816 Park Two Drive
Sugar Land, TX 77478
281.494.3252

KSA ENGINEERS

Addendum No. 02
TxDOT CSJ No. 1221HEBRN
Jim Hogg County Airport
Issued June 20, 2012

The plans, specifications and contract documents shall be modified as described below. **All bidders shall acknowledge receipt of this addendum on the bid proposal.** This addendum becomes part of the contract documents. All provisions of the original plans, specifications and contract documents shall remain in full force and effect, except as modified by this addendum.

1. Reference the Contract Documents and Specifications for Airport Improvement Project:

   The Contract Documents and Specifications for Airport Improvement Project have specific requirements for information to be submitted with the bid proposal. In addition, the required information must be submitted in the proper format. Please review the "Bidder Qualifications" and "Instructions to Bidders" to insure that a complete bid is submitted.

2. Addendums to the contract documents are posted on TxDOT Aviation's website (http://www.dot.state.tx.us/AVN/avninfo/addendum/construct/index.htm). The bidder is responsible for checking the website regularly for addendums. All addendums must be acknowledged on the bid proposal.

3. Reference the Contract Documents and Specifications for Airport Improvements at the Jim Hogg County Airport, Bid Proposal:

   Replace the entire Bid Proposal (sheets P-1 to P-10) with attached revised Bid Proposal sheets (sheets REV P-1 to REV P-11). Various bid items have changed and the contract time has changed.

4. Reference the Plans, Sheet 3 – Summary of Quantities:

   Changes to Bid Proposal apply to Quantity Sheet.

5. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Technical Specifications Table of Contents":

   Delete Technical Specification Table of Contents Item 12 "Tx552MOD" and "Item Tx552".

6. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Modifications to Item SS-800" and "Item SS-800 Game Fencing":

   Replace the entire "Modification to Item SS-800" (sheet SS-800MOD-1) and "Item SS-800 Game Fencing" (sheets SS-800-1 to SS-800-6) with attached revised

"Modification to Item SS-800" (sheet REV SS-800MOD-1) and "Item SS-800 Game Fencing" (sheets REV SS-800-1 to REV SS-800-6), respectively.

7. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Item 552 Wire Fence":

   Delete the entire specification "Item Tx552 Wire Fence" and "Modifications to Item Tx552".

8. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Item S-22 Slide Gate Operator":

   Replace the entire "Item S-22 Slide Gate Operator" (sheets S-22-1 to S-22-5) with attached revised "Item S-22 Slide Gate Operator" (sheets REV S-22-1 to REV S-22-5).

9. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Modifications to Item Tx636 Aluminum Signs":

   Replace "Modifications to Item Tx636 Aluminum Signs" (sheet Tx636MOD-1) with attached revised "Modifications to Item Tx636 Aluminum Signs" (sheet REV Tx636MOD-1). The intent is to include a sign with after hours access contact information.

10. Reference the Plans, Cover Sheet:

    Reference "TxDOT CSJ No.: 1221HERBN"

    "1221HERBN" should read "1221HEBRN"

11. Reference the Plans, Sheet 5 – Project Layout:

    Reference Major Project Items, No. 7 "Remove and Dispose Existing Gate and Fence (403')"

    This Major Project Item No. 7 description has been revised as "Existing Gate To Be Removed, Existing Fence Between Existing Gate and Proposed Gate To Remain."

12. Reference the Plans, Sheet 7 – Phasing Plan, Phase 2 – Electrical Work, Obstruction Lights, Runway Exit Signs, Rotary Beacon and Rotary Beacon Tower:

    Add Notes 2 and 3 as following:

    Note 2: Runway 13/31 will be closed only when construction activities (i.e. installing runway exit signs and installing obstruction lights) are within the 150 feet wide by 5,600 feet long runway safety area. Runway will be open for construction activities occurring outside of runway safety area. Contractor shall contact Mr. Clark Rossi at

the airport so that the appropriate NOTAM can be issued. The cost of establishing and removing Closed Runway Markings shall not be measured for a separate payment.

Note 3: Runway 13/31 shall be open at the end of each day's construction operation. From September 1, 2012 to January 31, 2013, Runway 13/31 can only be closed for construction activities on Monday, Tuesday and Wednesday.

13. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Electrical Specifications":

    Replace the entire Specification "E1" (Sheets E1-1 to E1-17) with attached revised Specification "E01/Rev1" (Sheets E1/Rev1-1 to E1/Rev1-17).

14. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Electrical Specifications":

    Replace the entire Specification "E3" (Sheets E3-1 to E3-5) with attached revised Specification "E03/Rev1" (Sheets E3/Rev1-1 to E3/Rev1-5).

15. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Electrical Specifications":

    Add the entire Specification "S-L810/Rev1" (Sheets S-L810/Rev1-1 to S-L810/Rev1-4).

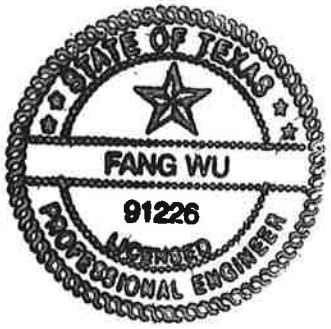
16. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Electrical Specifications", "Section E2-Power Generation/Utility Service":

    Add "Section E2-Power Generation/Utility Service" (Sheet E2-1).

17. Reference the Contract Documents and Specifications for Airport Improvements Jim Hogg County Airport, "Electrical Specifications", "Modification to Item L-109":

    Replace "Modifications to Item L-109" (sheet L-109-MOD) with attached revised "Modifications to Item L-109" (sheet REV L-109-MOD/Rev 1-1).

Questions were received by KSA Engineers, Inc. by phone, email, and at the pre-bid meeting. Responses to these questions are attached to this addendum. Questions are paraphrased and are as understood by KSA Engineers, Inc.



Addendum Number Two Issued By:

KSA Engineers, Inc.

Wu 6-20-2012

Kent Wu, P.E., CFM

Attachments:

1. REVISED Bid Proposal sheet (REV P-1 to REV P-11)
2. REVISED Item SS-800 Game Fencing and Modification to Item SS-800 (REV SS-800-1 to REV SS-800-6, and REV SS-800MOD-1)
3. REVISED Item SS-22 Slide Gate Operator (REV S-22-1 to REV S-22-4)
4. REVISED Modifications to Item Tx636 Aluminum Signs"(sheet REV Tx636MOD-1)
5. REVISED Specification "E01/Rev1" (Sheets E1/Rev1-1 to E1/Rev1-17)
6. "Section E2-Power Generation/Utility Service" (Sheet E2-1)
7. REVISED Specification "E03/Rev1" (Sheets E3/Rev1-1 to E3/Rev1-5)
8. "Modifications to Item L-109"(sheet REV L-109-MOD/Rev 1-1)
9. Specification "S-L810/Rev1" (Sheets S-L810/Rev1-1 to S-L810/Rev1-4)
10. Engineer's Response to Questions

PROPOSAL

Proposal TxDOT CSJ No. 1221HEBRN

Project Description: 2011 Airport Improvement Project

Proposal by: Name of Bidder: _____

Address: _____

_____

Telephone: _____ Fax: _____

To the Texas Department of Transportation hereinafter called the Agent.

Pursuant to the foregoing Instruction to Bidders, the undersigned bidder having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all the conditions surrounding the construction of the project hereby proposes to furnish all necessary superintendence, labor, machinery, equipment, tools materials and supplies to complete all the work upon which is bid in accordance with the contract documents, within the time set forth and at the prices stated below.

BASE BID

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
Item 1 – Mobilization and Barricades						
1.01	S-1	1	LS	Mobilization		
				at _____ DOLLARS		
				and _____ Cents	$ _____	$ _____
				per lump sum		
1.02	S-3	1	LS	Barricades		
				at _____ DOLLARS		
				and _____ Cents	$ _____	$ _____
				per lump sum		
				Total Item 1 – Mobilization and Barricades	**$** _____	

(Insert Total Item 1 on Page REV P-9)

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
Item 2 – Game Fence						
2.01	SS-800-5.1	1	LS	Surveying and Fence Layout at _____ DOLLARS and _____ Cents per lump sum	$ _____	$ _____
2.02	SS-800-5.2	14,300	LF	Remove and Dispose of Existing Fence and Gates at _____ DOLLARS and _____ Cents per linear foot	$ _____	$ _____
2.03	SS-800-5.3	2.6	Acre	Clear Fence Line at _____ DOLLARS and _____ Cents per acre	$ _____	$ _____
2.04	SS-800-5.4	14,300	LF	8-Foot Game Fence at _____ DOLLARS and _____ Cents per linear foot	$ _____	$ _____
2.05	SS-800-5.5	4	EA	Single Swing Gate (12' Wide) at _____ DOLLARS and _____ Cents per each	$ _____	$ _____
2.03	S-21	1	EA	Control Access Gate (36' Wide) at _____ DOLLARS and _____ Cents per each	$ _____	$ _____
2.04	S-22	1	EA	Slide Gate Operator (Controlled Access Gate) at _____ DOLLARS and _____ Cents per each	$ _____	$ _____
2.05	E-5.1	1	EA	Electrical Service (Controlled Access Gate) at _____ DOLLARS and _____ Cents per lot	$ _____	$ _____
2.06	E-5.2	1	LOT	Electrical Power Distribution (Controlled Access Gate) at _____ DOLLARS and _____ Cents per lot	$ _____	$ _____

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
2.07	SS-800-5.6	1	EA	Pedestrian Gate (4' Wide)		
				at _____ DOLLARS		
				and _____ Cents	$ _____	$ _____
				per each		
2.08	Plan Detail	4	EA	Bollards		
				at _____ DOLLARS		
				and _____ Cents	$ _____	$ _____
				per each		
2.09	Tx636	71	EA	Aluminum No Trespassing Signs (TY A) @ 200'		
				at _____ DOLLARS		
				and _____ Cents	$ _____	$ _____
				per each		
2.10	S-7	500	LF	Temporary Filter Fabric Fence		
				at _____ DOLLARS		
				and _____ Cents	$ _____	$ _____
				per linear foot		

Total Item 2 – Game Fence $ _____

(Insert Total Item 2 on Page REV P-9)

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
Item 3 – Obstruction Lights and Markers - North and South End						
3.01	L-108-5.2	5,400	LF	#8 AWG L-824C at _____ DOLLARS and _____ Cents per linear foot	$ _____	$ _____
3.02	L-108-5.3	2,700	LF	Counterpoise at _____ DOLLARS and _____ Cents per linear foot	$ _____	$ _____
3.03	L-109-5.5	1	EA	10-kw Regulator Installed at _____ DOLLARS and _____ Cents per each	$ _____	$ _____
3.04	L-110-5.C1*	2,700	LF	Two Inch PVC Conduit at _____ DOLLARS and _____ Cents per linear foot	$ _____	$ _____
3.05	L-115-5.4	11	EA	L-867B Hand Hole at _____ DOLLARS and _____ Cents per each	$ _____	$ _____
3.06	S-L810-5.1	9	PR	Obstruction Markers at _____ DOLLARS and _____ Cents per	$ _____	$ _____
3.07	S-L810-5.2	9	EA	L-810 Obstruction Lights at _____ DOLLARS and _____ Cents per each	$ _____	$ _____

Total Item 3 – Obstruction Lights and Markers - North and South End $ _____

(Insert Total Item 3 on Page REV P-9)

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
Item A1 – Additive Alternate Bid No. 1: Rotating Beacon						
A1.01	L-101	1	LS	Install Rotating Beacon at _____ DOLLARS and _____ Cents per lump sum	$ _____	$ _____

Total Item A1 – Add Alternate Bid No. 1: Rotating Beacon $ _____

(Insert Total Item A1 on Page REV P-9)

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
Item A2 – Additive Alternate Bid No. 2: Paint Rotating Beacon Tower						
A2.01	L-103	1	LS	Paint Rotating Beacon Tower at _____ DOLLARS and _____ Cents per lump sum	$ _____	$ _____

Total Item A2 – Add Alternate Bid No. 2: Paint Rotating Beacon Tower $ _____

(Insert Total Item A2 on Page REV P-9)

BID NO.	ITEM	QTY	UNIT	DESCRIPTION WRITTEN & NUMERIC PRICE	UNIT PRICE	TOTAL PRICE
Item A3 – Additive Alternate Bid No. 3: Runway Exit Sign						
A3.01	L-117-5.1	8	EA	1 Module Sign Installed at _____ DOLLARS and _____ Cents per each	$ _____	$ _____
A3.02	L-117-5.2	8	EA	1 Module Sign Removed at _____ DOLLARS and _____ Cents per each	$ _____	$ _____

Total Item A3 – Add Alternate Bid No. 3: Runway Exit Sign $ _____

(Insert Total Item A3 on Page REV P-9)

Jim Hogg County Airport
Hebbronville, Texas
AIRPORT IMPROVEMENT PROJECTS

BID SUMMARY

Item Number	Description	Total Bid for Each Item
1	Mobilization and Barricades	$ _____
2	Game Fence	$ _____
3	Obstruction Lights and Markers - North and South End	$ _____
	Total Base Bid Amount:	$ _____
A1	Additive Alternate No. 1: Rotating Beacon	$ _____
A2	Additive Alternate No. 2: Paint Rotating Beacon Tower	$ _____
A3	Additive Alternate No. 3: Runway Exit Sign	$ _____
	Total Base Bid + Additive Alternates:	$ _____

It is understood the quantities of work to be done at unit prices are approximate and are intended for bidding purposes only. Amounts are to be shown in both words and figures. In case of discrepancy the amount shown in words shall govern.

Bidders understand the Agent reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner or Agent and conforms to State and local laws and ordinances pertaining to the letting of construction contracts. Funding availability will be considered in selecting the bid award. The bidder agrees this bid shall be honored and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids.

Upon receipt of the written "Notice of Award", the bidder will execute the formal contract agreement within 14 days and deliver a surety bond or bonds as required under the contract documents. The bid security attached, two percent (2%) of the total bid price stated in the proposal, in the sum of $_____ is to become the property of the Agent in the event the contract is not executed as set forth in the contract documents as liquidated damages for the delay and additional expense caused thereby.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" and to fully complete the project (Base Bid) within **90** calendar days thereafter. An additional 30 calendar days will be allowed for the inclusion of any of the three Additive Alternates or any combination of the three Additive Alternates. Bidder further agrees to pay as liquidated damages the sum of $1,000.00 for each calendar day to complete the work beyond the allotted time or as extended by an approved Change Order or Supplemental Agreement.

_____ _____

Signature Title

_____ _____

Signature Title

_____

Mailing Address City, State, Zip Code

Addendum:

The undersigned Bidder certifies that he has acknowledge the addendum(s) to the contract as indicated below.

Addendum No. _____ dated_____
Addendum No. _____ dated_____
Addendum No. _____ dated_____

Pre-Qualification Acknowledgement and Signature:

The undersigned Bidder certifies they are a prequalified bidder with the Texas Department of Transportation (TxDOT) and is on the current TxDOT "Bidder's List" as indicated below:

_____ Full Prequalification with a bidding capacity of $_____
_____ Bidder's Questionnaire with a bidding capacity of $_____

OR

The undersigned Bidder is not a pre-qualified TxDOT bidder and has enclosed the bidder's qualifications per General Provision 20-02, Prequalification of Bidders.

_____ I have enclosed pre-qualification statements.

_____ _____
Signature Title

_____
Mailing Address City, State, Zip Code

Note: The bidder may also submit an electronically printed proposal. The proposal must have pay items in the same order and with the exact informationas on this proposal form. If submitting an electronically printed proposal, please submit qualification/signature page. Teh bidder is responsible for incorrect information and will be considered non-responsive if pay items are incorrect.

Modifications to Item SS-800

GAME FENCING

This modification page modifies, amplifies, or amends the technical specifications and plans. In the event of discrepancy, this modification shall take precedence over the plans and the technical specifications.

800-2.1 GAME FENCE WIRE FABRIC. The game fence shall be High Tensile Fixed Knot Fence, Specification 2096-6-330 or 2096-12-330. Fence shall be eight (8') foot in height, 12.5 gauge line wires and vertical stay wires, 13 gauge knot wire, with 6" horizontal openings, and 12 gauge top and bottom wires. As an exclusion fence, the 2096-12-330 will suffice over the 2096- 6-330.

800-2.3 GAME FENCE POSTS, GATES, RAILS, BRACES, T-POSTS, AND ACCESSORIES. Wire can be erected on posting of up to 25 feet apart and brace pull points of up to 1,320 feet apart. T-posts in fence line should be a 1.5 lb per foot weight. Pipe for this fence can be galvanized or standard black painted pipe of at least Schedule 40 thickness.

Paragraph 800-3.4 Clearing Fence Line Add the following:

Disposal of material can be done by one or a combination of the following methods:

1. Haul off site and dispose of in a legal manner.
2. Burning will be allowed on the airport site in accordance with local burning ordinance and requirements. The area for burning activity will be located generally at the northwest corner of the airport property. Contractor shall contact Mr. Clark Rossi for the specific limits of this area.

ITEM SS-800 GAME FENCING

DESCRIPTION

800-1.1 This item shall consist of furnishing and erecting a game fence in accordance with these specifications and the details shown on the plans and in conformity with the lines and grades shown on the plans. This item shall also include removing and salvaging existing fencing materials, and gates, and clearing the proposed fence line in preparation for installing the new game fence.

MATERIALS

800-2.1 GAME FENCE WIRE FABRIC. A nominal 96" inch, fixed-knot game fence with 20 horizontal wires, with horizontal openings of 6-3"; 2-4", 2-5", 3-6", and 6-7" and a 6 inch horizontal spacing between the vertical stay wires shall be used. The wire shall be a heavily galvanized Class 3 coating (0.85oz to 1.1oz per sq ft) and shall meet ASTM A-116 and the requirements of the following Table 1. The fence knot shall be a minimum 13 gauge "fixed-knot" that will reinforce the wire so that it stands up to impacts without sagging or breaking. No hinged joint knot is desired. In particular, the "2096-6-330" high-tensile game fence shall be 20 horizontal wire, 96 inch high, 6 inch horizontal spacing, and with a roll length of 330 feet. Posts, rails, and braces shall conform to the requirements of subparagraph 800-2.3.

Table 1. Game Fence Fabric (48" or 96" fabric)

Wire	Gauge	Tensile Strength	Breaking Load
Top & Bottom	12	Hi-Tensile: 179K - 210K	1462 lbs - 1696 lbs
Line Wires	12½	Hi-Tensile: 179K - 210K	1350 lbs - 1584 lbs
Stay Wires	12½	Med-Tensile: 125K - 145K	943 lbs - 1094 lbs
Knot Wires	13	Low-Tensile: 72K - 95K	438 lbs - 580 lbs

800-2.2 WATER GAP MATERIALS: Materials for the water gap fence will be made of high quality, commercially available materials. The fence fabric for the water gap fence shall be a minimum 6-gauge Class 3 galvanized steel wire in a 4-inch mesh and shall meet the requirements of ASTM A 116. Posts shall conform to the requirements of subparagraph 800-2.4. The steel tubing shall be 2"x2" 14 gauge hot dipped galvanized steel meeting the requirements of ASTM A500 Grade B. Wire rope shall be 5/16" galvanized cable meeting the requirements of Federal Specification RR-W-410E. Eye bolts and "D" shall be galvanized steel as recommended by the wire rope manufacturer for use with the wire rope specified.

800-2.3 GAME FENCE POSTS, GATES, RAILS, BRACES, T-POSTS, AND ACCESSORIES. These items, when specified, shall conform to the requirements of Fed. Spec. RR-F-191 or ASTM F1043 as amended by ASTM F1083 as follows:

a. Galvanized tubular steel pipe shall conform to the requirements of Group 1 A, (Schedule 40) coatings conforming to Type A or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.

b. Posts, rails, and braces, with the exception of galvanized steel conforming to ASTM F 1043 or ASTM F 1083, Group 1 A, Type A, or aluminum alloy, shall demonstrate the ability to withstand testing in salt spray in accordance with ASTM B 117 as follows:

External: 1,000 hours with a maximum of 5% red rust
Internal: 650 hours with a maximum of 5% red rust

c. The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Fed. Spec. RR-F-19113D, as amended.

d. All posts, rails, and braces used for the fence shall be zinc-coated or galvanized. T-posts for the game fence shall be 124 inches in length with a weight of 1.50 pounds per linear foot. T-post clips shall be made of 0.115 galvanized wire or thicker or as recommended by the manufacturer, whichever is sturdier.

800-2.4 GATES. Man gate and swing gate frames shall consist of galvanized tubular steel pipe meeting the minimum diameter dimensions shown on the plans and shall conform to the specifications for the same material under subparagraph 800-2.3. The fabric shall be of the same type material as used in the game fence. The 3 and 4 foot wide man gates shall be self-closing gates that have a minimum of two self closing 2" x 3" (gate frame x gate post) hinges or Engineer approved equal. The number of hinges required shall be based manufacturer's recommendation based on the weight of the man gates. These man gates shall also be self-latching and have a galvanized finish.

800-2.5 BARBED WIRE (ZINC-COATED). Zinc-coated barbed wire shall be 2-strand twisted No. 12 1/2 gauge galvanized steel wire with 4-point barbs of No. 14 gauge galvanized steel wire. All wire shall conform to ASTM A 121, Type A. The barbs shall be spaced approximately 4 inches (100 mm) apart.

800-2.6 WIRE TIES AND TENSION WIRES. Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type with a minimum No.7 gauge thickness or as recommended by the manufacturer. Tension wires are to be a minimum No.7 gauge marcelled steel tension wire conforming to ASTM A 824. All material shall conform to Fed. Spec. RR-F-191/4D, as amended.

800-2.7 MISCELLANEOUS FITTINGS AND HARDWARE. Miscellaneous steel fittings and hardware for use with zinc-coated steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A 153.

800-2.8 CONCRETE. All concrete shall be of a commercial grade and shall meet the FAA P-610 specifications (Minimum 28-day compressive strength of 3,000 psi, etc.) as modified.

800-2.9 MARKING. Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and type of coating.

800-2.10 PAINT. Paint for repair of damaged hot dipped galvanized coating shall be zinc rich paint with organic binders meeting the requirements of ASTM A780. Paint to be Galv Match Plus as manufactured by NuWave Solutions or approved equal.

CONSTRUCTION METHODS

800-3.1 GENERAL. The game fence shall be constructed in accordance with the details on the plans and as specified herein using new materials, and all work shall be performed in a workmanlike manner satisfactory to the Engineer.

The finished game fence shall be plumb, taut, true to line and ground contour, and complete in every detail. The clearance between the base of the fence and the ground line shall be maintained to the tolerances shown on the plans. If necessary the Contractor shall stake down the game fence at several points between posts. The new fence shall be permanently tied to the terminals of existing fences. The finished fence shall be plumb, taut, true to line and ground contour, and complete in every detail.

If the Contractor is not an authorized installer for the required game fence fabric, the Contractor shall have his installation procedures verified I approved by the game fence fabric manufacturer at the Contractor's expense.

800-3.2 SURVEYING THE NEW FENCE LINE. Prior to the beginning of the work, the Contractor shall locate the position of the work from the plans by establishing and marking the game fence line. The survey shall be performed by a Registered Professional Land Surveyor (RPLS) currently licensed to provide professional services in the State of Texas. A boundary survey of the airport has been recently completed and the game fence shall be located approximately one-foot inside the surveyed property lines in areas where the fence is adjacent to the property line. The field survey will be paid for under the appropriate item in the Bid Proposal.

800-3.3 REMOVING THE EXISTING FENCE. The existing airfield perimeter fence, including posts, fabric, gates, and miscellaneous hardware and appurtenances, shall be removed by the Contractor, in the areas shown on the plans, prior to the installation of new fencing. Existing fencing shall be removed in manageable sections or lengths, allowing for timely replacement and minimizing the timeframe that any portion of the airport property is unfenced.

800-3.4 CLEARING FENCE LINE. The site of the game fence shall be sufficiently cleared of obstructions, vegetation, and surface irregularities and shall be graded so that the game fence will conform to the general contour of the ground. The game fence line shall be cleared to a minimum width of 10 feet on each side of the centerline of the fence where the fence is inside the property lines. For areas where the fence is on the property line an area 8 feet on the outside of the fence shall be cleared. This clearing shall consist of the removal of all stumps, brush, logs, rocks, trees, or other obstructions. Existing fences which coincide with, or are in a position to interfere with, the new fence location shall be removed by the Contractor. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other material acceptable to the Engineer and shall be compacted properly with tampers.

The work shall include the handling and disposal of all material cleared, excavated or removed, regardless of the type, character, composition, or condition of such material encountered.

800-3.5 INSTALLING POSTS. All posts shall be set at the required dimension and depth and at the spacing shown on the plans. Corner supports, in-line supports, braces, anchors, ends, and gate posts shall be set in concrete bases as shown on the plans. Unless otherwise shown on the plans, posts should be spaced not more than 10 feet apart. Line posts should be set a minimum of 36 inches (90 cm) and corner posts and gate posts should be set a minimum of 48 inches (120 cm) unless shown otherwise on the plans. Unless otherwise shown on the plans, the post holes shall be in proper alignment so that there is a minimum of 3 inches (75 mm) of concrete on all sides of the posts. T-posts shall be set a minimum of 26 inches in the ground.

The concrete shall be thoroughly compacted around the posts using a mechanical vibrator. The top of the concrete footing shall have a smooth, trowel finish one inch higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. Holes of full depth and size for the concrete bases for posts shall be provided. All post settings shall be done carefully and to true alignment.

Dirt removed for placing posts, anchor bars, flanges, etc., shall be replaced, tamped, and leveled. When T-posts are driven, care shall be exercised to prevent marring or buckling of the posts. Damaged posts shall be replaced at the Contractor's expense. No extra compensation will be made for rock excavation. Rock excavation shall not be grounds for extension of time.

No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.

800-3.6 BRACING. All corner supports, in-line supports, anchor, end, and gate posts shall be braced as

shown on the plans. "A-Brace" anchor posts shall be braced as shown on the plans and shall be set a maximum of 1320 foot intervals and at all top of slopes and bottom of slopes.

800-3.7 INSTALLING WIRE. All welded wire and game fence wire shall be installed at the height indicated on the plans. All wire shall be stretched taut and shall be installed to the required elevations without sag and with true alignment. Care shall be taken not to stretch the wire so tightly that it will break in cold weather or pull up corner and brace posts. All horizontal wires shall be fastened securely to each post by fasteners or clips designed for use with the posts furnished. The game fence wire shall be wrapped around end, corner, and gate posts, and the ends of all horizontal wires shall be tied with snug, tight twists. The wire shall be secured to prevent slipping up and down the post. Tension wires shall be stretched and secured to each post with a minimum of three wraps around each end post. At end, corner, and gate posts the game fence wire shall be securely wrapped and anchored once about the post from outside and secured against slipping by tying the ends with snug, tight twists. Unless otherwise shown on the plans, the fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 2 inches (50 mm) or more than 4 inches (l00 mm) from the ground surface. Grading shall be performed where necessary to provide a neat appearance. A stand of barbed wire is to be fastened to the posts at the base of the fence as shown on the plans.

At locations of natural swales or drainage ditches water gaps are to be installed. The bottom wire of the water gap wire fencing shall clear the ground by not more than 3 inches or less than 2 inches at any point.

800-3.8 SPLICING WIRE. The splice shall be made with an approved galvanized bolt-clamp splice or a wire splice as recommended by the wire manufacturer. The splice shall be made in accordance with the manufacturer's printed instructions and in accordance with industry standards.

800-3.9 INSTALLING GATES. Install gates at the proper dimensions and alignments as shown on the plans. Contractor shall grade the area in the vicinity of the gate to provide a level area for the gate opening. The work is subsidiary to the unit cost of the gate installed. No separate pay item for grading is provided.

800-3.10 EXISTING FENCE CONNECTIONS. Wherever the new game fence or water gap fence joins an existing fence, either at a corner or at the intersection of straight game fence lines, a corner or anchor post shall be set at the junction and braced and anchored the same as herein described for corner posts for the game fence and the end post for the water gap fence. If the connection is made at other than the corner of the new game fence, the last span of the old game fence shall contain a brace span.

800-3.11 ELECTRICAL GROUNDS. Electrical grounds shall be constructed where a power line passes over the fence and shall be installed directly below the point of crossing. The ground shall be accomplished with a copper clad rod 8 feet (240 cm) long and a minimum of 5/8 inch (15 mm) in diameter driven vertically until the top is 6 inches (150 mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction.

800-3.12 CLEANING UP. The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, concrete debris, etc., used during construction. Unless otherwise shown on the plans, existing fence and gate materials will be properly disposed of off airport property or as designated by the Engineer.

METHOD OF MEASUREMENT

800-4.1 Surveying and fence layout shall be measured by the lump sum for the layout and staking of the entire fence line, including fence, gates, corner posts, and the various items for the fence construction.
800-4.2 The quantity of remove and dispose of existing fence and gates will be measured by the linear foot. The measurement will be made from center of end post, corner post, or end of fence line, and shall be the length of fence and gates actually removed and disposed.

800-4.3 The quantity of clear fence line as shown by the limits on the plans or as specified shall be the number of acres fractions thereof, of land specifically cleared for the fence construction, within the limits shown on the plans and as specified unless specifically approved in writing by the Engineer.

800-4.4 The quantity of the various styles of fence, 8-foot game fence and water gap fence, shall be measured by the linear foot, in place, from center to center of end posts or corner posts, and shall be the length of fence actually constructed and accepted, except for the space occupied by the gates.

800-4.5 The quantity of gates shall be measured by the unit for the various spans of gates installed and accepted.

BASIS OF PAYMENT

800-5.1 Payment for surveying and fence layout shall be made at the contract unit price per lump sum.

800-5.2 Payment for remove and dispose of existing fence and gates shall be made at the contract unit price per linear foot.

800-5.3 Payment for clear fence line shall be made at the contract unit price per acre.

800-5.4 Payment for the various styles of fence, 8-foot game fence and water gap fence, shall be made at the contract unit price per linear foot of fence installed and approved for acceptance.

800-5.5 Payment for the gates shall be made at the contract unit price for each of the various widths of gates installed and approved for acceptance.

Payment will be made under:

Item SS-800-5.1	Surveying and Fence Layout -- per lump sum
Item SS-800-5.2	Remove and Dispose of Existing Fence and Gates -- per linear foot
Item SS-800-5.3	Clear Fence Line -- per acre
Item SS-800-5.4	8-Foot Game Fence -- per linear foot
Item SS-800-5.5	Single Swing Gate (12' wide) – per each
Item SS-800-5.6	Pedestrian (4' Wide) – per each

MATERIAL REQUIREMENTS (AS REQUIRED)

ASTM A 123	Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 446	Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A 446	Steel, Carbon (0.15 Maximum, Percent), Hot Rolled Sheet and Strip Commercial Quality
ASTM A 446	Hot-Rolled Carbon Steel Sheet and Strip Structural Quality
ASTM A 446	High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality

ASTM A 446	Pipe, Steel, Hot-Dipped Zinc-coated (Galvanized) Welded, for Fence Structures
ASTM A 446	Protective Coatings on Steel Framework for Fences
ASTM A 446	Protective Coatings on Steel Framework for Fences
ASTM A 446	Fencing, Wire, and Post, Metal (and Gates, Chain-Link Fence Fabric, and Accessories)
ASTM A 446	Fencing, Wire, Fence Post and Accessories (Barbed Wire, Woven Wire and Netting)

END OF ITEM SS-800

ITEM S-22
Slide Gate Operator

PART 1 – GENERAL

1.01. INCLUDED IN THIS SECTION
A. Pre-wired, self-contained, slide gate operator for horizontal sliding gates, including all selected attachments and accessory equipment.

1.02. RELATED WORK SPECIFIED ELSEWHERE
A. Fencing: See Plans.
B. Concrete: See section Tx421
C. Electrical service and connections: See Sections E-1, E-2, and E-3.
D. Chain link cantilever slide gates: See Section S-21.

1.03. SUBMITTALS
A. Shop drawings: Submit shop drawings under the provisions of Section S-2. Submit drawings showing connections to adjacent construction, range of travel, and all electrical and mechanical connections to the operator. Drawings shall also show the size and location of the concrete mounting pad. Underground electrical runs shall be shown on shop drawings.
B. Installation instructions: Submit two copies of manufacturer's installation instructions for this specific project.
C. Test reports:
   1) Submit affidavits from the manufacturer demonstrating that the gate mechanism has been tested to 200,000 cycles without breakdown.
   2) Each operator shall bear a label indicating that the operator mechanism has been tested for full power and pressure of all hydraulic components, full stress tests of all mechanical components and electrical tests of all overload devices.

1.04. QUALITY ASSURANCE
A. Manufacturer: A company specializing in the manufacture of hydraulic gate operators of the type specified, with a minimum of ten years experience.
B. Installer: A minimum of three years experience installing similar equipment.

1.05. CODES AND REGULATORY REQUIREMENTS
A. Operators shall be built to UL325 standards and be listed by a testing laboratory. Complete all electrical work according to local codes and National Electrical code. All fieldwork shall be performed in a neat and professional manner, completed to journeyman standards.
B. Current safety standards require the use of multiple external sensors to be capable of reversing the gate in either direction upon sensing an obstruction. See also 2.02D.
C. Vehicle gates should never be used by pedestrians. Separate pedestrian gates must always be provided when foot traffic is present.
D. Current safety standards require gate operators to be designed and labeled for specific usage classes.

1.06. PRODUCT DELIVERY AND STORAGE
A. Store products upright in the original shipping containers, covered, ventilated and protected from all weather conditions.

1.07. WARRANTY
A. Provide a five-year limited warranty against all defects in materials or workmanship.

Defective materials shall be replaced with comparable materials furnished by the manufacturer, at no cost to the owner. Freight, labor and other incidental costs are not covered under the factory warranty, but may be covered by a separate service agreement between installing company and the owner.

PART 2 – PRODUCTS

2.01. GATE OPERATORS

A. Gate operator shall meet following requirements:

- 4,000 pound max gate weight
- 12" per second minimum gate travel
- 300 pound draw bar pull
- Continuous Duty Cycle

2.02. OPERATION

A. Operation shall be by means of a metal rail passing between a pair of solid metal wheels with polyurethane treads. Operator motors shall be hydraulic, geroller type, and system shall not include belts, gears, pulleys, roller chains or sprockets to transfer power from operator to gate panel. The operator shall generate a minimum horizontal pull of 300 pounds without the drive wheels slipping and without distortion of supporting arms. Operator shall be capable of handling gates weighing up to 4000 pounds. Gate panel velocity shall not be less than 1.0 feet per second and shall be stopped gradually to prevent shock loads to the gate and operator assembly. The "soft stop" feature of the gate operator shall be controlled by two adjustable hydraulic brake valves (one for each direction)

B. Standard mechanical components shall include as a minimum:
   1) Supporting arms: Cast aluminum channel. Arms shall incorporate a fully bushed, 1-1/2" bronze bearing surface, acting on arm pivot pins. (item 2 below)
   2) Arm pivot pins: 3/4" diameter, stainless steel, with integral tabs for ease of removal.
   3) Tension spring: 2-1/2" heavy duty, 800 pound capacity.
   4) Tension adjustment: Finger tightened nut, not requiring the use of tools.
   5) Drive release: Must instantly release tension on both drive wheels, and disengage them from contact with drive rail in a single motion, for manual operation.
   6) Limit switches: Fully adjustable, toggle types, with plug connection to control panel.
   7) Electrical enclosure: Oversized, metal, with hinged lid gasketed for protection from intrusion of foreign objects, and providing ample space for the addition of accessories.
   8) Chassis: 1/4" steel base plate, and 10 Ga. sides and back welded and ground smooth.
   9) Cover: 16GA. galvanized sheet metal with a powder paint finish. All joints welded, filled and ground smooth. Finished corners square and true with no visible joints.
   10) Finish: Fully zinc plated then finish coat of high gloss powder paint withstanding 1000-hour salt spray test.
   11) Drive wheels: 6" Dia. Metal hub with polyurethane tread.
   12) Drive rail: Shall be extruded 6061 T6, not less than 1/8" thick. Drive rail shall incorporate alignment pins for ease of replacement or splicing. Pins shall enable a perfect butt splice.
   13) Hydraulic hose: Shall be 1/4" synthetic, rated to 2750 p.s.i.
   14) Hydraulic valves: Shall be individually replaceable cartridge type, in an integrated hydraulic manifold.
   15) Hose fittings: At manifold shall be quick-disconnect type, others shall be swivel type.
   16) Hydraulic fluid: High performance type with a viscosity index greater than 375.
   17) A zero to 2000-PSI pressure gauge, mounted on the manifold for diagnostics, shall be a standard component.

18) The hydraulic fluid reservoir shall be formed from a single piece of metal, non-welded, and shall be powder painted on the inside and the outside, to prevent fluid contamination.

C. Minimum standard electrical components:
   1) Pump motor: Shall be a 1 HP, 56C, TEFC, continuous duty motor, with a service factor of 1.15, or greater. Standard voltages available, single or three phase.
   2) All components shall have overload protection.
   3) Controls: Smart Touch Controller Board with 128K memory containing:
      a) inherent entrapment sensor;
      b) built in "warn before operate" system;
      c) built in timer to close;
      d) liquid crystal display for reporting of functions;
      e) 19 programmable output relay options;
      f) anti-tailgate mode;
      g) built-in power surge/lightening strike protection;
      h) capable, with optional software, of event logging EEPROM for trouble shooting diagnostics;
      i) RS232 port for connection to laptop or other computer peripheral and RS485 connection of Master/Slave systems.
   4) Transformer: 75 VA, non-jumpered taps, for all common voltages.
   5) Control circuit: 24VDC.
D. Required external sensors: See 1.05B. Photo eyes or gate edges or a combination thereof to be installed such that the gate is capable of reversing in either direction upon sensing an obstruction.
E. Optional control devices:
   1) Handheld remote transmitters for opening and closing gate.

2.03. FACTORY TESTING

A. Fully assemble and test, at the factory, each gate operator to assure smooth operation, sequencing and electrical connection integrity. Apply physical loads to the operator to simulate field conditions. Tests shall simulate physical and electrical loads equal to the fully rated capacity of the operator components.
B. Check all mechanical connections for tightness and alignment. Check all welds for completeness and continuity. Check welded corners and edges to assure they are square and straight.
C. Inspect painted finish for completeness and gloss. Touch up imperfections prior to shipment.
D. Check all hydraulic hoses and electrical wires to assure that chafing cannot occur during shipping or operation.

2.04. ACCESS CONTROLS

A. The key pad shall be exterior keypad pedestal mounted or engineer approved equal.
B. The Knox box shall be provided with an open/close switch mounted inside the Knox box.
C. An Output Receiver and Ten (10) 1-channel block coded key ring transmitters shall be provided.
D. Requests for substitution shall include the amount of savings to be passed on to the owner.

PART 3 – EXECUTION

3.01. SITE EXAMINATION

A. Locate concrete mounting pad in accordance with approved shop drawings.
B. Make sure that gate is operating smoothly under manual conditions before installation of

gate operators. Do not proceed until gate panel is aligned and operates without binding.

3.02. INSTALLATION

A. Install gate operator in accordance with the manufacturer's printed instructions, current at the time of installation. Coordinate locations of operators with contract drawings, other trades and shop drawings.

B. Installer shall insure that the electric service to the operator is at least 20 AMPS. Operator wattage is 1500.

3.03. FIELD QUALITY CONTROL

A. Test gate operator through ten full cycles and adjust for operation without binding, scraping or uneven motion. Test limit switches for proper "at rest" gate position.

B. All anchor bolts shall be fully concealed in the finished installation.

3.04. CONTINUED SERVICE AND DOCUMENTATION

A. Train owner's personnel in the general maintenance of the gate operator and accessories and provide one copy of "operations and maintenance", manual for the owner's use (a second manual is available upon request.) Manuals will identify parts of the equipment for future procurement.

PART 4 – MEASUREMENT

4.01 SLIDE GATE OPERATOR

A. The quantity of slide gate operator to be paid for under this item shall be the number installed as completed unit in place, ready for service and accepted by the Engineer.

B. All costs of keypad, ten (10) handheld remote control units, two (2) obstruction loops, one (1) free exit loop, and all related electrical components and mechanical equipment are subsidiary to the Slide Gate Operator.

PART 5 – PAYMENT

5.01 SLIDE GATE OPERATOR

A. Payment shall be made at the unit price bid for each slide gate operator, installed in place and accepted by the engineer. This price shall be full compensation for furnishing all materials; for all preparation, assembly and installation of these materials; and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item S-22 Slide Gate Operator – per each.

Modifications to Item Tx636

Aluminum Signs

This modification page modifies, amplifies, or amends the technical specifications and plans. In the event of discrepancy, this modification shall take precedence over the plans and the technical specifications.

6361. Description - Add the following:

Work includes installation of No Trespassing Signs and one information sign located near the electric slide gate. Information sign shall state, "For After Hours Access Contact (xxx) xxx-xxxx". Telephone number to be provided after construction contract award.

Paragraph 636.5 Payment – Add the following:

Payment will be made under:

Tx636.5a	No Trespassing Signs	per each

ELECTRICAL SPECIFICATIONS

E01/Rev1 - BASIC MATERIALS AND METHODS FOR ELECTRICAL INSTALLATIONS

E02 - POWER GENERATION / UTILITY SERVICE

E03/Rev1 - POWER DISTRIBUTION DEVICES

L-108 & MOD – UNDERGROUND POWER CABLE FOR AIRPORTS

L-109 & MOD – INSTALLATION OF AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT

L-110 & MOD – AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

L-115 & MOD – ELECTRICAL MANHOLES AND JUNCTION STRUCTURES

L-117 & MOD – INSTALLATION OF INTERNALLY LIGHTED GUIDANCE SIGNS

S-L810/Rev1 – AIRPORT OBSTRUCTION MARKERS AND LIGHTS

6/18/2012

TECHNICAL SPECIFICATIONS
SECTION E1 – BASIC MATERIALS AND METHODS FOR ELECTRICAL INSTALLATIONS

PART 1 GENERAL – This applies only the automatic entry gate scope of work

1. SUMMARY

1.1 It is the intent of the contract documents that upon completion of the electrical work, the entire system shall be in a finished workable condition. Therefore, furnish all work, labor, tools, superintendence, material, equipment, and accessories necessary to provide for a complete and workable electrical system as defined by the contract documents.

1.2 All work that may be called for in the specifications but not shown on the drawings, or all work that may be shown on the drawings but not called for in the specifications, shall be formed by the CONTRACTOR as if described in both. Should work be required which is not set forth in either document, but is nevertheless required for fulfilling the intent thereof, then the CONTRACTOR shall perform all such work as fully as if it were specifically set forth in the contract documents.

1.3 The drawings and specifications of other divisions of this contract, as well as supplements issued thereto, information to bidders, and other pertinent documents issued by the Owner's Representatives are a part of these drawings and specifications and shall be complied with in all respects. All the above documents will be on file at the office of the Owner's Representative and shall be examined by the CONTRACTOR. Failure to examine all documents shall not relieve the CONTRACTOR of any responsibility nor shall it be used as a basis for additional compensation due to omission of details of other divisions from the electrical documents.

1.4 The use of the word "furnish" or "install" or "provide" shall be taken to mean that the item or facility is to be both furnished and installed unless specifically stated to the contrary.

1.5 The use of the term "as (or where) indicated"; "as (or where) shown"; "as (or where) specified"; or "as (or where) scheduled" shall be taken to mean that the reference is made to the contract documents, either under the drawings or the specifications, or both documents.

1.6 The CONTRACTOR shall be responsible for visiting the site, checking the existing conditions, and shall determine the conditions to be met for installing the work and plan accordingly.

1.7 SUBMITTALS

1.7.1 The following is applicable to sections of the electrical specifications. Each submittal shall be accompanied by a cover memo in which the contents of the submitted documents are described. This memo shall identify the project, whether the documents are "For Information", "For Review and Approval" or "For Record" and shall identify to which specification and section the attached documents are attempting to fulfill the submittal requirements thereof. Any documents submitted without the reference to which specification and section they are attempting to fulfill shall be rejected in whole without review. Submit the following.

1.7.2 FOR INFORMATION

1.7.2.1 Elementary diagrams showing internal wiring of manufactured devices and assemblies.

1.7.2.2 Point to point wiring diagrams showing terminations and wire numbers for each assembly.

1.7.2.3 Dimension prints for each device or assembly

1.7.2.4 Installation manual for each device or assembly

1.7.2.5 Dimensions of areas required for servicing device or assembly

1.7.2.6 Nameplate data and ratings for all devices

1.7.2.7 Recommended spare parts and special tools list for maintaining equipment in service for one year and five year periods

1.7.2.8 Catalog literature for each device or assembly

1.7.3 FOR REVIEW & APPROVAL

1.7.3.1 Review shall not remove responsibility for furnishing material or devices of acceptable dimensions, quantity, quality, or errors thereof.

1.7.3.2 Drawings not clearly marked or lacking the contractor's approval stamp shall be rejected.

1.7.3.3 Elementary (loop) diagrams showing schematically each device in a loop or control scheme, when not furnished with the ISSUED FOR CONSTRUCTION drawings.

1.7.3.4 Panel layouts with bills of material.

1.7.3.5 Not used

1.7.3.6 Functional description of interlocks and control systems

1.7.4 FOR RECORD

1.7.4.1 Operation and maintenance manuals shall be compiled six weeks prior to project completion for each device or assembly.

1.7.4.2 Markup deviations to ISSUED FOR CONSTRUCTION drawings with red pencil and provide original to ENGINEER for record.

1.7.5 SAMPLES

Furnish samples when requested of materials and devices for acceptance review. When accepted, then that item of material or device installed shall be of equal or better quality than the sample. If quality of the installed material or device is not equal or better, then all such material or devices shall be replaced at the CONTRACTOR's expense.

1.8 REGULATORY REQUIREMENTS:

1.8.1 Secure all permits, licenses, and inspections as required by all authorities having jurisdiction. Give all notices and comply with all laws, ordinances, rules, regulations, and contract requirements bearing on the work. Codes and ordinances having jurisdiction over the work shall serve as minimum requirements, but, if the contract documents indicate requirements which are in excess of those minimum requirements, then the requirements of the contract documents shall be followed. Should there be any conflicts between the contract documents and codes, or any ordinances having jurisdiction, then report these.

1.8.2 Determine the exact requirements for the utility services as set by the utilities that will serve the facility, and pay for and form all work as required by those utilities. The Contractor shall notify the serving utility immediately upon award of the contract.

Effective 09/01/2004 all electrical work shall be performed by electricians and electrical contractors licensed in accordance with chapter 1305 of the Texas Occupations Code. All electrical work shall be performed by licensed electrical apprentices, licensed journeyman electricians, and licensed master electricians. Each electrical contractor shall be a licensed master electrician or employ a licensed master electrician. Each electrical contractor shall submit a copy of their master electrician's license to the engineer prior to the start of electrical work and prior to any other electrical submittal.

1.9 *SEQUENCING*

1.9.1 Cooperate with all other trades to facilitate the general progress of the work. Allow other trades every reasonable opportunity for the installation of their work and the storage of their materials.

1.9.2 The work under this section shall follow the general building construction closely. Set all pipe sleeves, inserts, etc., and see that

openings for cases, pipes, etc., are provided before concrete is placed or masonry installed.

1.9.3 Work with other trades in determining the exact locations of outlets, conduits, fixtures, and equipment to avoid interference with lines as required to maintain proper installation of other work.

1.9.4 Progress this work to not delay the work of other trades. Schedule the work so that completion dates as established by the Engineer are met. Furnish sufficient labor or work overtime to accomplish these requirements, if directed to do so.

1.10 COMMISSIONING

Test the insulation value of each service entrance cable, each feeder cable, and each branch circuit wire. Tests shall be made by means of crank-type ohmmeter (megger) that impresses 1500 volts dc across the insulation. Each ungrounded conductor shall have its insulation integrity tested after installation within its raceways from termination-to-termination. However, testing shall be made prior to connection to line or load. All such testing shall be done in the presence of the Owner's Representative and the test results shall be submitted for review. The insulation value of each installed cable and wire shall be equal to, or greater than 500,000 ohms. Should the insulation value be less than 500,000 ohms for any conductor tested, the faulty conductor shall be replaced, and re-tested until compliance is achieved.

PART 2 PRODUCTS

2.1 MATERIALS:

All materials and devices shall conform to the requirements of the contract documents. They shall be new and free from defects and shall conform to the requirements of the latest edition of NFPA 70, the National Electrical Code. All materials and devices of the same class shall be supplied by the same manufacturer unless otherwise specified.

2.2 RACEWAYS – as called for in the plan set

2.2.1 Rigid metallic conduit shall be aluminum or hot-dipped galvanized steel, inside and out. Conduit couplings shall be aluminum or threaded steel with hot-dipped galvanized finish.

2.2.2 Concrete encased non-metallic conduit shall be thin wall PVC plastic type EB. Couplings shall be PVC solvent-weld type.

2.2.3 Plastic jacketed rigid metallic conduit shall meet the specifications for rigid conduit above and shall have a 40 mil minimum thickness PVC coating on exterior metallic surfaces and a minimum 2 mil urethane coating on interior metallic surfaces. Couplings shall be sleeved.

2.2.4 Flexible liquid tight ferrous metallic conduit shall have an extruded thermoplastic cover with interlocked galvanized steel core. The conduit shall be U.L. listed.

2.2.5 Seal fittings shall be malleable iron.

2.2.6 Rigid metallic conduit locknuts shall be galvanized steel in sizes under 2" and galvanized malleable iron on sizes 2½" and larger. Sealing locknuts shall have in addition to that specified above, an integrally fused thermoplastic gasket so that the locknut is rated NEMA-4.

2.2.7 Rigid metal conduit insulating bushings shall be molded canvas bake-a-lite type and suitable for operation in 100°C rise over 40°C ambient. Polypropylene bushings are not acceptable.

2.2.8 Grounding type bushings shall have threaded steel body, insulated throat, and ground lug.

2.2.9 Rigid metallic conduit expansion/deflection fittings shall be watertight with a flexible plastic sleeve that allows ¾" movements in all directions. Hubs shall be threaded, galvanized malleable iron. Clamping bands shall be stainless steel. There shall be an equipment bonding ground jumper.

2.2.10 Rigid metallic conduit hubs shall be liquid-tight type with threaded female body, with sealing ring on conduit side and threaded male tapered steel body with hardened steel locknut on box side. Plastic jacketed hubs shall have 40 mils PVC coating.

2.2.11 Chase nipples, reducers, enlargers, capped els, short els, long els, split couplings and fittings shall be hot dipped galvanized malleable iron threaded type for use with rigid metallic conduit.

2.2.12 Rigid metallic conduit bodies shall be cast aluminum with threaded hubs and gasketed cast metal covers with stainless steel screws. Listed explosion-proof fittings shall be used in Division 01 locations.

2.2.13 Liquid-tight flexible conduit fittings shall be hot-dipped galvanized steel body with captive grounding ferrule, sealing ring, and compression nut. Connector body shall have nylon-insulated throat. Pullout resistance of each completed connector shall be at least 1½ times U.L. minimum.

2.2.14 Rigid metal conduit boxes shall be cast aluminum with threaded integrally-cast hubs, cast metal cover, and with stainless steel cover screws. Plastic jacketed type shall have 40 mils minimum coating of PVC.

2.2.15 Cadmium plated devices and hardware shall not be acceptable.

2.3 DUCTBANKS / MANHOLES- Not used

2.4 WIRING

2.4.1 All conductors for power and control wiring shall be stranded, soft drawn copper.

2.4.2 Insulation for Power and Control Circuitry shall be THHN/THWN, 600 volt rated, 75 C rated.

2.4.3 All connectors shall be rated for 75 C.

2.4.4 The ampacity of all conductors and connectors shall be on the basis of a 75 C rating.

2.4.5 Factory pigmented insulation color for sizes #6 and smaller for building power wiring shall
be as follows:

2.4.5.1 150V-to ground, or less:
phase A –Red, phase B – Black, phase C - Blue
Grounding Conductor Green
Grounded Conductor White

2.4.5.2 Greater than 150V-to-ground:
phase A – brown, phase B – purple, phase C- yellow
Grounding Conductor Green
Grounded Conductor Grey

2.4.6 Bare conductors for grounding purposes shall be hard-drawn stranded copper.

2.5 CONNECTORS

2.5.1 Mechanical connectors shall be bolted pressure type with tin-plated bronze body and tin-plated silicon-bronze hardware.

2.5.2 Insulated setscrew connectors shall consist of copper body with flame-retardant, 600V class insulated shell.

2.5.3 Terminal connectors for flat-head terminal screws shall be locking spade type with vinyl insulated compression indent shaft.

2.5.4 Terminal strips shall be channel-mounted types with tin-plated solderless box lugs contained with barriered nylon-insulated separable barriers.

2.6 INSULATING PRODUCTS

2.6.1 General purpose electrical tape shall be 7 mil thick stretchable vinyl plastic, pressure-adhesive type.

2.6.2 Insulation putty shall be rubber-based, non-vulcanizing, elastic-type putty in tape form.

2.6.3 High Temperature, insulating void filling, moisture-proof tape shall be stretchable ethylene propylene rubber with high-tack, self-fusing surfaces. Tape shall be rated for 90°C continuous, 130°C overload.

2.6.4 High temperature protective tape shall be rated 180°C continuous, Indoor/outdoor and shall be cured, self-fusing silicone rubber.

2.6.5 Arc and fireproofing tape shall be oil and water resistant, heat resistant, fabric reinforced.

2.7 LABELS, NAMEPLATES, AND SIGNS

2.7.1 Marking labels for wire numbering shall be typed-on heatshrink plastic.

2.7.2 Write-on type labels for identification of conduits shall be weather resistant polyester with flat surface for marking pen application.

2.7.3 Colored bonding tape shall be 5 mil stretchable vinyl, self-adhesive (with permanent solid colors corresponding to hereinbefore specified wire colors)

2.7.4 Nameplates shall be 3/32" inch thick, lengths as required to accommodate lettering, and in 3/4" and 1 1/4" widths. Each plate shall have adhesive backing with pull-apart resistance of at least 100 psi. Plates shall be laminated type with black background and white letters. Nameplates shall be installed on all starters, switches, relays, contactors, etc.

2.7.5 Signs shall be similar to nameplates in (4) above with the size, type, and wording as indicated on the contract drawings.

2.7.6 DETECTABLE WARNING TAPE Plastic, detectable magnetic tape shall be polyethylene film with a metalized foil core and shall be 4-6 inches (75-150 MM) wide. Tape shall be red with black letters marked 'WARNING ELECTRICAL".

2.8 SUPPORTING DEVICES

2.8.1 Slotted channel supports and framing members shall be cold rolled steel. Finish for inside, dry location in finished areas (such as offices) shall be factory painted with backed-on enamel. Finish for outside and damp or wet locations shall be hot dipped galvanized after fabrication. Size of slotted channels unless otherwise indicated, shall be 1-5/8" x 1-5/8" in cross-section. Special purpose slotted channel support shall be furnished as indicated.

2.8.2 Hanger rods shall be hot dipped-galvanized and shall be all-thread type, 3/8" minimum diameter.

2.8.3 Beam clamps, side-beam connectors, and one-hole clamps shall be hot-dipped galvanized malleable iron. Plastic coated types shall have 40 mils, minimum PVC covering.

2.8.4 Pressed steel, two-piece single bolt, slotted channel conduit straps shall be electro-galvanized and shall be of the same manufacturer as the slotted channel. Plastic coated types shall have 40 mils, minimum PVC covering and hardware shall be stainless steel.

2.8.5 Single rod-hung "J" conduit clamps shall be adjustable type with hot dipped galvanized finish.

2.8.6 Indoor, dry-location slotted channel hardware (nuts, bolts, washers, etc.) shall have electro-galvanized finish. Outdoor, wet location slotted channel hardware shall be stainless steel.

2.8.7 Stainless steel hardware shall be ANSI Type 304 or 316.

2.8.8 Plywood shall be solid-core, marine type suitable for wet locations. Edge trim shall be oak. Trim glue shall be epoxy type waterproofed glue.

2.8.9 Concrete and masonry anchors shall be stainless steel type.

2.9 GROUNDING DEVICES

2.9.1 Ground rods shall be copper clad steel in 30 foot lengths, unless otherwise specified.

2.9.2 Ground rod connectors shall be copper alloy with silicon bronze bolts and in sizes to fit ground rod diameters.

2.9.3 Pipe ground connectors shall be copper alloy with silicon bronze bolts and in sizes to fit pipe diameter.

2.9.4 Thermal welding devices shall consist of correct size molds to fit application and correct amount of weld metal.

PART 3 EXECUTION

3.1 EXAMINATION

Except where specifically detailed or shown, the locations and elevations of equipment are approximate and are subject to small revisions as may prove necessary, or desirable, at the time the work is installed. Final locations shall be confirmed with the Engineer in advance of construction. Confirmed locations shall be made for the following: poles, receptacles, rough-ins and connections for equipment furnished under other sections, lighting fixtures, outlets, motor control centers, switchboards, panelboards, etc.

Where equipment is being furnished under another section, request from the Engineer an accepted drawing that will show exact dimensions of required locations of connections. Install the required facilities to the exact requirements of the approved drawings.

The drawings are diagrammatic and do not give exact details as to elevations or routings of conduits, nor do they show all offsets and fittings; nevertheless, install the conduit system to conform to the structural and mechanical conditions of the construction. Unless locations and routing of exposed conduits are dimensioned, confirm locations and routing prior to installation with the Engineer.

3.2 INSTALLATION

All work shall be done in the best and most workmanlike manner by qualified, careful electricians who are skilled in their trade. The electrical contractor shall employ a Texas licensed master electrician assigned to this project and all electricians serving this project shall be Texas licensed electricians. The standard of work required throughout shall be of the first class only and electricians whose work is unsatisfactory to the Engineer shall be dismissed from the work upon written notice from the Engineer. All work must meet the approval of the Engineer.

Cabling inside equipment shall be carefully routed, trained, and laced. Cables so placed that they obstruct equipment devices shall not be accepted.

Equipment shall be set level and plumb. Supporting devices installed shall be set and braced so that equipment is held in a rigid, tight-fitting manner.

3.3 DUCTBANK

3.3.1 Install duct to locate top of ductbank at depths as indicated on drawings.

3.3.2 Install duct with minimum slope of 4 inches per 100 feet (0.33 percent). Slope duct away from building entrances.

3.3.2 Cut duct square using saw or pipe cutter; de-burr cut ends.

3.3.4 Insert duct to shoulder of fittings; fasten securely.

3.3.5 Join nonmetallic duct using adhesive as recommended by manufacturer.

3.3.6 Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

3.3.7 Install no more than equivalent of three 90-degree bends between pull points.

3.3.8 Provide suitable fittings to accommodate expansion and deflection where required.

3.3.9 Not used

3.3.10 Not used

3.3.11 Not used

3.3.12 Not used

3.3.13 Not used

3.3.14 Not used

3.3.15 Not used

3.3.16 Not used

3.3.17 Not used

3.3.18 Provide suitable pull string in each empty duct except sleeves and nipples.

3.3.19 Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.

3.3.20 Backfill trenches..

3.4 MANHOLE – Not used

3.5 RACEWAYS

3.5.1 Install the conduit system to provide the facility with the utmost degree of reliability and maintenance free operation. Kinked conduit, conduit inadequately supported or carelessly installed shall not be accepted.

3.5.2 Raceways shall be installed for all wiring runs except as otherwise indicated.

3.5.3 Conduit sizes, where not indicated, shall be code-sized to accommodate the number and diameter of wires to be pulled into the conduit. Use NEC tables for sizing.

3.5.4 Exposed runs of conduit shall be installed parallel to the lines of the structure.

3.5.5 PVC runs shall be joined with manufacturer's approved cement.

3.5.6 Finished installation of conduit runs from each terminus to each terminus shall be watertight.

3.5.7 Generally, raceways shall be installed exposed on the structures and in the buildings except as otherwise specified. Horizontal runs shall be supported on 24" centers and vertical runs on 48" centers.

3.5.8 Conduit runs in finished areas within building shall be installed concealed within the structure but not in the slab, except as otherwise specified.

3.5.9 Except where up-turns to structures and equipment is made. The up-turn shall be made with 40 mil PVC coated steel 90° elbow and conduit. Depth of lateral runs shall be 24" minimum unless otherwise indicated.

Coordinate installation with site work finished grades. Duct bank depths shall be as indicated on the drawings.

3.5.10 Conduit runs that enter an enclosure without penetrating the sheet metal, such as bottom entry into motor control centers, shall be equipped with bushings.

3.5.11 Conduit bodies such as "LB, "T" or equal shall be installed in exposed runs of conduit wherever required to overcome obstructions, and to provide pulling access to wiring. Covers for such fittings shall be accessible and unobstructed by the adjacent construction.

3.5.12 Conduit shall enter all wireways, boxes, motor control centers, panelboards and other enclosures straight and true. Conduits installed cocked and not parallel to the lines of the enclosure shall not be acceptable.

3.5.13 Conduit entrances into equipment shall be carefully planned. Cutting away of enclosure structure, torching out braces, and removal of enclosure channels and sills shall not be accepted.

3.5.14 Use approved hole cutting tool for entrances into sheet metal enclosures. Use of cutting torch or incorrect tool shall not be accepted.

3.5.15 Install expansion or expansion/deflection fittings where conduit runs across an expansion joint within the concrete, or where conduit runs across an expansion joint and the runs are rigidly attached to the structure.

3.5.16 Plastic jacketed flexible metallic conduit shall be used for connections to motors, solenoids, pressure switches, electric valve operators, unit heaters, motorized louvers, torque switch devices, flowmeters, limit switches, lay-in lighting fixtures, and other devices that may need to be removed for servicing in non-hazardous locations.

3.5.17 Flex runs shall be joined with specified flex connectors and these connectors shall be made up tightly onto the lengths of flex and onto its connected devices. All plastic jacketed flexible conduit connections shall be watertight.

3.5.18 Cap each end of conduits as soon as placed to prevent mud, dirt, debris, and water from entering raceways. Each run shall be swabbed clean prior to wire pulling.

3.5.19 All junction and pull boxes shall be equipped with blank covers.

3.5.20 All boxes shall be installed with their axes parallel to the lines of the building structure.

3.5.21 All conductors shall be the size as indicated and where no size is given, the conductor size shall be #12 AWG, unless otherwise specified.

3.5.22 Generally, control wiring shall be #14 AWG.

3.5.23 All wiring shall be installed in raceways unless otherwise indicated.

3.5.24 All power and control wiring shall be made with insulated, stranded copper wire.

3.5.25 No wire or cable shall be drawn into a conduit until all work of a nature which may cause injury is completed. A cable pulling compound shall be used as a lubricant and its composition shall not affect the conductor or its insulation.

3.5.26 Do not exceed cable manufacturer's recommended pulling tensions.

3.5.27 Service and feeder wiring runs shall be made from terminus to terminus without splice.

3.5.28 Branch circuits shall run from supply to load without splice except where taps and splices are required for receptacle, light fixture, and small appliance loads.

3.5.29 Taps, splices, and connections shall be made with tinned copper alloy compression connectors. Make up connection tightly to produce as low a resistance as if the conductor where continuous. Such connectors shall be insulated with a smooth cover of void-filling insulation putty and then covered with at least four (4) half lapped layers of electrical tape. Insulated connector shall have at least 1½ KV insulation value.

3.5.30 Specified sizes of wire shall be installed with factory-pigmented colors. Phase label black pigmented wires with colored banding tape as specified. Install labels at each terminus.

3.5.31 Numbered marking labels shall be installed to identify circuit numbers from panelboards and to identify control wires. Install labels on each wire in each panelboard, junction and pullbox, and device and control connection.

3.5.32 Label each wiring run with write-on waterproof labels inside each motor control center, switchboard, pullbox and handhole. Wrap label ties around wire group at conduit entrance and write on label the wire size, conduit size, and service.

3.5.33 Control wiring that terminates onto flat head type terminals shall be equipped with crimp-type spade lugs. Label each wire with number to correspond with terminal strip number.

3.5.34 All wiring inside enclosures shall be neatly trained and laced with tie-wraps.

3.5.35 All raceway systems, outlets, boxes, wireways, cabinets, enclosures, lighting fixtures, transformers, and related equipment shall be adequately and safely supported with at least 3-1 safety factor.

3.5.36 Slotted channels shall be used to support equipment that is mounted free of structure. Use factory fabricated back-to-back hot-dipped galvanized members 3-1/4" deep that have welded feet.

3.5.37 Runs of exposed conduits shall be installed as follows:

3.5.38 Single surface runs shall be attached to the structure by means of conduit clamps, except as otherwise specified. Single runs along structural members shall be supported by means of side beam clamps, or similar supporting devices.

3.5.39 Multiple surface runs shall be attached to the structure by means of slotted channels. Each conduit shall be attached to the slotted channel by means of two-piece conduit clamps.

3.5.40 Rod hangers shall be hot dipped, galvanized all thread, 3/8" minimum diameter steel type. Paint each rod hanger and its support with undercoat and one finish coat of galvanized type paint.

3.5.41 Rod hangers shall be attached to the structure with appropriate hanger such as concrete insert, beam clamp, ceiling flange, or side beam connector.

3.5.42 Slotted channels that are field cut shall have raw edges painted with cold galvanized coating spray paint.

3.5.43 Plywood that is used to mount equipment shall be marine grade and shall be painted with prime and two (2) finish coats of epoxy paint.

3.5.44 Any and all conduits penetrating fire rated walls shall do so only through UL listed openings having a fire rating equal to or greater than the fire rating of the wall which they penetrate. All such openings shall be installed in accordance with the manufacturer's instructions.

3.4.46 No conduit shall be embedded or concealed in a fire rated wall.

3.6 EXCAVATION AND BACKFILLING

3.6.1 Complete excavating and back-filling necessary for the installation of the work. This includes shoring and pumping in ditches to keep them dry until the work has been installed. Shoring required to protect the excavation and safeguard employees shall be properly performed. See TRENCH SAFETY SYSTEM section of the specifications.

3.6.2 All excavations shall be made to the proper depth, with allowances made for floor slabs, forms, beams, finished grades, etc. Soil under conduits shall be well compacted before conduits are installed.

3.6.3 All backfill shall be made with selected soil, free of rocks and debris and shall be pneumatically tamped in six-inch layers to secure a field density ration of 90 percent, unless otherwise specified.

3.6.4 All excavated material not suitable and not used in the backfill shall be removed to the on-site disposal area. The disposal area shall be as directed by the Engineer.

3.7 CUTTING AND PATCHING

3.7.1 Cutting and patching required under this section shall be done in a neat workmanlike manner. Cutting lines shall be uniform and smooth.

3.7.2 Use concrete saws for large cuts in concrete and use core drills for small round cuts in concrete.

3.7.3 Where large openings are cut through metal surfaces, attach metal angles around the opening.

3.7.4 Patch concrete openings that are to be filled with nonmetallic, non-shrinking grout. Finished concrete patching shall be troweled smooth and shall be uniform with surrounding surfaces.

3.7.5 No cutting of structural elements shall be done without permission of the Engineer.

3.7.6 Where openings are cut through masonry walls, provide lintel or other structural supports to protect the remaining masonry. Adequate support shall be provided during the cutting operation to prevent damage to the masonry.

3.7.7 Holes for raceway penetration into sheet metal cabinets and boxes shall be accurately made with a hole-punch. Cutting openings with a torch or other device that produces a jagged, rough-cut shall not be accepted.

3.7.8 Raceway entry into equipment shall be carefully planned. Cutting of enclosure framework to accommodate poorly planned raceway placement shall not be accepted.

3.8 FLASHING

3.8.1 Provide waterproof flashing for each penetration of exterior walls and roofs.

3.8.2 Flashing for conduit penetrations through built-up roofs shall be made with pitch panel filled full with pitch.

3.9 REPAIR/RESTORATION

3.9.1 Field check and verify the locations of all underground utilities prior to any excavation. Avoid disturbing these as far as possible. In the event existing utilities are broken into or damaged, they shall be repaired so as to make their operation equal to that before the excavation was started.

3.9.2 Where the excavation requires the opening of existing walks, drives, or other existing pavement, these facilities shall be cut as required to install new lines and to make connections to existing lines. The sizes of the cuts shall be held to a minimum, consistent with the work to be installed. After installation of new work is completed and the excavation has been backfilled in accordance with the above, then repair existing walks, drives, or other existing pavement to match existing installation.

3.10 CLEANING

3.10.1 Remove all temporary labels, dirt, paint, grease, and stains from all exposed equipment. Upon completion of work, clean equipment and the entire installation to present a first class job suitable for occupancy. No loose parts or scraps of equipment shall be left on the premises.

3.10.2 Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer, or with an approved paint.

3.10.3 Clean interiors of each item of electrical equipment. At completion of work, all equipment interiors shall be free from dust, dirt, and debris.

3.11 PROTECTION

3.11.1 Provide suitable protection for all equipment, work, and property against damage during construction.

3.11.2 Assume full responsibility for material and equipment stored at the site and incorporated within the project.

3.11.3 Conduit openings shall be closed with caps or plugs during installation. All outlet boxes and cabinets shall be kept free of concrete, plaster, dirt, and debris.

3.11.4 Equipment shall be covered and tightly sealed against entrance of dust, dirt, and moisture.

TECHNICAL SPECIFICATIONS
SECTION E2 – POWER GENERATION / UTILITY SERVICE

POWER GENERATION – Applies only to automatic entry gate scope of work

PART 1 GENERAL

1.1 SUMMARY

A standby generator shall not be provided. No provision shall be provided for a future generator.

UTILITY SERVICE – Applies only to automatic entry gate scope of work

PART 1 GENERAL

1.1 SUMMARY

A new utility service to a new distribution system at an existing facility shall be provided.

1.2 SYSTEM DESCRIPTION

The utility shall provide a 120/240-vac, 1-phase, 3-wire, 60-amp electrical service to a location illustrated in the plan set.

1.3 SEQUENCING – Not used

2.0 PRODUCTS – Not used

3.0 EXECUTION

The contractor shall notify the serving utility immediately upon award of the contract. Determine the exact requirements for the utility services as set by the utilities that will serve the facility, pay for, and form all work required by those utilities.

4.0 METHOD OF MEASUREMENT

TECHNICAL SPECIFICATIONS
E3 – POWER DISTRIBUTION DEVICES

PART 1 GENERAL – Applies only to automatic entry gate scope of work

ARC FLASH – SHOCK PROTECTION

1. All equipment shall be labeled in accordance with NFPA 70 Article 110.16 (latest edition) to warn qualified personnel of potential electric arc flash hazards.

2. All flash hazard reduction and shock protection features available as factory options for power distribution devices shall be provided. Such features may include, but are not limited to thermography windows, view ports and finger safe voltage test points.

PART 2 PRODUCTS

2.1 WIRING DEVICES- as called for in the plan set

2.1.1 All wiring devices shall be specification grade.

2.1.2 Not used

2.1.3 Not used

2.1.4 Not used

2.1.5 Not used

2.1.6 GFCI device shall be a duplex 5-15R, 15 amp, 125 V, 3-wire outlet with reset and test pushbuttons. Dry location enclosure shall consist of coverplate on a stamped steel box. Wet location enclosure shall consist of coverplate on cast metal FS box.

2.1.7 Not used

2.1.8 Not used

2.1.9 Not used

2.1.10 Select overloads to be 1.15 times motor FLA.

2.1.11 Covers for wiring devices located out-of-doors in damp or wet locations shall have weatherproof cover, gaskets, and stainless steel cover screws.

2.1.12 Covers for surface wiring devices located indoors and in dry locations shall be stainless steel type with beveled edges.

2.2 MOTOR CONTROL CENTERS- Not used

2.3 SEPARATELY MOUNTED CONTROLLERS- Not used

2.4 SAFETY SWITCHES

2.4.1 Safety switches shall be size and type as indicated. Each disconnect means shall be heavy-duty (unless specifically denoted otherwise), quick-make, quick-break mechanisms.

2.4.2 Unless otherwise indicated, safety switches shall be in a NEMA 4X, aluminum enclosure.

2.5 FUSES

2.5.1 Fuses shall be furnished for each fused overcurrent device and, in addition, three spare fuses for each rating required shall be furnished.

2.5.2 Fuses above 600 ampere shall be constructed using silver links with a fusing alloy soldered to the link for low temperature overload protection. The design shall provide time-delay of not less than 45 seconds at 300 percent of ampere rating. The interrupting rating shall be at least 200,000 amperes RMS symmetrical.

2.5.3 Fuses rated 600 amperes or less shall be dual element Class R, time-delay type. Such fuses shall incorporate separate thermal overload and short circuit elements. The design shall provide time delay of not less than ten seconds at 500 percent of ampere rating. The interrupting rating shall be 200,000 amperes RMS symmetrical.

2.5.4 Not used

2.6 DRY TYPE TRANSFORMERS- Not used

2.7 PANELBOARDS

2.7.1 Panelboards shall be dead-front type and shall be manufactured in accordance with Underwriters' Laboratories, Inc., standard for Panelboards (UL67).

2.7.2 The panelboards shall include automatic short circuit and over-current protective devices of the molded case circuit breaker type. All multi-pole breakers shall be so designed that an overload on one pole automatically causes all poles of the circuit breaker to open. The circuit breakers shall be quick make, and quick break on manual as well as automatic operation and shall have inverse time trips. Circuit breakers shall have the short circuit interrupting ratings indicated on the drawings.

2.7.3 Interiors shall be assembled on reinforced mounting pans or rails which provide protection against damage during handling or installation. Circuit breakers shall be assembled in accordance with the panel schedules included on the drawings. Design shall permit replacement of individual breakers without disturbing adjacent units or without disturbing main bus or branch circuit connectors. Interior design shall permit changing of branch circuits or the addition of circuit breakers to future spaces without additional machining, drilling, or tapping. Main bus bars and branch circuit connectors shall be made of copper. In-and-out adjustments of the panel interior shall be provided.

2.7.4 Panel bussing shall be arranged to maintain sequence phasing throughout, that is, adjacent poles shall be of unlike polarity and rotated in sequence. Circuit members shall be provided for each pole space or breaker space as shown on the panel schedule.

2.7.5 Cabinets shall be manufactured in accordance with Underwriters' Laboratories, Inc., standard for Cabinets and Boxes (UL 50) and shall provide a minimum of four inches wiring gutter on all sides. Cabinet fronts shall include doors with semi-concealed hinges, combination lock and catch on doors and a directory frame with circuit directory behind clear plastic, mounted on back of door. The front shall be attached to the box with suitable provision to provide proper alignment of trims.

2.7.6 Residential load centers shall not be accepted in lieu of panelboards.

2.8 REMOTE CONTROL STATION

Remote pilot operators such as start-stop push buttons, HOA selector switches, pilot lights and the like shall be heavy-duty, NEMA-4 devices mounted in a NEMA-4X Stainless Steel or aluminum. Conduit entry shall be hub connected.

2.9 SWITCHBOARDS- Not used

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Follow manufacturer's installation instructions.

3.1.2 Bottom conduits entries into cubicles shall be carefully arranged and set in manufacturer's allotted openings. Each conduit terminus shall be equipped with insulating grounding bushing.

3.1.3 Top conduit entries into cubicles shall enter to correct section to minimize cross wiring. Each conduit entry shall be equipped with bushing.

3.1.4 All cables inside enclosures shall be neatly arranged and bundled and bound with plastic tie-wraps.

3.1.5 Tighten all wire and busbar connectors to factory recommended torque settings.

3.1.6 Apply anti-corrosive compound equal to Kopr-Shield to all wire terminations.

4.0 METHOD OF MEASUREMENT

The quantity to be paid for shall be one lot electrical power distribution and includes all material, labor and incidentals between the electrical service and the automatic gate controller. It shall include but is not limited to the power distribution panel, the TVSS and area light.

5.0 BASIS OF PAYMENT

Payment shall be made the contract unit price for lot of completed and accepted electrical power distribution. This price shall be full compensation for furnishing

all materials, preparation, assembly, installation, labor, tools, fees and incidentals necessary to complete this item.

Payment will be made under:

Item E3-5.1	Electrical Power Distribution	per lot

Modifications to Item L-109

INSTALLATION OF AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT

These pages modify, amplify, or amend the referenced technical specification.

Add the following

Paragraph 109-2.21 Replace Constant Current Regulator - Materials:

Remove one 7.5-kw, type L-828 regulator now powering airfield lights and signs. Replace this regulator with a new 10-kw, type L-828, class 1 (6.6 amp), style 1 (3 step) ferro-resonant regulator. The new regulator shall be provided with an integral SCO (series cut-out), an output current meter, output voltage meter, and shall operate from a 240-vac, 1-phase, 2-wire plus ground circuit. The new regulator shall be powered from the existing 60-amp, 2-pole, 240-vac circuit breaker in the panel board. Reconnect the existing airfield wiring cables and control circuits to the new regulator as they were connected to the existing regulator.

Paragraph 109-4.4 The quantity of regulator replacements to be paid for under this item shall be the number of each size (kw-rating) regulator installed as fully completed units in place, ready for operation and accepted by the engineer.

Paragraph 109-5.1 BASIS OF PAYMENT: Add the following:

Payment will be made under:

Item L-109-5.5	10-kw regulator installed	per each

END OF ITEM L-109-MOD

ITEM S-L810 AIRPORT OBSTRUCTION MARKERS AND LIGHTS

DESCRIPTION

S-L810-1.1 This item shall consist of furnishing and installing obstruction markers and L-810 obstruction lights at game fencing in accordance with these specifications and in accordance with the dimensions, design, and details shown in the plans.

The work shall include the fabrication and installation of custom obstruction markers. The work shall include providing and installing the L-810 obstruction lights, power adapters, and associated L-830 transformer, L-867B junction cans, L-823 connectors and cables, ground rods and ground cables. The item shall also include the testing of the installation, and all incidentals necessary to each obstruction marker and obstruction light in operation as a completed unit to the satisfaction of the Engineer.

EQUIPMENT AND MATERIALS

S-L810-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified and listed under Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized binder, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

S-L810-2.2 OBSTRUCTION MARKERS. Obstruction markers shall be 24-inch by 24-inch, 12 gauge aluminum, having a 0.25-inch hole in each corner of the sheet. The center of each hole shall be 1-inch from the corners. Each

corner shall be rounded to 0.5-inch radius. Each sheet shall be divided into four equal 12-inch by 12-inch segments on both sides. The upper left quadrant shall be painted FAA orange. The upper right quadrant shall be painted FAA white. The lower left quadrant shall be painted FAA white. The lower right quadrant shall be painted FAA orange.

S-L810-2.3 L-810 OBSTRUCTION LIGHTS. L-810 obstruction lights shall be certified to FAA/ETL standards, shall use LED lamps, shall operate from a 6.6-amp, 3-step ferro-resonant regulator airfield lighting circuit, shall be provided with an integral power adapter, shall be provided with L-823 connectors of sufficient length to reach from the top of the game fence to the provided L-830 transformer enclosed in a provided L-867B can having not less than 3 feet of slack cable (approximately 15 feet) and shall require not more than 50-va load on the airfield lighting circuit for each obstruction light.

S-L810-2.4 CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of Underwriters Laboratories Standard 6, 514, and 1242.

S-L810-2.5 PLASTIC CONDUIT (for use below grade only). Plastic conduit and fittings-shall conform to the requirements of Fed. Spec. W--C-1094 and Underwriters Laboratories Standards UL-651 and shall be:

a. Type I–Schedule 40 PVC suitable for underground use either direct-buried or encased in concrete.

Plastic conduit adhesive shall be a solvent cement manufactured specifically for the purpose of gluing the specific type of plastic conduit and fitting.

S-L810-2.6 CONCRETE. The concrete for foundations shall be proportioned, placed, and cured in accordance with Item P-610, Structural Portland Cement Concrete.

S-L810-2.7 PAINT.

a. Priming paint for ungalvanized metal surfaces shall be a high solids alkyd primer conforming to TT-P-664D.

b. Priming paint for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-DTL-24441/19B. If necessary, add not more than ½ pint (0.06 liter) of turpentine to each gallon (liter).

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint meeting the requirements of Fed. Spec. TT-E-489. The color shall be in accordance with Federal Standards 595, Aviation Gloss Orange Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the Master Painter's Institute, Reference #9, Exterior Alkyd, Gloss, VOC Range E2.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above specified aviation-orange or white paint by adding ½ pint (0.06 liter) of raw linseed oil to each gallon (liter).

CONSTRUCTION METHODS

S-L810-3.1 OBSTRUCTION MARKER INSTALLATION. Obstruction markers shall be placed immediately below the top rail of the game fencing and within 6-inches of a line or corner pole at locations noted in the plan set. Obstruction markers shall be firmly secured to the game fence fabric at each corner using 16 gauge stainless steel wire. The obstruction marker shall not swing or rattle in the wind.

S-L810-3.2 L-810 OBSTRUCTION LIGHT INSTALLATION. L-810 obstruction lights shall be placed immediately above the game fence fabric so as to fully expose the fixture lens and in a manner that will allow full access to the fixture for maintenance. The fixture shall be just inside the fence fabric. The fixture shall be secured to the line fence post and the top rail using 16 gauge stainless steel wire. The obstruction lilght shall not swing or rattle in the wind.

S-L810-3.3 ELECTRICAL CONNECTION. The Contractor shall furnish all labor and materials and shall make complete electrical connections in accordance with the wiring diagram furnished with the project plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electric Code.

METHOD OF MEASUREMENT

S-L810-4.1 The quantity to be paid for shall be the number of obstruction markers and the number of obstruction lights installed as completed units in place, accepted, and ready for operation.

BASIS OF PAYMENT

S-L810-5.1 Payment will be made at the contract unit price for each completed and accepted job. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item **S-L810**-5.1	Obstruction Marker in place	per pair
Item **S-L810**-5.2	L-810 Obstruction Light	per each

MATERIAL REQUIREMENTS

AC 150/5345-7	Specification for L-824 Underground Cable for Airport Lighting Circuits
FED SPEC TT-E-489	Enamel, Alkyd, Gloss, Low VOC Content
FED SPEC J-C-30	Cable and Wire, Electrical (Power, Fixed Installation) (cancelled; replaced by AA-59544 Cable and Wire, Electrical (Power, Fixed Installation))
FED SPEC W-P-115	Panel, Power Distribution
FED STD 595	Colors Used in Government Procurement
MIL-DTL-24441/20	Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type III
Underwriters Laboratories Standard 6	Rigid Metal Conduit
Underwriters Laboratories Standard 514	Fittings For Conduit and Outlet Boxes
Underwriters Laboratories Standard 1242	Intermediate Metal Conduit
NFPA-70	National Electric Code
Master Painter's Institute	

END OF ITEM S-L810

Contractor Questions

1. Which side of the fence will the wire go on?

   Engineer's Response: **The wire shall be installed on the adjacent property owners side of the posts.**

2. What will contractor do with the existing rotating beacon that is being replaced?

   Engineer's Response: T**he existing rotating beacon shall be salvaged and delivered to the owner on the airport.**

3. Are there any restrictions on clearing limits and method of clearing?

   Engineer's Response: **Reference Modifications to Item SS-800 and Item SS-800.**

4. Are there any restrictions on burning cleared brush on site?

   Engineer's Response: **Reference Modifications to Item SS-800 and Item SS-800.**

5. Is there any coordination with adjacent property owners required to control livestock (i.e. cows) when installing new fences?

   Engineer's Response: **Yes. Contractor shall coordinate with property owners on sections of fence to be removed and cleared. Contractor can install temporary fence as necessary to control livestock.**