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 67	(2009; Reprint Nov 2014) Standard for Panelboards

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-03 Product Data

Panelboards; G

Directory Card and Holder; G

SD-06 Test Reports

Continuity Tests; G

Insulation Tests; G

SD-07 Certificates

Statements; G

SD-08 Manufacturer's Instructions

Panelboards; G

1.3 MAINTENANCE MATERIAL SUBMITTALS

Submit manufacturer's instructions for panelboards including special provisions required to install equipment components and system packages. Special notices detail impedances, hazards and safety precautions.

1.4 QUALITY ASSURANCE

Ensure the manufacturer of the assembly is the manufacturer of the major components within the assembly and has produced similar electrical equipment for a minimum period of five years.

Provide statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system or material meet specified requirements. Ensure statements are dated after the award of this contract, with the project name, and a list of the specific requirements which it is intended to address.

1.5 PREDICTIVE TESTING AND INSPECTION TECHNOLOGY REQUIREMENTS

This section contains systems and/or equipment components regulated by NASA's Reliability Centered Building and Equipment Acceptance Program. This program requires the use of Predictive Testing and Inspection (PT&I) technologies in conformance with RCBEA GUIDE to ensure building equipment and systems installed by the Contractor have been installed properly and contain no identifiable defects that shorten the design life of a system and/or its components. Satisfactory completion of all acceptance requirements is required to obtain Government approval and acceptance of the Contractor's work.

Perform PT&I tests and provide submittals.

PART 2 PRODUCTS

2.1 COMPONENTS

2.1.1 Panelboards

Totally enclose power-distribution panelboards and lighting and appliance branch-circuit panelboards in a steel cabinet, dead-front circuit breaker type with copper buses, surface- or flush-mounted as indicated. Ensure panelboards conform to NEMA PB 1 and UL 489. Provide branch circuit panels with buses fabricated for bolt-on type circuit breakers.

Provide an outer door or cover, hinged on one side, on surface-mounted panelboards to provide gutter space access. Provide a center door for circuit breaker/switch access only.

Voltage and current rating, number of phases, and number of wires is as indicated. Provide four-wire distribution panelboards and lighting and appliance branch-circuit panelboards with an isolated full-capacity neutral bus. Ensure panelboards are rated for 277/480-volt, three-phase, 60-hertz current.

Provide three-phase, 4-wire distribution lighting and branch circuit panelboards with an isolated full-capacity bus providing spaces for single-pole circuit breakers/switches and spaces indicated as spare.

Provide panelboards with a separate grounding bus bonded to the enclosure. Ensure grounding bus is a solid bus bar of rectangular cross section equipped with binding screws for the connection of equipment grounding conductors.

Ensure each panelboard, as a complete unit, has a short-circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or as indicated.

Ensure panelboards and main lugs or main breaker have current ratings as shown on the panelboard schedule.

Bus bar connections to the branch circuit breakers are the "distributed phase" or "phase sequence" type. Single-phase, three-wire panelboard busing is such that when any two adjacent single-pole breakers are connected to opposite phases, two-pole breakers can be installed in any location. Three-phase, four-wire busing is such that when any three adjacent single-pole breakers are individually connected to each of the three different phases, two- or three-pole breakers can be installed at any location. Ensure current-carrying parts of the bus assembly are plated. Mains ratings are as shown.

For mechanical lugs furnished with panelboards, use cast copper or copper alloys of sizes suitable for the conductors indicated.

Use boxes with the manufacturer's standard knockouts and are galvanized code-gage sheet steel. Fronts are of code-gage sheet steel furnished with hinged doors with adjustable trim clamps for securing the fronts to the boxes.

Panelboard box is galvanized code-gage sheet steel without knockouts. Ensure entire panelboard front is hinged on one side with a piano hinge for the full height and has captive screws opposite the hinged side. Where panelboards are installed flush with the walls, the installation details are such that the hinged front can be opened without damage to the adjacent wall surfaces. Ensure that the color of the finished coat of trim and front matches the adjacent walls except when the box is installed in electrical closets or equipment rooms, the gray finish as specified is acceptable.

Ensure panelboard enclosures are NEMA 250, Type 1. Provide enclosures with hinged fronts and corrosion-resistant steel pin-tumbler cylinder locks.

Key the locks alike and properly tagged. Provide two keys for each enclosure to the Contracting Officer.

Finish panelboards with baked enamel. Finish color is No. 61 gray conforming to FED-STD-595.

2.1.2 Circuit Breakers

Provide molded-case breakers with frame and trip ratings as indicated.

Interrupting rating of circuit breakers are as indicated.

Use bolt-on type breakers. Plug-in type is not acceptable.

Provide shunt trips where indicated.

In branch circuit panelboards, ensure branch circuit breakers feeding convenience outlets have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Provide UL listed single-pole 15- and 20-ampere circuit breakers as "Switching Breakers" at 277 volts ac. Provide UL Class A (5-milliampere sensitivity) ground fault circuit protection on 120-volt ac branch circuit as indicated. This protection is an integral part of the branch circuit breaker that also provides overload and short-circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption is not to disturb the feeder circuit to the panelboard. A single-pole circuit breaker with integral ground fault circuit interruption requires no more panelboard branch circuit space than a conventional slide pole circuit breaker.

Ensure connections to the bus are bolt-on type.

When multiple wires per phase are specified, furnish the circuit breakers with connectors made to accommodate multiple wires.

Ensure circuit breaker spaces called out on the drawings are complete with mounting hardware to permit ready installation of the circuit breakers.

2.1.3 Directory Card and Holder

Mount a directory card on the inside of hinged fronts and doors 0.030-inch thick minimum plastic in a metal frame, with spaces for circuit numbers, outlets controlled, and room numbers. Where hinged fronts or doors are not required, provide the directory card 0.030-inch thick minimum plastic in a metal frame mounted on the left-hand side of the front trim. The directory card identifies each branch circuit with its respective and numbered circuit breaker.

2.1.4 Precautionary Label

To ensure persons are aware of immediate or potential hazard in the application, installation, use, or maintenance of panelboards, conspicuously mark each panelboard on the trim or dead front shield with the text (or equivalent) **DANGER** symbol. If the panel is supplied with a door, ensure the label is visible when the door is in the open position.

2.2 FACTORY TESTING

Test complete panelboards in accordance with UL 67.

PART 3 EXECUTION

3.1 INSTALLATION

Install panelboards as indicated and in accordance with the manufacturer's instructions. Fully align and mount panels so that the height of the top operating handle does not exceed 72-inches above the finished floor.

Ensure directory-card information is typewritten in capital letters to indicate outlets controlled and final room numbers served by each circuit and is mounted in holders behind protective covering.

3.2 SITE TESTING

Perform PT&I tests and provide submittals.

Do not energize panelboards until the recorded test data has been submitted to and approved by the Contracting Officer.

Provide test equipment, labor, and personnel as required to perform the tests as specified. Conduct continuity tests using a dc device with bell.

Demonstrate each panelboard enclosure key operates the enclosure locks in the presence of the Contracting Officer.

Conduct continuity and insulation tests on the panelboards after the installation has been completed and before the panelboard is energized.

Conduct insulation tests on 480-volt panelboards using a 1,000-volt insulation-resistance test set. Record readings every minute until three equal and consecutive readings have been obtained. Ensure resistance between phase conductors and between phase conductors and ground is not less than 50 megohms.

Conduct insulation tests on panelboards rated 300 volts or less using a 500-volt minimum insulation-resistance test set. Record readings after 1 minute and until the reading is constant for 15 seconds. Ensure resistance between phase conductors and between phase conductors and ground is not less than 25 megohms.

Record test data and include the location and identification of panelboards and megohm readings versus time.

-- End of Section --

SECTION 26 56 00

EXTERIOR LIGHTING
05/13

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 the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 189.1	(2014; Errata 1-2 2015;) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus

ILLUMINATING ENGINEERING SOCIETY (IES)

IES HB-10	(2011) IES Lighting Handbook
IES LM-79	(2008) Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-80	(2008) Measuring Lumen Maintenance of LED Light Sources
IES RP-16	(2010; Addendum A 2008; Addenda B & C 2009) Nomenclature and Definitions for Illuminating Engineering
IES RP-8	(2014) Roadway Lighting
IES TM-15	(2011) Luminaire Classification System for Outdoor Luminaires
IES TM-21	(2011) Projecting Long Term Lumen Maintenance of LED Light Sources

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2014) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ANSLG C78.377	(2011) American National Standard for Electric Lamps— Specifications for the Chromaticity of Solid State Lighting Products
NEMA C82.77	(2002) Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2011) Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 150/5345-43	(2006; Rev F) Specification for Obstruction Lighting Equipment

UNDERWRITERS LABORATORIES (UL)

UL 1598	(2008; Reprint Oct 2012) Luminaires
UL 773	(1995; Reprint Mar 2002) Standard for Plug-In, Locking Type Photocontrols for Use with Area Lighting
UL 773A	(2006; Reprint Nov 2013) Standard for Nonindustrial Photoelectric Switches for Lighting Control
UL 8750	(2009; Reprint May 2014) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.2 RELATED REQUIREMENTS

Materials not considered to be luminaires or lighting equipment are specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION..

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings shall be as defined in IEEE 100 and IES RP-16.

b. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IES LM-80.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following:

SD-01 Preconstruction Submittals

Photometric Plan; G

LED Luminaire Warranty; G

SD-02 Shop Drawings

Luminaire drawings; G

SD-03 Product Data

LED Luminaires; G

Luminaire Light Sources; G

Lighting contactor; G

Time switch; G

Photocell; G

SD-05 Design Data

Design Data for luminaires; G

SD-06 Test Reports

LED Luminaire - IES LM-79 Test Report; G

LED Light Source - IES LM-80 Test Report; G

Operating test

Submit operating test results as stated in paragraph entitled "Field Quality Control."

SD-07 Certificates

Luminaire Useful Life Certificate; G

Submit certification from the manufacturer indicating the expected useful life of the luminaires provided. The useful life shall be directly correlated from the IES LM-80 test data using procedures outlined in IES TM-21. Thermal properties of the specific

luminaire and local ambient operating temperature and conditions shall be taken into consideration.

1.5 QUALITY ASSURANCE

1.5.1 Drawing Requirements

1.5.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and candlepower distribution data shall accompany shop drawings.

1.5.2 Photometric Plan

For LED luminaires, include computer-generated photometric analysis of the "designed to" values for the "end of useful life" of the luminaire installation using a light loss factor of 0.7. For LED and all other types of luminaires, the submittal shall include the following:

Horizontal illuminance measurements at finished grade, taken at a maximum of every 10 feet.

Vertical illuminance measurements at 5 feet above finished grade.

Minimum and maximum footcandle levels.

Average maintained footcandle level.

Maximum to minimum ratio for horizontal illuminance only.

1.5.3 Design Data for Luminaires

a. Provide distribution data according to IES classification type as defined in IES HB-10.

b. Shielding as defined by IES RP-8 or B.U.G. rating for the installed position as defined by IES TM-15.

c. Provide safety certification and file number for the luminaire family. Include listing, labeling and identification per NFPA 70 (NEC). Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratories).

d. Provide long term lumen maintenance projections for each LED luminaire in accordance with IES TM-21. Data used for projections shall be obtained from testing in accordance with IES LM-80.

e. Provide wind loading calculations for luminaires mounted on poles. Weight and effective projected area (EPA) of luminaires and mounting brackets shall not exceed maximum rating of pole as installed in particular wind zone area.

1.5.4 LED Luminaire - IES LM-79 Test Report

Submit test report on manufacturer's standard production model luminaire.

Submittal shall include all photometric and electrical measurements, as well as all other pertinent data outlined under "14.0 Test Report" in IES LM-79.

1.5.5 LED Light Source - IES LM-80 Test Report

Submit report on manufacturer's standard production LED package, array, or module. Submittal shall include:

a. Testing agency, report number, date, type of equipment, and LED light source being tested.

b. All data required by IES LM-80.

1.5.6 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.6 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.1 LED Luminaire Warranty

Provide Luminaire Useful Life Certificate.

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

a. Provide a written five year on-site replacement warranty for material, fixture finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.

    1. Finish warranty shall include warranty against failure and against substantial deterioration such as blistering, cracking, peeling, chalking, or fading.

    2. Material warranty shall include:

        (a) All power supply units (drivers).

        (b) Replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.

b. Warranty period must begin on date of beneficial occupancy. Contractor shall provide the Contracting Officer signed warranty certificates prior to final payment.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be luminaires, equipment or accessories are specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION.

2.2 LED LUMINAIRES

UL 1598, NEMA C82.77 and UL 8750. Provide luminaires as indicated in luminaire schedule and XL plates or details on project plans. Provide luminaires complete with light sources of quantity, type, and wattage indicated. All luminaires of the same type shall be provided by the same manufacturer.

2.2.1 General Requirements

a. Housings for luminaires other than LED shall be die cast, extruded, or fabricated aluminum. Fabricated aluminum housings shall have all seams and corners internally welded to resist weathering, moisture and dust.

b. LED luminaires shall be rated for operation within an ambient temperature range of minus 22 degrees F to 122 degrees F.

c. Luminaires shall be UL listed for wet locations per UL 1598.

d. LED luminaires shall produce a minimum efficacy as shown in the following table, tested per IES LM-79. Theoretical models of initial raw LED lumens per watt are not acceptable.

Application	Luminaire Efficacy in Lumens per Watt
Canopies	70

e. Luminaires shall have IES distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans per IES HB-10.

f. Housing finish shall be baked-on enamel, anodized, or baked-on powder coat paint. Finish shall be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.

g. Luminaires shall not exceed the following IES TM-15 Backlight, Uplight and Glare (B.U.G.) ratings:

1. Maximum Backlight (B) rating shall be determined by lighting zone in which luminaire is placed.

2. Maximum Uplight (U) rating shall be U0.

3. Maximum Glare (G) rating shall be determined by lighting zone in

which luminaire is placed.

h. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.

i. The finish color shall be as indicated in the luminaire schedule or detail on the project plans.

j. Luminaire lenses shall be constructed of tempered glass or UV-resistant acrylic.

k. Luminaires shall have a nameplate bearing the manufacturer's name, address, model number, date of manufacture, and serial number securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

2.2.2 Luminaire Light Sources

2.2.2.1 LED Light Sources

a. Correlated Color Temperature (CCT) shall be in accordance with NEMA ANSLG C78.377:

Nominal CCT: 4000 degrees K: 3985 plus or minus 275 degrees K

b. Color Rendering Index (CRI) shall be:

Greater than or equal to 70 for 4000 degrees K light sources.

c. Color Consistency:

Manufacturer shall utilize a maximum 4-step MacAdam ellipse binning tolerance for color consistency of LEDs used in luminaires.

2.3 OBSTRUCTION LIGHTING AND MARKING

Obstructions on or near the airfield shall be marked and/or lighted as shown on the contract drawings. Obstruction marker lights shall emit aviation red light as required. The light fixtures, shall be multiple-socket assembly FAA AC 150/5345-43. Obstruction marker lights shall be single-unit type as shown in the contract drawings.

2.4 EXTERIOR LUMINAIRE CONTROLS

Controls shall comply withASHRAE 189.1.

2.4.1 Photocell

UL 773 or UL 773A. Photocells shall be hermetically sealed, silicon diode light sensor type, 50/60 Hz with single-pole, single-throw contacts. Photocell shall be designed to fail to the ON position. Housing shall be constructed of die cast aluminum, rated to operate within a temperature range of minus 40 to 158 degrees F. Photocell shall have a 1/2 in threaded base for mounting to a junction box or conduit. Provide swivel base type housing. Photocell shall turn on at 1-3 footcandles and turn off at 3 to 15 footcandles. A time delay shall prevent accidental switching from transient light sources.

2.4.2 Timeswitch

Timeswitch shall be an electronic type with a programming function that changes on/off settings according to seasonal variations of sunset and sunrise, providing a total of 56 on/off set points. Digital clock display format shall be 24 hour type. Provide power outage backup for switch utilizing a capacitor which provides coverage for a minimum of 7 days. Timeswitch shall provide control to 2 channels or loads. Contacts shall be rated for 30 amps at 120-277 VAC resistive load in a normally open (NO). Provide switch with function that allows automatic control to be skipped on certain selected days of the week

Timeswitch shall be housed in a surface-mounted, lockable NEMA 3R enclosure constructed of painted steel conforming to NEMA ICS 6.

2.4.3 Lighting Contactor

NEMA ICS 2. Provide a lighting contactor housed in a NEMA 3R enclosure conforming to NEMA ICS 6. Contactor shall have silver cadmium oxide double-break contacts and shall require no arcing contacts.

2.5 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

3.1.1 GROUNDING

Ground noncurrent-carrying parts of equipment including luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.1.2 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in Section 09 90 00 PAINTS AND COATINGS.

3.2 FIELD QUALITY CONTROL

Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test after 100 hours of burn-in time to show that the equipment operates in accordance with the requirements of this section.

-- End of Section --

SECTION 33 71 02

UNDERGROUND ELECTRICAL DISTRIBUTION
02/15

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 HB-17	(2002; Errata 2003; Errata 2005, 17th Edition) Standard Specifications for Highway Bridges

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 318M	(2011; Errata 2013) Building Code Requirements for Structural Concrete & Commentary
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM B1	(2013) Standard Specification for Hard-Drawn Copper Wire
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM C478	(2014) Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C857	(2014) Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
ASTM C990	(2009; R 2014) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM F2160	(2010) Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81	(2012) Guide for Measuring Earth

	Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code
IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 7	(2013) Standard for Smooth-Wall Coilable Electrical Polyethylene Conduit
NEMA TC 9	(2004) Standard for Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-758	(2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bull 1751F-644	(2002) Underground Plant Construction

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-60005	(Basic; Notice 2) Frames, Covers, Gratings, Steps, Sump And Catch Basin, Manhole

UNDERWRITERS LABORATORIES (UL)

UL 1242	(2006; Reprint Mar 2014) Standard for Electrical Intermediate Metal Conduit -- Steel

UL 467	(2007) Grounding and Bonding Equipment
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012; Reprint Nov 2014) Conduit, Tubing and Cable Fittings
UL 6	(2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel
UL 651	(2011; Reprint May 2014) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 94	(2013; Reprint Sep 2014) Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

1.2 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE Stds Dictionary.

b. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

c. In the text of this section, "medium voltage cable splices," and "medium voltage cable joints" are used interchangeably and have the same meaning.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. 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

Precast underground structures; G

SD-03 Product Data

Precast concrete structures; G

Sealing Material

Pulling-In Irons

Manhole frames and covers; G

Cable supports (racks, arms and insulators); G

SD-06 Test Reports

Field Acceptance Checks and Tests; G

SD-07 Certificates

Cable splicer/terminator; G

Cable Installer Qualifications; G

1.4 QUALITY ASSURANCE

1.4.1 Precast Underground Structures

Submittal required for each type used. Provide calculations and drawings for precast manholes and handholes bearing the seal of a registered professional engineer including:

a. Material description (i.e., f'c and Fy)

b. Manufacturer's printed assembly and installation instructions

c. Design calculations

d. Reinforcing shop drawings in accordance with ACI SP-66

e. Plans and elevations showing opening and pulling-in iron locations and details

1.4.2 Certificate of Competency for Cable Splicer/Terminator

The cable splicer/terminator must have a certification from the National Cable Splicing Certification Board (NCSCB) in the field of splicing and terminating shielded medium voltage (5 kV to 35 kV) power cable using pre-manufactured kits (pre-molded, heat-shrink, cold shrink). Submit "Proof of Certification" for approval, for the individuals that will be performing cable splicer and termination work, 30 days before splices or terminations are to be made.

1.4.3 Cable Installer Qualifications

Provide at least one onsite person in a supervisory position with a documentable level of competency and experience to supervise all cable pulling operations. Provide a resume showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers. Cable installer must demonstrate experience with a minimum of three medium voltage cable installations. The Contracting Officer reserves the right to require additional proof of competency or to reject the individual and call for an alternate qualified cable installer.

1.4.4 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship must be in accordance with the mandatory and advisory provisions of IEEE C2 and NFPA 70 unless more stringent

requirements are specified or indicated.

1.4.5 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products must have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.5.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.5.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable, unless specified otherwise.

PART 2 PRODUCTS

2.1 CONDUIT, DUCTS, AND FITTINGS

2.1.1 Rigid Metal Conduit

UL 6.

2.1.1.1 Rigid Metallic Conduit, PVC Coated

NEMA RN 1, Type A40, except that hardness must be nominal 85 Shore A durometer, dielectric strength must be minimum 400 volts per mil at 60 Hz, and tensile strength must be minimum 3500 psi.

2.1.2 Intermediate Metal Conduit

UL 1242.

2.1.2.1 Intermediate Metal Conduit, PVC Coated

NEMA RN 1, Type A40, except that hardness must be nominal 85 Shore A durometer, dielectric strength must be minimum 400 volts per mil at 60 Hz, and tensile strength must be minimum 3500 psi.

2.1.3 Plastic Conduit for Direct Burial and Riser Applications

UL 651 and NEMA TC 2, EPC-40 as indicated.

2.1.4 Plastic Duct for Concrete Encasement

Provide Type EPC-40 per UL 651 and NEMA TC 2.

2.1.5 High Density Polyethylene (HDPE) Electrical Conduit for Directional Boring

Smoothwall, approved/listed for directional boring, minimum Schedule 80, ASTM F2160, NEMA TC 7.

2.1.6 Innerduct

Provide corrugated polyethylene (PE) or PVC innerducts, or fabric-mesh innerducts, with pullwire. Size as indicated.

2.1.7 Duct Sealant

UL 94, Class HBF. Provide high-expansion urethane foam duct sealant that expands and hardens to form a closed, chemically and water resistant, rigid structure. Sealant must be compatible with common cable and wire jackets and capable of adhering to metals, plastics and concrete. Sealant must be capable of curing in temperature ranges of 35 degrees F to 95 degrees F. Cured sealant must withstand temperature ranges of -20 degrees F to 200 degrees F without loss of function.

2.1.8 Fittings

2.1.8.1 Metal Fittings

UL 514B.

2.1.8.2 PVC Conduit Fittings

UL 514B, UL 651.

2.1.8.3 PVC Duct Fittings

NEMA TC 9.

2.1.8.4 Outlet Boxes for Steel Conduit

Outlet boxes for use with rigid or flexible steel conduit must be cast-metal cadmium or zinc-coated if of ferrous metal with gasketed closures and must conform to UL 514A.

2.2 PULL ROPE

Plastic or flat pull line (bull line) having a minimum tensile strength of 200 pounds.

2.3 GROUNDING AND BONDING

2.3.1 Driven Ground Rods

Provide copper-clad steel ground rods conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length. Sectional type rods may be used for rods 20 feet or longer.

2.3.2 Grounding Conductors

Stranded-bare copper conductors must conform to ASTM B8, Class B, soft-drawn unless otherwise indicated. Solid-bare copper conductors must

conform to ASTM B1 for sizes No. 8 and smaller. Insulated conductors must be of the same material as phase conductors and green color-coded, except that conductors must be rated no more than 600 volts. Aluminum is not acceptable.

2.4 UNDERGROUND STRUCTURES

Provide precast concrete underground structures as indicated, conforming to ASTM C857 and ASTM C478. Locate duct entrances and windows near the corners of structures to facilitate cable racking. Covers must fit the frames without undue play. Form steel and iron to shape and size with sharp lines and angles. Castings must be free from warp and blow holes that may impair strength or appearance. Exposed metal must have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Install a pulling-in iron in the wall opposite each duct line entrance. Cable racks, including rack arms and insulators, must be adequate to accommodate the cable.

2.4.1 Precast Concrete Structures, Risers and Tops

Precast concrete underground structures are subject to the requirements specified below. Precast units must be the product of a manufacturer regularly engaged in the manufacture of precast concrete products, including precast manholes.

2.4.1.1 General

Precast concrete structures must have the same accessories and facilities as required for cast-in-place structures. Likewise, precast structures must have plan area and clear heights not less than those of cast-in-place structures. Concrete materials and methods of construction must be the same as for cast-in-place concrete construction, as modified herein. Slope in floor may be omitted provided precast sections are poured in reinforced steel forms. Concrete for precast work must have a 28-day compressive strength of not less than 4000 psi. Structures may be precast to the design and details indicated for cast-in-place construction, precast monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures must be identified with the manufacturer's name embedded in or otherwise permanently attached to an interior wall face.

2.4.1.2 Design for Precast Structures

ACI 318M. In the absence of detailed on-site soil information, design for the following soil parameters/site conditions:

a. Angle of Internal Friction (phi) = 30 degrees

b. Unit Weight of Soil (Dry) = 110 pcf, (Saturated) = 130 pcf

c. Coefficient of Lateral Earth Pressure (Ka) = 0.33

d. Ground Water Level = 3 feet below ground elevation

e. Vertical design loads must include full dead, superimposed dead, and live loads including a 30 percent magnification factor for impact. Live loads must consider all types and magnitudes of vehicular

(automotive, industrial, or aircraft) traffic to be encountered. The minimum design vertical load must be for H20 highway loading per AASHTO HB-17.

f. Horizontal design loads must include full geostatic and hydrostatic pressures for the soil parameters, water table, and depth of installation to be encountered. Also, horizontal loads imposed by adjacent structure foundations, and horizontal load components of vertical design loads, including impact, must be considered, along with a pulling-in iron design load of 6000 pounds.

g. Each structural component must be designed for the load combination and positioning resulting in the maximum shear and moment for thatparticular component.

h. Design must also consider the live loads induced in the handling, installation, and backfilling of the manholes. Provide lifting devices to ensure structural integrity during handling and installation.

2.4.1.3 Construction

Structure top, bottom, and wall must be of a uniform thickness of not less than 6 inches. Thin-walled knock-out panels for designed or future duct bank entrances are not permitted. Provide quantity, size, and location of duct bank entrance windows as directed, and cast completely open by the precaster. Size of windows must exceed the nominal duct bank envelope dimensions by at least 12 inches vertically and horizontally to preclude in-field window modifications made necessary by duct bank misalignment. However, the sides of precast windows must be a minimum of 6 inches from the inside surface of adjacent walls, floors, or ceilings. Form the perimeter of precast window openings to have a keyed or inward flared surface to provide a positive interlock with the mating duct bank envelope. Provide welded wire fabric reinforcing through window openings for in-field cutting and flaring into duct bank envelopes. Provide additional reinforcing steel comprised of at least two No. 4 bars around window openings. Provide drain sumps a minimum of 12 inches in diameter and 4 inches deep for precast structures.

2.4.1.4 Joints

Provide tongue-and-groove joints on mating edges of precast components. Shiplap joints are not allowed. Design joints to firmly interlock adjoining components and to provide waterproof junctions and adequate shear transfer. Seal joints watertight using preformed plastic strip conforming to ASTM C990. Install sealing material in strict accordance with the sealant manufacturer's printed instructions. Provide waterproofing at conduit/duct entrances into structures, and where access frame meets the top slab, provide continuous grout seal.

2.4.2 Manhole Frames and Covers

Provide cast iron frames and covers for manholes conforming to CID A-A-60005. Cast the words "ELECTRIC" or "TELECOMMUNICATIONS" in the top face of power and telecommunications manhole covers, respectively.

2.5 CABLE SUPPORTS (RACKS, ARMS, AND INSULATORS)

The metal portion of racks and arms must be zinc-coated after fabrication.

2.5.1 Cable Rack Stanchions

The wall bracket or stanchion must be 4 inches by approximately 1-1/2 inch by 3/16 inch channel steel, or 4 inches by approximately 1 inch glass-reinforced nylon with recessed bolt mounting holes, 48 inches long (minimum) in manholes. Slots for mounting cable rack arms must be spaced at 8 inch intervals.

2.5.2 Rack Arms

Cable rack arms must be steel or malleable iron or glass reinforced nylon and must be of the removable type. Rack arm length must be a minimum of 8 inches and a maximum of 12 inches.

2.5.3 Insulators

Insulators for metal rack arms must be dry-process glazed porcelain. Insulators are not required for nylon arms.

2.6 CABLE TAGS IN MANHOLES

Provide tags for each power cable located in manholes. The tags must be polyethylene. Do not provide handwritten letters. The first position on the power cable tag must denote the voltage. The second through sixth positions on the tag must identify the circuit. The next to last position must denote the phase of the circuit and include the Greek "phi" symbol. The last position must denote the cable size. As an example, a tag could have the following designation: "11.5 NAS 1-8(Phase A)500," denoting that the tagged cable is on the 11.5kV system circuit number NAS 1-8, underground, Phase A, sized at 500 kcmil.

2.6.1 Polyethylene Cable Tags

Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are 0.08 inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees F. Provide 0.05 inch (minimum) thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties must have a minimum loop tensile strength of 175 pounds. The cable tags must have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and symbols must not fall off or change positions regardless of the cable tags' orientation.

PART 3 EXECUTION

3.1 INSTALLATION

Install equipment and devices in accordance with the manufacturer's published instructions and with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable. In addition to these requirements, install telecommunications in accordance with TIA-758 and RUS Bull 1751F-644.

3.2 CABLE INSPECTION

Inspect each cable reel for correct storage positions, signs of physical damage, and broken end seals prior to installation. If end seal is broken, remove moisture from cable prior to installation in accordance with the cable manufacturer's recommendations.

3.3 UNDERGROUND STRUCTURE CONSTRUCTION

Provide standard type precast construction as specified herein. Locate duct entrances and windows in the center of end walls (shorter) and near the corners of sidewalls (longer) to facilitate cable racking and splicing. Covers for underground structures must fit the frames without undue play. Steel and iron must be formed to shape and size with sharp lines and angles. Castings must be free from warp and blow holes that may impair strength or appearance. Exposed metal must have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Manhole locations, as indicated, are approximate. Coordinate exact manhole locations with other utilities and finished grading and paving.

3.3.1 Precast Concrete Construction

Set commercial precast structures on 6 inches of level, 90 percent compacted granular fill, 3/4 inch to 1 inch size, extending 12 inches beyond the structure on each side. Compact granular fill by a minimum of four passes with a plate type vibrator. Installation must additionally conform to the manufacturer's instructions.

3.3.2 Pulling-In Irons

Provide steel bars bent as indicated, and cast in the walls and floors. Alternatively, pipe sleeves may be precast into the walls and floors where required to accept U-bolts or other types of pulling-in devices possessing the strengths and clearances stated herein. The final installation of pulling-in devices must be made permanent. Cover and seal exterior projections of thru-wall type pulling-in devices with an appropriate protective coating. In the floor the irons must be a minimum of 6 inches from the edge of the sump, and in the walls the irons must be located within 6 inches of the projected center of the duct bank pattern or precast window in the opposite wall. However, the pulling-in iron must not be located within 6 inches of an adjacent interior surface, or duct or precast window located within the same wall as the iron. If a pulling-in iron cannot be located directly opposite the corresponding duct bank or precast window due to this clearance limitation, locate the iron directly above or below the projected center of the duct bank pattern or precast window the minimum distance required to preserve the 6 inch clearance previously stated. In the case of directly opposing precast windows, pulling-in irons consisting of a 3 foot length of No. 5 reinforcing bar, formed into a hairpin, may be cast-in-place within the precast windows simultaneously with the end of the corresponding duct bank envelope. Irons installed in this manner must be positioned directly in line with, or when not possible, directly above or below the projected center of the duct bank pattern entering the opposite wall, while maintaining a minimum clear distance of 3 inches from any edge of the cast-in-place duct bank envelope or any individual duct. Pulling-in irons must have a clear projection into the structure of approximately 4 inches and must be designed to withstand a minimum pulling-in load of 6000 pounds. Irons must be hot-dipped galvanized after fabrication.

3.3.3 Cable Racks, Arms and Insulators

Cable racks, arms and insulators must be sufficient to accommodate the cables. Space racks in power manholes not more than 3 feet apart, and provide each manhole wall with a minimum of two racks. Space racks in signal manholes not more than 16 1/2 inches apart with the end rack being

no further than 12 inches from the adjacent wall. Methods of anchoring cable racks must be as follows:

a. Provide a 5/8 inch diameter by 5 inch long anchor bolt with 3 inch foot cast in structure wall with 2 inch protrusion of threaded portion of bolt into structure. Provide 5/8 inch steel square head nut on each anchor bolt. Coat threads of anchor bolts with suitable coating immediately prior to installing nuts.

b. Provide concrete channel insert with a minimum load rating of 800 pounds per foot. Insert channel must be steel of the same length as "vertical rack channel;" channel insert must be cast flush in structure wall. Provide 5/8 inch steel nuts in channel insert to receive 5/8 inch diameter by 3 inch long steel, square head anchor bolts.

c. Provide concrete "spot insert" at each anchor bolt location, cast flush in structure wall. Each insert must have minimum 800 pound load rating. Provide 5/8 inch diameter by 3 inch long steel, square head anchor bolt at each anchor point. Coat threads of anchor bolts with suitable coating immediately prior to installing bolts.

3.4 UNDERGROUND CONDUIT AND DUCT SYSTEMS

3.4.1 Requirements

Run conduit in straight lines except where a change of direction is necessary. Provide numbers and sizes of ducts as indicated. Provide a 4/0 AWG bare copper grounding conductor above medium-voltage distribution duct banks. Bond bare copper grounding conductor to ground rings (loops) in all manholes and to ground rings (loops) at all equipment slabs (pads). Route grouding conductor into manholes with the duct bank (sleeving is not required). Ducts must have a continuous slope downward toward underground structures and away from buildings, laid with a minimum slope of 3 inches per 100 feet. Depending on the contour of the finished grade, the high-point may be at a terminal, a manhole, a handhole, or between manholes or handholes. Provide ducts with end bells whenever duct lines terminate in structures.

Perform changes in ductbank direction as follows:

a. Short-radius manufactured 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable.

b. The minimum manufactured bend radius must be 18 inches for ducts of less than 3 inch diameter, and 36 inches for ducts 3 inches or greater in diameter.

c. As an exception to the bend radius required above, provide field manufactured longsweep bends having a minimum radius of 25 feet for a change of direction of more than 5 degrees, either horizontally or vertically, using a combination of curved and straight sections. Maximum manufactured curved sections: 30 degrees.

3.4.2 Treatment

Ducts must be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers must be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer must be used whenever an existing duct is connected to a duct of different

material or shape. Ducts must be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts must be thoroughly cleaned before being laid. Plastic ducts must be stored on a flat surface and protected from the direct rays of the sun.

3.4.3 Conduit Cleaning

As each conduit run is completed, for conduit sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs.

3.4.4 Galvanized Conduit Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations must be PVC coated and must extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.4.5 Multiple Conduits

Separate multiple conduits by a minimum distance of 3 inches, except that light and power conduits must be separated from control, signal, and telephone conduits by a minimum distance of 12 inches. Stagger the joints of the conduits by rows (horizontally) and layers (vertically) to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly must consist of base spacers, intermediate spacers, ties, and locking device on top to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

3.4.6 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty must be provided with plugs on each end. Plugs must contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.4.7 Conduit and Duct Without Concrete Encasement

Depths to top of the conduit must be not less than 24 inches below finished grade. Provide not less than 3 inches clearance from the conduit to each side of the trench. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level with original bottom with sand or earth free from particles, that would be retained on a 1/4 inch sieve. The first 6 inch layer of backfill cover must be sand compacted as previously specified. The rest of the excavation must be backfilled and compacted in 3 to 6 inch layers. Provide color, type and depth of warning tape as specified in Section 31 00 00 EARTHWORK.

3.4.7.1 Encasement Under Roads and Structures

Under roads, paved areas, and railroad tracks, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Concrete encasement must extend at least 5 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks. Depths to top of the concrete envelope must be not less than 24 inches below finished grade.

3.5 GROUNDING SYSTEMS

NFPA 70 and IEEE C2, except provide grounding systems with a resistance to solid earth ground not exceeding 25 ohms.

3.5.1 Grounding Electrodes

Provide cone pointed driven ground rods driven full depth plus 6 inches, installed to provide an earth ground of the appropriate value for the particular equipment being grounded.
If the specified ground resistance is not met, an additional ground rod must be provided in accordance with the requirements of NFPA 70 (placed not less than 6 feet from the first rod). Should the resultant (combined) resistance exceed the specified resistance, measured not less than 48 hours after rainfall, notify the Contracting Officer immediately.

3.5.2 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

b. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies must be as recommended by the manufacturer. An embossing die code or other standard method must provide visible indication that a connector has been adequately compressed on the ground wire.

3.5.3 Grounding Conductors

Provide bare grounding conductors, except where installed in conduit with associated phase conductors. Ground cable sheaths, cable shields, conduit, and equipment with No. 6 AWG. Ground other noncurrent-carrying metal parts and equipment frames of metal-enclosed equipment. Ground metallic frames and covers of handholes and pull boxes with a braided, copper ground strap with equivalent ampacity of No. 6 AWG. Provide direct connections to the grounding conductor with 600 v insulated, full-size conductor for each grounded neutral of each feeder circuit, which is spliced within the manhole.

3.5.4 Ground Cable Crossing Expansion Joints

Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper

cable across such separations.

3.5.5 Manhole Grounding

Loop a 4/0 AWG grounding conductor around the interior perimeter, approximately 12 inches above finished floor. Secure the conductor to the manhole walls at intervals not exceeding 36 inches. Connect the conductor to the manhole grounding electrode with 4/0 AWG conductor. Connect all incoming 4/0 grounding conductors to the ground loop adjacent to the point of entry into the manhole. Bond the ground loop to all cable shields, metal cable racks, and other metal equipment with a minimum 6 AWG conductor.

3.5.6 Canopy Grounding

Provide grounding for canopies as indicated. Provide grounding for canopies with a ground rod at fixed post as indicated . Drive ground rods until the top is 12 inches below grade. Attach a No. 4 AWG copper conductor, by exothermic weld to the ground rods and extend underground to the immediate vicinity of post. Fasten by approved bronze compression fitting, to bond wire to post. Clamps must be of the anti-electrolysis type.

3.6 EXCAVATING, BACKFILLING, AND COMPACTING

Provide in accordance with NFPA 70 and Section 31 00 00 EARTHWORK.

3.6.1 Reconditioning of Surfaces

3.6.1.1 Unpaved Surfaces

Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding, and provide topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching.

3.6.1.2 Paving Repairs

Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists , restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.7 CAST-IN-PLACE CONCRETE

3.7.1 Concrete Slabs (Pads) for Equipment

Unless otherwise indicated, the slab must be at least 8 inches thick, reinforced with a 6 by 6 - W2.9 by W2.9 mesh, placed uniformly 4 inches from the top of the slab. Slab must be placed on a 6 inch thick, well-compacted gravel base. Top of concrete slab must be approximately 4 inches above finished grade with gradual slope for drainage. Edges above grade must have 1/2 inch chamfer. Slab must be of adequate size to project at least 8 inches beyond the equipment.

Stub up conduits, with bushings, 2 inches into cable wells in the concrete

pad. Coordinate dimensions of cable wells with transformer cable training areas.

3.7.2 Sealing

When the installation is complete, seal all conduit and other entries into the equipment enclosure with an approved sealing compound. Seals must be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter.

3.8 FIELD QUALITY CONTROL

3.8.1 Performance of Field Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.8.1.1 Grounding System

a. Visual and mechanical inspection

Inspect ground system for compliance with contract plans and specifications.

b. Electrical tests

Perform ground-impedance measurements utilizing the fall-of-potential method in accordance with IEEE 81. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground resistance tester in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument must be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test. Provide site diagram indicating location of test probes with associated distances, and provide a plot of resistance vs. distance.

3.8.2 Follow-Up Verification

Upon completion of acceptance checks and tests, show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer must be given 5 working days advance notice of the dates and times of checking and testing.

.... -- End of Section --

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.... -- End of Section --

GEOTECHNICAL ENGINEERING STUDY

LAUGHLIN AFB PREFABRICATED SUNSHADE STRUCTURES WA #22 DEL RIO, TEXAS

Prepared For:

MR. ROGELIO R. MUZQUIZ JR.
VAL VERDE COUNTY
PURCHASING DEPARTMENT
400 PECAN STREET 3RD FLOOR
DEL RIO, TEXAS 78840

Submitted By:

CARRILLO & ASSOCIATES, INC.

911 Frio City Road – San Antonio, Texas 78207
TBPE Firm Reg. No. F-7951

10/5/16

STATE OF TEXAS
HECTOR CARRILLO
75556
LICENSED
PROFESSIONAL ENGINEER

Project No. 72-315

Date: October 5, 2016

CARRILLO
& ASSOCIATES, INC.

CONSULTING ENGINEERS

GEOTECHNICAL • CONSTRUCTION MATERIAL TESTING & ENGINEERING • ENVIRONMENTAL

October 5, 2016

Val Verde County
Purchasing Department
400 Pecan Street, 3rd Floor
Del Rio, Texas 78840

Attention: Mr. Rogelio R. Musquiz, Jr.

Subject: Geotechnical Engineering Study
Laughlin AFB Prefabricated Sunshade Structures WA #22
Del Rio, Texas
Project No. 72-315

Dear Mr. Musquiz:

In accordance with your request and authorization, we have completed a geotechnical engineering study for the above referenced project. The conclusions and recommendations developed from the exploration and analysis are discussed in detail in the attached report.

We appreciate the opportunity to be of professional service to you on this project. If you should have any questions regarding our report or if additional engineering services are needed, please call us at (210) 667 8991.

Sincerely,

CARRILLO & ASSOCIATES, INC.
TBPE Firm Reg. No. F-7951

STATE OF TEXAS
HECTOR CARRILLO
75556
LICENSED
PROFESSIONAL ENGINEER
10/5/16

Hector Carrillo, P.E
Principal

Cc: Above

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INTRODUCTION

Carrillo & Associates, Inc., is pleased to submit the results of the subsurface exploration conducted August 27 and September 10, 2016 for the proposed Prefabricated Sunshade Structures in Laughlin AFB Texas. This geotechnical engineering study was authorized on July 21, 2016 by Mr. Carl Bain, P.E., Vice President with Bain Medina Bain, Inc..

SCOPE OF SERVICES

The authorized scope of services performed by our firm included a site reconnaissance, subsurface exploration, field laboratory testing and a geotechnical engineering study to provide design recommendations for the proposed project. We accomplished these purposes by:

- Reviewing readily-accessible geologic and geotechnical information in the general site vicinity;
- Conducting geotechnical field and laboratory tests to assess pertinent soil engineering properties;
- Analyzing the field and laboratory data to develop conclusions and engineering recommendations; and
- Preparing this report to provide guidelines for:
    a) Soil foundation design parameters;
    b) Allowable bearing pressures, and estimated settlements;
    c) Subgrade preparation, selection and placement of fill materials;
    d) Recommended pavement structural sections; and
    e) General comments regarding construction methods, earthwork and difficult excavation recommendations.

Our scope of services excluded environmental issues that may be pertinent to the site.

SITE AND PROJECT DESCRIPTION

We understand that ten rows of Prefabricated Sunshade Structures will be erected for the T-6 aircraft in Laughlin AFB Texas. The proposed canopies will be at the south end aircraft parking apron where the T6 aircraft are parked. The canopies will consist of a metal structure supported by a shallow or deep foundation system with the typical structural vertical loads for a one story prefab metal canopy. The site topography is overlaid with six inches of concrete paving and is used as an aircraft parking apron.

EXPLORATION AND SUBSURFACE CONDITIONS

Field Exploration and Testing Procedures

Subsurface conditions were evaluated by drilling a total of ten (10) bores within the proposed facility. The approximate test boring locations are indicated on the Boring Location Plan enclosed.

The field investigation to determine the engineering characteristics of the subsurface materials included a reconnaissance of the project site, drilling of borings, performing standard penetration tests and obtaining disturbed split-barrel and auger samples.

Soil samples were obtained at selected intervals from the soil test borings. Undisturbed soil samples were obtained in general accordance with ASTM D-1587 (Thin-Walled Tube Sampling of Soils) using a standard split-spoon sampler. A split-spoon sampler is a 2-inch O.D. tube that is driven into the soil to be sampled that can be split open lengthwise for easy removal and visual inspection of the soil obtained. Disturbed soil samples were obtained in general accordance with ASTM D 1586 (Penetration Test and Split-Barrel Sampling of Soils). All samples were identified according to project number, boring number and depth, encased in polyethylene plastic wrapping to protect against moisture loss, and transported to our laboratory in special containers.

The standard penetration value (N) is defined as the number of blows of a 140-pound hammer, falling 30 inches, required to advance the split-spoon sampler one (1) foot into the soil (ASTM D 1585). The sampler is lowered to the bottom of the drill hole and the number of blows recorded for each of the three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers.

The results of the standard penetration test indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Water level observations were made during the boring operations and the results are noted in the boring logs.

Soil Laboratory Testing

Laboratory testing is useful for evaluating the engineering properties of soils. Tests for engineering properties can assess soil strength, compressibility, swell potential, and potential steel corrosion or adverse reactivity with Portland cement concrete. We performed laboratory testing on selected soil samples to assess the following:

- Classification of Soils (ASTM D 2487);
- Atterberg Limits (ASTM D 4318);
- Moisture Content (ASTM D 2216); and
- Amount of Material in Soils Finer than the No. 200 (75-µm) sieve (ASTM D 1140).

General Geology

A review of the Geologic Atlas of Texas Del Rio sheet dated 1977 indicates that the studied area is in the Uvalde Gravel (T-Qu) formation. The formation consists of caliche cemented gravel, some boulders up to one foot in diameter, well rounded cobbles of chert, some cobbles of quartz, limestone and igneous rock.

Subsoils

The detailed soil conditions encountered at the borehole locations are described in the boring logs located in the Appendix. The soil test results and definitions of the terminology and symbols used on the boring logs are provided on the explanation sheets also in the Appendix. The following is a brief description of the soil types encountered.

Stratum I

From the subsurface to and approximate depth of five to six and one half feet in depth a dense to medium dense soil consistency was encountered. The soil varied in color from pale brown to brown and in some bores white. Standard penetration tests (SPT) ranged from twelve (12) to 45 blows per foot of penetration within the first five to six and one half feet of sampling. This soil was encountered at all bores from six inch below surface to approximately five to six and one half feet of sampling. These soils are considered to exhibit a low to medium expansive shrink/swell potential.

Stratum II

Limestone or Mudstone; very dense to hard, standard penetration tests (SPT) ranging from fifty-eight (58) to 50 blows reference 2" of penetration per foot of penetration from an

approximate depth of five to six and one half feet to fifteen feet of sampling. The limestone/mudstone was encountered at all borehole locations to drill depth or refusal. These soils are considered to exhibit a low to medium expansive shrink/swell potential.

The sampled specimens had a plasticity index test result between one and twenty-eight. These subsurface bores had a maximum potential vertical rise (PVR) of 0.95 inches in the dry stage.

Groundwater

The borings were dry augured to their termination depths in an attempt to observe for the presence of subsurface water. Groundwater or subsurface water generally appears as either a permanent or temporary water source. In our case, groundwater was not encountered at time of drilling (ATD). The water levels indicated in the boring logs may not be an accurate indication of the depth or lack of subsurface groundwater. A long period of time is generally required for subsurface water to stabilize in the impervious soils encountered at the boring locations. Long term groundwater monitoring was not included in our scope of work. Seasonal weather conditions or other factors may dictate groundwater elevations at the time of construction.

Even though a subsurface water table was not encountered we observed water bleeding through some concrete pavement cracks or joints and the upper six inches of the soil sampled had a high moisture content. When the pavement was cored a plastic liner was at the bottom of the concrete core.

ENGINEERING RECOMMENDATIONS

General

Based on the results of our geotechnical investigations the project site is suitable for the proposed structure. No geotechnical or geologic hazards were observed that would make the development of the proposed structure unsuitable. A shallow foundation system or drill piers can be used for support of the proposed structures after the recommended site preparation has been performed.

Potential Vertical Rise (PVR)

The sub soils at this site exhibit a low to medium potential to experience volume changes as a result of moisture fluctuation. Potential vertical soil movements have been estimated using the TxDOT method TEX 124E, Potential Vertical Rise (PVR). This method utilizes the soils in situ moisture conditions and plasticity characteristics within the active zone. Our laboratory analyses indicate that the PVR at this site is less than *one (1) inch* in its present

condition. The PVR movement is within the acceptable structural design tolerances of maximum one (1) inch PVR considered by Geotechnical and Structural Engineers. Measures to minimize the foundation movement within acceptable tolerances will not be required.

The following recommendations are based upon the project information provided to us and our experience with similar subsurface and site conditions.

We assume that the sunshade canopies will be supported by either columns on footings or on drilled piers.

Site Preparation

Existing grade elevations and Finished Floor Elevations (FFE) were not provided to us at time this report was prepared. However, the foundation should always be provided with adequate drainage and the soil properly prepared to minimize changes in soil moisture and differential movement.

Footings

The following subgrade preparation is intended to minimize the foundation movements of the structure.

1. Remove vegetation, foreign matter, loose soils, abandoned utility lines or foundations may exist on site. If present within the area of construction, these items should be removed and disposed of off-site at least three (3) feet beyond the limits of the new construction area. Existing utility pipelines that extend beyond the limits of the proposed construction and that are to be abandoned in-place should be plugged with flowable fill to prevent migration of soil and/or water. All excavations resulting from removal activities should be cleaned of loose or disturbed material (including all previously-placed backfill) and dish-shaped (with sides sloped 3(h): 1(v) or flatter) to permit access for compaction equipment.

2. The exposed subgrade should be proof rolled to evidence any weak or soft areas. If soft or unstable areas are encountered, these areas should be over excavated to a depth of at least two (2) feet or to a firm base and be replaced with select fill material compacted in lifts.

3. Following proof rolling operations, we recommend all areas to receive engineered fill or to be used for the future support of structures or concrete slabs supported-on-grade be scarified to a depth of eight (8) inches, uniformly moisture-conditioned to between minus and plus two (± 2) percentage points of the optimum moisture content and compacted to at least 95 percent of the maximum dry density as evaluated by ASTM D 1557.

4. Imported select fill should be used to achieve a final grade elevation. Select fill materials should be placed in lifts (appropriate thickness for compaction equipment used) with mechanical compactive effort applied until no further consolidation of the material occurs. We recommend the lift thickness for compaction not to exceed eight (8) inches in loose lifts or six (6) inches compacted measure, between minus and plus two (±2) percentage points of the optimum moisture content and compacted to at least 95 percent of the maximum dry density as evaluated by ASTM D 1557. *On site soil "clean" of debris and foreign matter may be used as select fill provided they meet the select fill criteria presented in this report.*

   We recommend that fill materials have a Liquid Limit (LL) of less than 35, and a Plasticity Index (PI) of less than 15.

Recommended Foundation Systems

General. Based on the results of the soil test borings, laboratory testing and our engineering evaluation, it is our opinion that the subsurface conditions are suitable for supporting the proposed structure using shallow footings.

a) Footing Foundation

We assume that the sunshade canopies may rest on either footings or drill piers and the structural concrete will only be used under every column. Should footings be used we recommend that the bottom of footings be at located at a minimum of 36 inches below the existing natural ground elevation.

Slab Design Parameters

Allowable Bearing Pressure, psf at 36"depth

Allowable Bearing Capacity at 36" depth: 3000 PSF

We recommend that the *spread footings* be designed using the above allowable soil bearing pressure if the site has been prepared according to our recommendations. The allowable soil bearing pressures are based on the present soil conditions, the results of field and laboratory tests, recommended compaction levels and past experience with similar soil conditions.

BRAB/PCI Design Criteria – Modified Soil	
	Modified Subgrade*
Depth of Replacement with Select Fill, ft	1.0
Potential Vertical Rise (PVR), inches	< 1.0
Effective Plasticity Index (PI)	18
Soil Support Index (C)	1.0
Climatic Rating (C_w)	15

* Based on our "Site Preparation" recommendations.

Conventional spread footings founded on native or imported soils may be designed based on the above design parameters. In general, excavations should be protected against surface water runoff and ingress of groundwater; footing bases should not be allowed to dry out excessively during construction; and the bearing soil should be protected against freezing during and after construction. The spread footings should rest at a minimum of three (3) feet below the top of concrete. The uplift resistance of a spread footing may be computed using the effective weight of the soil above the spread footing along with the weight of the spread footing and structure. A soil weight of 100 pcf may be assumed for the select fill material placed above the footing, provided that the select fill is properly compacted as recommended in "Selection of Imported Fill".

Total post construction settlement of the structure will be less than one (1) inch. Unknown soil conditions at the site that are different from those depicted at the boring location could increase the amount of expected settlement.

Excavations

Temporary construction slopes should be designed and excavated in strict compliance with the rules and regulations of the United States Department of Labor, Occupational Safety and Health Administration (OSHA), 29 CFR, Part 1926 revised in October 1989 or latest. This document was prepared to better insure the safety of workers entering trenches or excavations, and requires that all excavations conform to the new OSHA guidelines.

The contractor is solely responsible for protecting excavations by shoring, sloping, benching or other means as required to maintain stability of both the excavation sides and bottom. Carrillo & Associates, Inc. does not assume any responsibility for construction site safety or the activities of the contractor.

For this site, the overburden soil encountered in our exploratory borings consisted of mostly Lean Clay and Fat Clay. We anticipate that OSHA will classify these materials as type C. OSHA recommends a maximum slope inclination of 1H: 1V for type C soils. Excavation

requirements will vary depending on the actual soil conditions in some areas. Temporary construction slopes should be closely observed for signs of mass movement, such as tension cracks near the crest, bulging at the toe of the slope, etc.

Drilled Pier Foundation (Straight Shaft Piers)

A deep foundation provides an economical method for transfer of structural loads below unstable (weak, compressible, and expansive) to deeper stable (firm, incompressible, and non swelling) strata. We recommend drilled straight shaft piers due to be more economical than under reams and difficulties associated with attempting to form bells due to existing cemented soils. Principal column loads for the canopy area may be supported on piers bearing at a minimum depth of 13 feet below existing grade elevation.

The piers may be designed for a net allowable bearing pressure of 20,000 pounds per square feet (psf). An allowable skin friction value of 600 pounds per square feet (psf) may be used in the natural soils to aid in resisting axial compressive loads on the piers.

The skin friction should be neglected for the upper five (5) feet of natural soil in contact with the pier shaft and within one (1) pier diameter of the bottom of the shaft. *Pier founding elevation should not be deeper than 15 feet.*

The above dead load bearing pressures should provide a minimum safety factor of three (3) and the total load bearing pressure includes a safety factor of two (2) against shear or base failure. The skin friction includes a safety factor of two (2).

Uplift forces on the shaft due to uplift wind loads and other induced structural loading conditions are a concern at this site.

The cross sectional area of the reinforced steel should not be less than one-half (½) percent of the gross cross sectional area of the drilled pier shaft. The reinforcing steel should extend from the top to the bottom of the shaft to resist this potential uplift force.

Ultimate uplift resistance of the non under reamed drilled piers can be evaluated using the following equation:

$$Q_r = 2.6 \bullet d \bullet D_p + W_p + P_{DL}$$

Where:

- Q_r = Ultimate uplift resistance of pier in kips (k);
- d = Diameter of pier shaft in feet (ft);
- D_p = Founding depth of pier in natural soils in feet (ft);
- W_p = Weight of the drilled pier in kips (k); and
- P_{DL} = Dead load acting on the drilled pier in kips (k).

The canopy sunshade supplier should consider uplift wind load and verify whether square footings or piers can be used to withstand the uplift wind forces. With square footings the weight of square footing plus the weight above the footing can be used to counteract the uplift wind load force.

A safety factor of at least two (2) will be applied to the computed ultimate uplift force. A minimum clearance of three (3) diameters of the drilled pier, center to center, should be provided between the drilled piers to develop the recommended bearing pressures and to control settlements. Differential settlements will occur between individual piers and will usually be about 50 to 75 percent of the total settlement. For properly designed and constructed piers, differential settlements should be less than one (1) inch.

Measures must be taken to ensure that the proper functioning of all elements is not hampered by differential settlement. The increased cost of proper design and construction where unusual or difficult construction procedures are required is insignificant when compared with the cost of the structure. The cost of remedial measures to correct deficiencies caused by improper design and construction usually will be greater than the initial cost required to prevent the deficiencies.

Geotechnical input parameters for the LPILE computer program are provided below:

Lateral and Axial Design Parameters for Undrained Conditions

Layer	Bottom Depth, ft	Effective Unit Weight, pcf	Undrained Shear Strength, psf	Internal Friction Angle, °	Horizontal Stress Coeficent	Strain Factor (ε_{50})	LPILE Soil Type	Subgrade Modulus (k_s), pci	Adhesion Factor (α)	Bearing Capacity Factors		
										N_c	N_q	N_γ
1	5	110	500	0	---	0.014	3*	460	1.00	6	1	0
2	10	110	3,000	0	---	0.005	3*	780	0.40	6	1	0
3	15	105	6,000	0	---	0.004	3*	1,460	0.30	9	1	0

* Stiff clay without the presence of water.

Notes:

1. Design depth to subsurface water is deeper than 20 feet.
2. For uplift conditions, the computed skin friction should be multiplied by 0.9 clay (0.7 for sand).
3. Stratigraphy shown above is based on our interpretation of soil strength and may not correspond with the boring log descriptions.
4. The lateral load criteria shown above are for use in the LPILE computer programs.
5. The depth to base width ratio must exceed four (4) to use $N_c = 9$. Otherwise, use $N_c = 6$.

Construction Considerations

Subsurface water was not encountered during the drilling operations. However high moisture of surface water or water traveling near the concrete pavement subgrade level was encountered in the north half of the T-6 parking area. We recommend that groundwater conditions be checked prior to foundation or construction excavation activities. It is contractor's responsibility to select an appropriate drilling and excavation procedures to protect the adjacent facilities. *Excavation and drilling into the cemented materials and limestone encountered at the site will likely require high torque drilling and excavation equipment.*

The following list of construction operations and observations should be followed to achieve the required results.

Drilling	1) Proper shaft dimensions; 2) Collapse of hole; and 3) Proper cleanout of hole of loose and weak soil.
Dry Method	1) Loose cuttings in the hole; 2) No more than 2 or 3 inches of water at the bottom if end bearing; 3) Concrete no strike the shaft perimeter if free fall; and 4) Adequate vibration provided to consolidate concrete around reinforcement.
Casing Method	1) Clean and under formed casing before concrete placement; and 2) Sufficient concrete placed to balance the external pressure head before the casing is pulled.
Slurry Method	1) Viscosity of slurry adequate to be displaced from the perimeter of the hole and the reinforcing steel by the concrete; 2) Clean out bucket used to clean the bottom prior to concreting; and 3) Bottom of the tremie pipe maintained in fresh concrete at all times after placement has begun. The deeper the embedment in concrete the flatter the finished slope will be.
Under reams	1) Minimal cuttings in the bottom (at least 75 to 80 percent of the bottom free of cuttings); and 2) Adequate bell diameter (check travel of the kelly on the ground surface when the reamer is extended to the proper bell diameter).
Concrete Placement	1) No segregation during placement; 2) Concrete never to be poured through water; 3) Adequate slump (avoid hot concrete); and 4) Maximum aggregate size not too large for reinforcement.
Reinforcement Cage	1) Resistance to buckling during the concrete placement; 2) Full length if casing used; 3) Restriction to flow of concrete through the cage; 4) Restrained from movement during concrete placement; and 5) Proper position of the cage.

We recommend following the American Concrete Institute (ACI) 318-08 Building Code Requirements for Structural Concrete, ACI 336.1-01 Reference Specification for the Construction of Drilled Piers, ACI 336.3R-93 (Reapproved 2006) Design and Construction of Drilled Piers, and 2014 TxDOT Standard Specifications Manual, Item 421.4 A (6) Construction – Mix Designs.

Seismic Design Considerations

Section 20.1 in the 2010 ASCE-7 requires a site soil profile determination to a profile depth of 100 feet for seismic site classification. In our current scope the borings were drilled to a maximum depth of 15 feet and this seismic site class definition considers that hard soil continues below the maximum depth of the subsurface exploration. The Code does permit Site Class D as defined in the 2012 International Building Code (IBC) / ASCE 7 and for the purpose of this seismic design a Site Class D was used.

Using this site class and the location of the project site latitude 29.46191^{o} N and longitude -98.41988^{o} W, the following probabilistic ground motions were determined for this project site:

Period (seconds)	Design Spectral Response Acceleration Parameters	Site Coefficient, Fa	Site Coefficient, Fv
0.2	0.084 (SDS)	1.6	---
1.0	0.040 (SD1)	---	2.4

Frost Penetration Depth Considerations

The effects of frost penetration should be negligible at this site.

Structural Tests and Special Inspections

Chapter 17 of the 2012 IBC, Structural Tests and Special Inspections, will be required for this project. The design/build team should consult with the Building Code officials having jurisdiction about the requirements and develop schedules for the required testing and inspection.

Selection and Placement of Materials

Flexible Base

Base material may be composed of crushed limestone base meeting all of the requirements of 2004 TxDOT Standard Specifications manual Item 247, Type A, Grade 1 or 2. *In addition the percent passing No. 200 sieve should not exceed 15 percent.*

We recommend the lift thickness for compaction of base material not to exceed eight (8) inches in loose lifts or six (6) inches compacted measure, between minus and plus two (±2) percentage points of the optimum moisture content and compacted to at least 95 percent of the maximum dry density as determined by the moisture-density relationship (ASTM D 1557).

Moisture Conditioned Subgrade

The subgrade should be scarified to a depth of at least six (6) inches and moisture conditioned at moisture contents ranging between minus and plus two (± 2) percentage points of the optimum moisture content. The subgrade should then be compacted to at least 95 percent of the maximum dry density determined in accordance with ASTM D1557. *The subgrade should be moisture conditioned just prior to fill placement in order that the subgrade maintains its compaction moisture levels and does not dry out.*

Pavement areas should be stripped of vegetation, debris and loose topsoil, and the exposed subgrade should be proof rolled with appropriate construction equipment weighing at least 15 tons. The purpose of this recommendation is to check the subgrade for weak or soft areas prior to fill placement and compaction. This operation should be observed and evaluated by qualified geotechnical personnel experienced in earthwork operations.

If weak or soft areas are evidenced during proof rolling operations, the soil in the subject area should be removed to expose competent subgrade soils in both horizontal and vertical limits. The excavated soils, provided they are not contaminated with deleterious materials, or clean imported fill soils can be used to restore grade at these isolated areas; any imported fill should meet the requirements for select fill. Placement and compaction of the soils should be as discussed below.

Selection of Imported Fill

Select fill soils may be required to achieve the proposed site grades. All imported or on-site non expansive select fill soils should be nearly-free of organic or other deleterious debris, essentially non-plastic, and less than three (3) inches in maximum dimension. Coarse-

grained soils are preferred for fill; however, most fine-grained soils can be used advantageously if attention is given to drainage, compaction requirements, compaction moisture, and density control.

Well-graded mixtures of gravel, clayey gravel, crushed limestone, caliche, and small quantities of cobbles, rock fragments, and/or clayey soils are generally acceptable for use as engineered fill. The clayey gravel should meet the gradation criteria for Item 247, Type A, grades 1-2 as specified in the 2014 TxDOT Standard Specifications manual.

We recommend the lift thickness for compaction of fill material not to exceed eight (8) inches in loose lifts or six (6) inches compacted measure, between minus and plus two (±2) percentage points of the optimum moisture content and compacted to at least 95 percent of the maximum dry density as evaluated by ASTM D 1557.

Site Drainage

Final elevations at the site should be planned so that drainage is directed away from all foundations. Accumulation of water near the column foundations may cause significant moisture variations in the soils adjacent to the foundations, thus increasing the potential for structural distress. Flatwork at the column foundation should be effectively sealed and maintained to prevent water infiltration. Maintaining positive surface drainage throughout the life of the structure is essential.

GENERAL REMARKS

Construction Services

We recommend that Carrillo & Associates, Inc. be retained to provide soil engineering and material testing services during grading and construction of the project. This is to observe compliance with the plans, specifications and geotechnical engineering recommendations and to allow design changes if the subsurface conditions differ from those anticipated before construction.

Limitations of the Subsurface Exploration

This subsurface exploration was generally limited to observations of only that portion of the bores conducted and excavations readily visible without moving or removal of any item causing visual obstruction. The nature and extent of variation in soil conditions between or beyond the borings may not become evident until actual construction. The transition lines shown on the boring logs are approximate and the actual transitions may be gradual. This report is not meant to be employed in the determination of construction means and methods.

Soil samples not altered by laboratory testing will be retained for a period of 30 days and then, unless we are directed otherwise, will be discarded.

These opinions are based on the engineers experience with similar properties and the construction techniques in this area of the state. Professional opinions can vary and no guarantee can be made that another engineer's opinion of the property will occur with the opinion expressed in this report. Carrillo & Associates, Inc.'s liability is limited to the amount received as fee for preparation of the present report.

APPENDIX

Site Location Plan

Boring Location Plan

Boring Logs

Key to Log of Boring

Key to Terms and Symbols

Recommended Specifications for Earthwork and Pavement Construction

Professional Opinion

SITE LOCATION PLAN

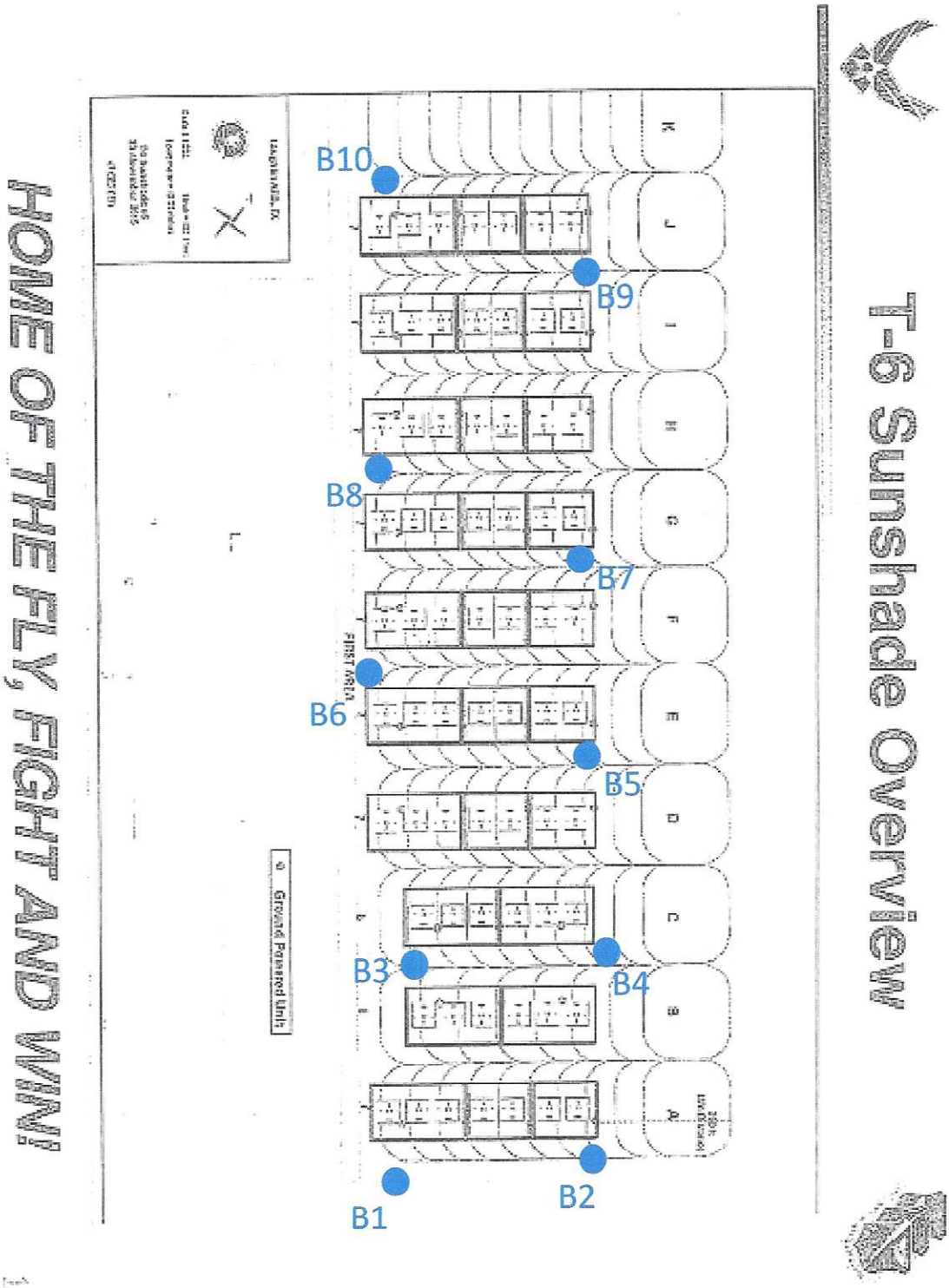
CARRILLO & ASSOCIATES, INC.
Engineering Consultants
1219 Clark Blvd
Laredo, Texas 78040

Site Location Plan

Laughlin AFB – Prefabricated Sunshade Structure
Laughlin AFB, Del Rio TX

Revisions:			Date: October 5, 2016	Job No. : 72-315
No. :	Date:	Description:	Drawn By: MC	
			Approved By: HC	
			Figure 1	

BORE LOCATION PLAN



CARRILLO & ASSOCIATES, INC.
Engineering Consultants
1219 Clark Blvd
Laredo, Texas 78040

Bore Location Plan

Laughlin AFB – Prefabricated Sunshade Structure
Laughlin AFB, Del Rio TX

Revisions:			Date: October 5, 2016	Job No. : 72-315
No. :	Date:	Description:	Drawn By: MC	
			Approved By: HC	
			Figure 2	

BORE LOGS

Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 **Project Location:** Laughlin AFB, Del Rio Tx **Project Number:** 72-315	**Log of Boring B-1** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			12	SC		Medium Dense Very Pale Brown Clayey Sand	15.8	33.8	30	9	
			7	SC		Loose Very Pale Brown Silty Clayey Sand	12.7	48.9	50	27	
	5		12	SC		Medium Dense Very Pale Brown Clayey Sand	12	40.3	38	16	
			24	CL		Medium Dense Very Pale Brown Lean Clay	11	63.6	37	13	
			33	CL		Dense Very Pale Brown Lean Clay with Sand	9.4	73	34	10	
	10										
			50 Ref 2"	CL		Very Dense Very Pale Brown Lean Clay	9.7	61.9	28	7	
	15					End of Bore					
						PVR Dry = 0.95" , Wet = 0.40"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 Project Location: Laughlin AFB, Del Rio Tx Project Number: 72-315	**Log of Boring B-2** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			51	SC		Very Dense Light Brownish Gray Clayey Sand	13.7	33.9	40	13	
			25	CL		Medium Dense Brown Lean Clay	15.9	64.7	31	8	
	5		69 Ref 10"	CL		Very Dense Very Pale Brown Lean Clay with Sand	15.6	73	38	14	
			50 Ref 3"	CL		Very Dense Very Pale Brown Lean Clay with Sand	14.9	77.8	35	12	
			50 Ref 2"	CL-ML		Very Dense Very Pale Brown Silty Clay with Sand	14.6	74.1	27	7	
	10										
			50 Ref 2"	CL-ML		Very Dense White Silty Clay with Sand	12.5	72.9	32	7	
	15					End of Bore PVR Dry = 0.35" , Wet = 0.35"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 **Project Location:** Laughlin AFB, Del Rio Tx **Project Number:** 72-315	**Log of Boring B-3** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			13	SC		Medium Dense Pale Brown Clayey Sand	14	41.7	33	10	
			24	SC		Medium Dense Very Pale Brown Clayey Sand	12.1	46.9	35	12	
	5		41	CL		Dense Pale Brown Lean Clay	11.9	60.1	34	12	
			50 Ref 1"	ML		Very Dense Very Pale Brown Silty Clay	6.3	58.1	29	5	
			50 Ref 1"	CL		Very Dense Very Pale Brown Lean Clay	5	54.2	31	9	
	10										
			Could Not Penetrate			Very Pale Brown Clayey Sand	6.6	44.1	28	7	
	15					End of Bore PVR Dry = 0.30" , Wet = 0.10"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 Project Location: Laughlin AFB, Del Rio Tx Project Number: 72-315	**Log of Boring B-4** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			16	SC		Medium Dense Brown Clayey Sand	15.8	23.3	54	11	
			9	SC		Loose Light Brown Clayey Sand	15.4	12.2	41	17	
	5		22	SC		Medium Dense White Clayey Sand	15.1	33.1	41	9	
			35	SC		Dense Light Gray Clayey Sand	15.8	4.8	51	26	
	10		41	SC		Dense Tan Silty Clayey Sand	16.3	38.7	19	13	
	15		41	SC		Dense Light Brown Clayey Sand	16.1	42.1	28	16	
						End of Bore PVR Dry = 0.75" , Wet = 0.10"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 Project Location: Laughlin AFB, Del Rio Tx Project Number: 72-315	**Log of Boring B-5** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			17	SC		Medium Dense White Clayey Sand with Gravel	12.5	14	36	13	
			13	SC		Medium Dense Clayey Sand with Gravel	15.4	19.8	39	10	
	5		27	SC		Medium Dense Pinkish White Clayey Sand with Gravel	13.3	17.7	40	12	
			Ref 5"	SC		Very Dense Clayey Sand	10.9	14.2	35	10	
			50 Ref 2"	SC		Very Dense White Clayey Sand with Gravel	9.5	19.7	36	13	
	10										
			50 Ref 2"	SC		Very Dense Reddish White Clayey Sand with Gravel	10.4	20.5	38	8	
	15					End of Bore PVR Dry = 0.35" , Wet = 0.10"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 Project Location: Laughlin AFB, Del Rio Tx Project Number: 72-315	Log of Boring B-6 Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			13	SC		Medium Dense Light Gray Clayey Sand	14.9	21.7	38	12	
			13	SC		Medium Dense Light Gray Clayey Sand with Gravel	16.6	15.5	37	9	
	5		16	SC		Medium Dense White Clayey Sand with Gravel	33.3	25	38	8	
			58	SC		Dense White Clayey Sand	28.5	22.2	44	18	
	10		50 Ref 3"	SC		Very Dense White Clayey Sand with Gravel	13.8	12.1	57	28	
			50 Ref 4"						41	21	
	15					End of Bore PVR Dry = 0.70" , Wet = 0.10"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 **Project Location:** Laughlin AFB, Del Rio Tx **Project Number:** 72-315	**Log of Boring B-7** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			16	SC		Medium Dense Brown Clayey Sand with Gravel	14.7	14.4	33	9	
			18	SC		Medium Dense Pinkish Gray Clayey Sand with Gravel	15.4	13.4	35	13	
	5		45	SC		Dense Tan Silty Sand with Gravel	14.1	12.1	40	1	
			50 Ref 5"	SC		Very Dense Light Gray Clayey Sand	12.8	12.3	41	23	
			50 Ref 3"	SC		Very Dense Very Pale Brown Clayey Sand	12.5	14.3	49	21	
	10										
			50 Ref 5"	SC		Very Dense Light Brown Clayey Sand with Gravel	11.7	10.1	39	11	
	15					End of Bore					
						PVR Dry = 0.60" , Wet = 0.10"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 **Project Location:** Laughlin AFB, Del Rio Tx **Project Number:** 72-315	**Log of Boring B-8** Sheet 1 of 1

Date(s) Drilled	8-27-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	10 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			11	SC		Loose to Medium Dense Brown Clayey Sand with Gravel	19.6	7.8	21	16	
			21	SC		Medium Dense Brown Clayey Sand	18.5	16.8	38	15	
	5		17	SC		Medium Dense Tan Clayey Sand	18.6	23.9	60	28	
			79 Ref 9"	SC		Very Dense Tan Clayey Sand			38	22	
			50 Ref 5"	SC		Very Dense Brown Clayey Sand with Gravel	15.6	3.8	48	17	
	10					End of Bore Could Not Penetrate After 15 Minutes PVR Dry = 0.95" , Wet = 0.30"					
	15										

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 **Project Location:** Laughlin AFB, Del Rio Tx **Project Number:** 72-315	**Log of Boring B-9** Sheet 1 of 1

Date(s) Drilled	9-10-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			13	CH		Medium Dense Dark Grayish Brown Sandy Fat Clay	23.4	72	52	22	
			20	SC		Medium Dense Dark Brown Clayey Sand	20.3	38.5	33	12	
	5		23	SC		Medium Dense Very Pale Brown Clayey Sand	20.7	37.2	27	8	
			38	CL		Dense White Lean Clay with Sand	17.6	67.4	36	16	
			50 Ref 3"	CH		Very Dense Fat Clay with Sand	11.5	75.1	57	14	
	10										
			50 Ref 2"	CL		Very Dense White Lean Clay with Sand	10.7	67.3	31	13	
	15					End of Bore PVR Dry = 0.60" , Wet = 0.20"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22 Project Location: Laughlin AFB, Del Rio Tx Project Number: 72-315	**Log of Boring B-10** Sheet 1 of 1

Date(s) Drilled	9-10-2016	Logged By	M Carrillo	Checked By	H. Carrillo
Drilling Method	Solid Stem Auger	Drill Bit Size/Type	4.5 inch rock bit	Total Depth of Borehole	15 feet bgs
Drill Rig Type	Simco SK 2400	Drilling Contractor	Carrillo & Associates, Inc.	Approximate Surface Elevation	Existing Surface
Groundwater Level and Date Measured	Not Encountered ATD	Sampling Method(s)	SPT, Other	Hammer Data	140 lb, 30 in drop, rope & cathead
Borehole Backfill	Bentonite Chips	Location	See Bore Plan		

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
	0					6" Concrete Pavement					
			17	CL		Medium Dense Brown Lean Clay	21.3	62.8	25	10	
			23	CL		Medium Dense Dark Brown Lean Clay with Sand	21	71.8	48	18	
	5		28	CL		Medium Dense Brown Lean Clay	17.5	63.3	47	20	
			37	CL		Dense Tan Lean Clay with Sand	17.2	71.4	26	9	
	10		50 Ref 3"	CL		Very Dense Tan Lean Clay with Sand	16.8	76	58	20	
			50 Ref 1"	CL		Very Dense Light Brown Lean Clay with Sand	17	78.1	29	8	
	15					End of Bore PVR Dry = 0.60" , Wet = 0.15"					

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Figure

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Project: Laughlin AFB - Prefabricated Sunshade Structure WA #22
Project Location: Laughlin AFB, Del Rio Tx
Project Number: 72-315

Key to Log of Boring

Sheet 1 of 1

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	#200	LL	PI	AASHTO SOIL DESIGNATION
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 **Elevation, feet:** Elevation (MSL, feet)

2 **Depth, feet:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at the depth interval shown.

4 **Sampling Resistance, blows/foot:** Number of blows to advance driven sampler foot (or distance shown) beyond seating interval using the hammer identified on the boring log.

5 **USCS Symbol:** USCS symbol of the subsurface material.

6 **Graphic Log:** Graphic depiction of the subsurface material encountered.

7 **MATERIAL DESCRIPTION:** Description of material encountered. May include consistency, moisture, color, and other descriptive text.

8 **Water Content, %:** Water content of the soil sample, expressed as percentage of dry weight of sample.

9 **#200:** #200 % Passing

10 **LL:** Liquid Limit

11 **PI:** Plasticity Index

12 **AASHTO SOIL DESIGNATION:** Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

TYPICAL MATERIAL GRAPHIC SYMBOLS

- Other
- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- Well graded GRAVEL with Silt (GW-GM)
- Well graded GRAVEL with Clay (GW-GC)
- Poorly graded GRAVEL with Silt (GP-GM)
- Poorly graded GRAVEL with Clay (GP-GC)
- Silty GRAVEL (GM)
- Clayey GRAVEL (GC)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- Well graded SAND with Silt (SW-SM)
- Well graded SAND with Clay (SW-SC)
- Poorly graded SAND with Silt (SP-SM)
- Poorly graded SAND with Clay (SP-SC)
- Silty SAND (SM)
- Clayey SAND (SC)
- SILT, SILT w/SAND, SANDY SILT (ML)
- Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
- SILT, SILT w/SAND, SANDY SILT (MH)
- Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
- SILT, SILT with SAND, SANDY SILT (ML-MH)
- Lean-Fat CLAY, CLAY w/SAND, SANDY CLAY (CL-CH)
- SILTY CLAY (CL-ML)
- Lean CLAY/PEAT (CL-OL)
- Fat CLAY/SILT (CH-MH)
- Fat CLAY/PEAT (CH-OH)
- Silty SAND to Sandy SILT (SM-ML)
- Silty SAND to Sandy SILT (SM-MH)
- Clayey SAND to Sandy CLAY (SC-CL)
- Clayey SAND to Sandy CLAY (SC-CH)
- SILT to CLAY (CL/ML)
- Silty to Clayey SAND (SC/SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- 2-inch-OD unlined split spoon (SPT)
- 2.5-inch-OD Modified California w/ brass liners
- 3-inch-OD California w/ brass rings
- Shelby Tube (Thin-walled, fixed head)
- Grab Sample
- Bulk Sample
- Pitcher Sample

OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting a given time)
- Minor change in material properties within a stratum
- Inferred or gradational contact between strata
- ? Queried contact between strata

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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Laughlin AFB – Prefabricated Sunshade Structures WA #22 Del Rio Texas
Project No. 72-315

RECOMMENDED SPECIFICATIONS FOR EARTHWORK AND PAVEMENT CONSTRUCTION

CARRILLO
& ASSOCIATES, INC.

RECOMMENDED SPECIFICATIONS FOR EARTHWORK AND PAVEMENT CONSTRUCTION

GENERAL

Scope

The work done under these specifications shall include clearing, stripping, removal of unsuitable material, excavation, installation of subsurface drainage, preparation of natural soils, placement and compaction of onsite and imported fill material, and placement and compaction of building and pavement materials.

Contractor's Responsibility

The contractor shall attentively examine the site in such a manner that he can confirm existing surface conditions with those presented in the soils report. Any discrepancy that may be of prior knowledge to the contractor or that is revealed through his investigations shall be made available to the owner.

Geotechnical Engineer

The work covered by these specifications shall be observed and tested by the geotechnical engineer, *Carrillo & Associates, Inc.* who shall be hired by the owner. The geotechnical engineer will be present during the site preparation and grading to observe the work and to perform the tests necessary to evaluate material quality and compaction.

Standard Specifications

Where referred to in these specifications, "Standard Specifications" shall mean the current TxDOT and ASTM standard specifications.

SITE PREPARATION

Clearing

Areas to be graded shall be cleared and grubbed of all vegetation and debris. These materials shall be removed from the site by the contractor.

Stripping

Surface soils containing roots and organic matter shall be stripped from areas to be graded and stockpiled or discarded as directed by the owner. In general, the depth of stripping of the topsoil will be approximately two (2) inches. Deeper stripping where required to remove weak soils or accumulations of organic matter, shall be performed when determined by the geotechnical engineer.

Removal of Existing Fill

Existing fill soils, trash, and debris in the areas to be graded shall be removed prior to the placing of any compacted fill. Portions of any existing fills that are suitable for use in compacted fill may be stockpiled for future use. All organic material, topsoil, expansive, oversize material or other unsuitable material shall be removed from the site by the contractor or disposed of at a location onsite, if so designated by the owner.

Ground Surface

The ground surface exposed by stripping shall be scarified to a depth of eight (8) inches, moisture conditioned to the proper moisture content for compaction as specified in the geotechnical report and compacted to a minimum of 95 percent of the maximum dry density as evaluated by ASTM D1557.

EXCAVATION

General

Excavations shall be performed to the lines and grades indicated on the plans. The data presented in the soils report is for information only and the contractor shall make his own interpretation with regard to the methods and equipment necessary to perform the excavation and to obtain material suitable for fill.

Materials

Soils which are removed and are unsuitable for fill should be placed in non structural areas of the project. Where necessary, these soils may be placed in deeper fills if approved by the geotechnical engineer.

Exposed Surface

The ground surface exposed by excavation shall be scarified to a depth of eight (8) inches moisture conditioned to the proper moisture content for compaction, and compacted as required for compacted fill.

Rock Excavation

Where solid rock is encountered in excavation, it shall be loosened and broken up so that no solid ribs, projections, or large fragments will be within six (6) inches of the surface of the final subgrade.

COMPACTED FILL

Materials

Fill material shall consist of suitable onsite or imported fill. All materials used for structural fill shall be reasonably free of organic material, have a Liquid Limit (LL) less than 35, a Plasticity Index (PI) less than 15, and no stones larger than three (3) inches. Fill material shall be approved by the geotechnical engineer.

Placement

All fill materials shall be placed in horizontal layers not to exceed eight (8) inches loose lift or six (6) inches compacted measure. The lift should then be compacted with a sheep foot roller or other approved compaction equipment to achieve a minimum of 95 percent of the maximum dry density as evaluated by ASTM D 1557 in areas under structures, and to a *minimum of 90 percent in undeveloped areas*. We recommend one (1) density test per 2,500 square feet per lift with a minimum of three (3) tests per lift. Moisture content as specified in the Geotechnical report.

Benching

Fill placed on slopes steeper than five (5) horizontal to one (1) vertical shall be keyed into firm, native soils or rock by a series of benches. Benching can be conducted simultaneously with placement of fill.

Compaction Equipment

The contractor shall provide and use sufficient equipment of a type and weight suitable for the conditions encountered in the field. The equipment shall be capable of obtaining the required compaction in all areas, including those that are inaccessible to ordinary rolling equipment.

Responsibility

The contractor shall be responsible for maintenance and protection of all embankments and fills during the contract period and shall bear the expense of replacing any portion which has

become displaced due to carelessness, negligent work, or failure to take proper precautions.

SUBGRADE AND FLEXIBLE BASE FOR PAVED AREAS

Subgrade Preparation

After completion of the utility trench backfill and prior to placement of flexible base, the upper six (6) inches of subgrade soil shall be uniformly compacted to a minimum of 95 percent of the maximum dry density as evaluated by ASTM D 1557. Moisture content as specified in the Geotechnical report.

This may require scarifying, moisture conditioning, and compacting in both cut and fill areas. Compaction testing frequency should be a minimum of one test for every 4000 square feet of each lift placed with a minimum of three (3) tests per lift.

Flexible Base

Base materials shall meet the specified requirements of TxDOT and ASTM standard specifications.

After the subgrade is properly prepared, the flexible base shall be placed in layers; moisture conditioned as necessary, and compacted by rolling to a minimum of 100 percent of the maximum dry density as evaluated by ASTM D 1557. Moisture content as specified in the Geotechnical report.

The compacted thickness of base material shall be shown on the approved plans. Compaction testing frequency should be a minimum of one test for every 4000 square feet of each lift placed with a minimum of three (3) tests per lift.

HMAC PAVEMENT

Thickness

The compacted thickness of HMAC shall be as shown on the approved plans.

Materials

Aggregate materials for HMAC shall conform to the TxDOT requirements. The mix design shall be based on the current methods. Material testing of asphalt material should occur at a minimum of one test: Asphalt content, gradation, rice, molded density, every 500 tons of material laid, or a days production if less than 500 tons.

Placement

The HMAC and placement procedures shall conform to appropriate sections of TxDOT standard specifications. In-place asphalt core densities should occur for every 500 tons of material laid, or a days production if less than 500 tons.

PROFESSIONAL OPINION

PROFESSIONAL OPINION

The actual subsurface conditions are determined only at the boring locations and only at the time samples are taken. The information is reviewed by the Geotechnical Engineer who then renders professional opinions regarding the characteristics of the subsurface materials, the behavior of the soils during construction, and appropriate foundation designs. No exploration, however complete, can be assured of sampling the entire range of soil conditions. The soils may vary between the borings and stratum transitions may be more gradual or more abrupt and all types of soil and rock existing on the site may not be found on the borings. The geotechnical engineer is often retained during construction to evaluate recommended solutions to problems encountered on the site.

REPORT IS BASED UPON SPECIFIC SITE AND PROJECT

This report applies to a specific structure and site; the geotechnical report should not be used in the following circumstances unless the geotechnical engineer has reviewed the changes and concurs in the use of the report.

- When the location of the structure on the site has changed.
- When the size, configuration, or floor elevation is changed.
- When the proposed structure is changed such as an office building instead of a warehouse or parking garage, or a refrigerated warehouse instead of one which is not refrigerated.
- When there is a change in ownership

REPORTS SUBJECT TO MISINTERPRETATION

Geotechnical reports rely on the project information available at the time the report was generated and drilled and the judgment and opinions of the geotechnical engineer. The geotechnical engineer should be retained during the design process to interpret the recommendations and review the adequacy of the plans and specifications related to the geotechnical issues. The boring logs should not be separated from the geotechnical report, rather the entire report should be made available to the contractors and others needing this information.

Laughlin AFB – Prefabricated Sunshade Structures WA #22 Del Rio Texas
Project No. 72-315

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