

THE STATE OF TEXAS §
 §
COUNTY OF HARRIS §

4600007284
2006-1138

I. PARTIES

A. Address

THIS AGREEMENT FOR TELECOMMUNICATIONS EQUIPMENT MAINTENANCE FOR THE HOUSTON AIRPORT SYSTEM ("Agreement") is made on the date of countersignature by the City Controller ("Effective Date") between the **CITY OF HOUSTON, TEXAS** ("City"), a municipal corporation, and **VERIZON SELECT SERVICES INC.** ("Contractor"), a Delaware corporation doing business in Texas.

The initial addresses of the parties, which one party may change by giving written notice to the other party, are as follows:

<u>City</u>	<u>Contractor</u>
Director, Houston Airport System or Designee City of Houston P.O. Box 60106 Houston, Texas 77205-01061	Verizon Select Services Inc. Attn: Dave Kapavik 6210 Rothway Houston, Texas 77040 Telephone (713) 867-6674 With copy to: Verizon Business 22001 Loudoun County Parkway Ashburn, VA 20147 Attn: Vice President, Legal

The Parties agree as follows:

B. Table of Contents

This Agreement consists of the following sections:

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- C. HOUSTON AIRPORT SYSTEM STANDARDS**
- D. PBX SYSTEM DETAILS AND LOCATIONS**
- E. EQUAL EMPLOYMENT OPPORTUNITY**
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- H. DRUG POLICY COMPLIANCE AGREEMENT**
- I. CERTIFICATION OF NO SAFETY IMPACT POSITIONS**

J. DRUG POLICY COMPLIANCE DECLARATION

C. Parts Incorporated

The above-described sections and exhibits are incorporated into this Agreement.

D. Controlling Parts

If a conflict among the sections or exhibits arises, the exhibits control over the sections.

E. Signatures

The Parties have executed this Agreement in multiple copies, each of which is an original.

VERIZON SELECT SERVICES INC.

WITNESS: *Patti Hood*

By: *[Signature]*
Name: **Suleiman Hessami**
Title: **VP - PCM**
Tax Identification No: 161337624

By: _____
Name: _____
Title: _____

APPROVED AS TO FORM:

[Signature]
Counsel

ATTEST/SEAL:

[Signature]
City Secretary

CITY OF HOUSTON, TEXAS

Signed by:

[Signature]
Mayor *[Signature]*

APPROVED:

[Signature]
Purchasing Agent

COUNTERSIGNED BY:

[Signature]
City Controller *[Signature]*

APPROVED AS TO FORM:

[Signature]
Sr. Assistant City Attorney
L.D. File No. 0040600055001

DATE COUNTERSIGNED:

11-17-06

II. DEFINITIONS

As used in this Agreement, the following terms have the meanings set out below:

"Acceptable" means that services, equipment, or performance, meet or exceed the requirements of this Agreement.

"Agreement" means this contract between the parties including all exhibits and any written amendments authorized by City Council and Contractor.

"Airport(s)" mean George Bush Intercontinental Airport/Houston, William P. Hobby Airport and Ellington Field.

"AOA" means the Air Operations Area and includes, but is not limited to, runways, ramps, taxiways and aprons.

"ASC" means the Airport Services Complex located at 4500 Will Clayton Parkway.

"Basic Services" mean those services described in Exhibit "A" of the Agreement.

"Business Days" mean all days of a calendar year except Saturdays, Sundays and City Council approved City holidays, unless Contractor receives written notice(s) from the Director on a preceding Thursday modifying the work days for the following week(s) and Contractor agrees, in which case, the modified work days become Business Days only for the period of time designated in such notice.

"City" is defined in the preamble of this Agreement and includes its successors and assigns.

"Contractor" is defined in the preamble of this Agreement and includes its successors and assigns.

"Director" means the Director of the Houston Airport System or the City Purchasing Agent or their designee in writing. This Agreement designates certain functions to be performed by the Director. For purposes of this Agreement, those functions are assigned to the Deputy Assistant Director, Information Technology Division.

"Documents" mean notes, manuals, notebooks, plans, computations, databases, tabulations, exhibits, reports, underlying data, charts, analyses, maps, letters, models, forms, photographs, the original tracings of all drawings and plans, and other work products (and any modifications or improvements to them) that Contractor prepares or provides under this Agreement.

"EFD" means Ellington Field.

"Emergency Service Request" means a verbal request from the Director to Contractor to perform remedial maintenance due to a Major Failure, a Minor Failure, or a Non-critical Failure that Contractor must respond to in accordance with the Response Times set forth in Section 8.2.1 of Exhibit "A."

"Fee Schedule" sets forth the fees the City pays Contractor for its services as defined in Exhibit "B".

"First Class Condition" refers to the quality of systems, parts, equipment and related components, including replacements ("elements"). It also refers to the condition of the wear and operation of the elements. When referring to the quality of the elements, First Class Condition means of a quality equal to or better than the elements as originally installed before execution of this Agreement. When referring to the wear and operation of the elements, First Class Condition means a standard that is within the manufacturer's published tolerances, or if no published tolerances, within generally accepted tolerances within the telecommunications industry.

"HAS" means the Houston Airport System.

"HOU" means William P. Hobby Airport.

"Houston Airport System" means the property and facilities of the City of Houston Department of Aviation which include, but are not limited to, George Bush Intercontinental Airport/Houston (IAH), William P. Hobby Airport (HOU), Ellington Field (EFD), and the Houston Airport System Administration Buildings.

"Houston Airport System Standards", as amended from time to time, are listed in Exhibit "C" and incorporated herein by reference.

"IAH" means George Bush Intercontinental Airport/Houston, which includes, but is not limited to, Terminal A (2800 North Terminal Road), Terminal B (3100 North Terminal Road), Terminal C (3500 North Terminal Road), Terminal D (3701 North Terminal Road), Terminal E (3950 North Terminal Road) and the Federal Inspection Services (FIS) Building (3870 North Terminal Road).

"IDF" means Intermediate Distribution Frame.

"MAC" means move, add, or change order(s) that are required as part of the normal day to day activities in managing a telecommunications system when telecommunications terminal equipment and station lines have to be rearranged, increased or decreased as a result of normal business activity. By way of example, and not by way of limitation, MACs include individual telephone changes; installing new telephones and associated cabling and programming to make operational; removing existing telephones; and modifying existing telephones.

"Major Failure" is any System failure severe enough to impair HAS' ability to maintain operation and administration functions of the Airports. By way of example, and not by way of limitation, Major Failures include:

- .1 attendant's console cannot receive or place calls;
- .2 20% or more of all telephone or data ports are unable to place or receive calls;
- .3 20% or more of the trunks are inoperative;

- .4 an attached processor is unable to send, receive or retrieve information; or
- .5 any other outage determined to be a Major Failure by the Director.

"MDF" means Main Distribution Frame.

"Minor Failure" means any system failure that adversely affects more than one station, but does not render the phone system inoperable or completely useless. By way of example and not by way of limitation, Minor Failures include station card and trunk card failures, inoperative bulbs, inoperative handset cords, or any other failure determined to be a Minor Failure by the Director.

"Non-critical Failure" is any failure which affects only an isolated station. By way of example and not by way of limitation, Non-critical Failures include station equipment failures, station wiring failures, or any other failure determined to be a Non-critical Failure by the Director.

"Normal Business Hours" means 8:00 a.m. to 5:00 p.m., Monday through Friday unless Contractor receives a written notice from the Director on a preceding Thursday modifying the work hours for the following week(s) and Contractor agrees in which case, the modified work hours become the Normal Business Hours only for the period of time designated in such notice.

"Notice to Proceed" means a written communication from the Director to Contractor instructing Contractor to begin performance.

"Other Service Request (OSR)" is the form used to request Other Work/Services within the scope of this Agreement.

"Other Work/Services" means those services or types of systems and equipment described in Exhibit "A" as Other Work/Services.

"Parties" mean all entities set out in the Preamble who are bound by this Agreement.

"Patch" means a small addition to the original software code, written to bypass or correct a problem.

"Preventive Maintenance" or "PM" means periodic or scheduled maintenance in accordance with manufacturer's maintenance specifications, industry standards, professional association recommendations, and as set forth in this Agreement.

"Remedial Maintenance" or "RM" means the repair of equipment with parts, materials, and labor to restore performance to the designed function in the event of any breakdown or stoppage of equipment where the equipment is unable to perform its designed function.

"Resale of Services" means the resale of telecommunications services by HAS to internal third parties at IAH, HOU and EFD.

"Response Time" means the maximum elapsed time in which Contractor must respond to an Emergency Service Request. The maximum elapsed time is measured from Contractor's receipt of an Emergency Service Request to Contractor's arrival at the specified work site.

"Substantial Completion" means the stage in the progress of the work when the work or designated portion thereof is sufficiently complete in accordance with the Agreement and OSR so that the City can occupy or utilize the work product for its intended use.

"Telecommunication System" or "System" means all equipment, software, cabling, connectivity, and instruments, and all appurtenances thereto identified in this Agreement.

"Update" means a Patch or fix to the existing system operating at current functionality or a revised edition of the current software. Updates are included in the cost of Basic Services.

"Upgrade" means hardware or software to improve the current system for additional functionality and/or expansion/increases of capacity.

"Urgent Service Request" is defined as a non-remedial maintenance request for immediate action. An urgent service request may be issued outside of Normal Business Hours, in which case additional labor charges will apply. (See Section 8.2.1 of Exhibit "A.")

III. DUTIES OF CONTRACTOR

A. Scope of Services

In consideration of the payment specified in this Agreement, Contractor shall provide all labor, supervision, parts, equipment, materials, tools, instruments, expendable items, supplies, reports, transportation, insurance, subcontracts, bonds, and incidentals necessary to perform the Basic Services and, if requested, Other Work/Services described in the Performance/Work Statement set forth in Exhibit "A". Contractor shall not be paid for travel time to and from the job site.

B. Duty to Inspect

Contractor represents that it or its agent has inspected all sites affected by this Agreement and that it is not entitled to additional compensation for its failure to accurately account for all of the work required to be performed under this Agreement.

C. Invoicing

Contractor shall submit its invoices on forms approved in advance by the Director. Each invoice must be accompanied by support documents as may be requested by the Director. Each invoice Contractor submits must be in duplicate and each copy must include required support documents. Each invoice must be identified by the Contract name and Contractor number. All invoices are to be delivered or mailed to the following location:

The City of Houston
Houston Airport System
Accounts Payable Section
P.O. Box 60106
Houston, Texas 77205-0106

D. Payment of Subcontractors

Contractor shall make timely payments to all persons and entities supplying labor, materials, services, or equipment for the performance of this Agreement. CONTRACTOR SHALL DEFEND AND INDEMNIFY THE CITY FROM ANY CLAIMS OR LIABILITY ARISING OUT OF CONTRACTOR'S FAILURE TO MAKE THESE PAYMENTS. Contractor shall submit disputes relating to payment of MWBE subcontractors to arbitration in the same manner as any other disputes under the MWBE subcontract.

E. Personnel of Contractor

Contractor shall provide sufficient, fully qualified personnel to meet the performance requirements set forth in Exhibit "A". Contractor shall replace any of its personnel or subcontractors whose work product is deemed unsatisfactory by the Director.

F. RELEASE

EXCEPT FOR THE CITY'S GROSS NEGLIGENCE OR WILFUL MISCONDUCT, CONTRACTOR AGREES TO AND SHALL RELEASE THE CITY, ITS AGENTS, EMPLOYEES, OFFICERS, AND LEGAL REPRESENTATIVES (COLLECTIVELY THE "CITY") FROM ALL LIABILITY FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR PROPERTY SUSTAINED IN CONNECTION WITH OR INCIDENTAL TO PERFORMANCE UNDER THIS AGREEMENT, EVEN IF THE INJURY, DEATH, DAMAGE, OR LOSS IS CAUSED BY THE CITY'S SOLE OR CONCURRENT NEGLIGENCE AND/OR THE CITY'S STRICT PRODUCTS LIABILITY OR STRICT STATUTORY LIABILITY.

G. INDEMNIFICATION

CONTRACTOR AGREES TO AND SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY, ITS AGENTS, EMPLOYEES, OFFICERS, AND LEGAL REPRESENTATIVES HARMLESS FOR ALL CLAIMS, CAUSES OF ACTION, LIABILITIES, FINES, AND EXPENSES (INCLUDING, WITHOUT LIMITATION, ATTORNEYS' FEES, COURT COSTS, AND ALL OTHER DEFENSE COSTS AND INTEREST) FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR TANGIBLE PROPERTY ARISING AS A RESULT OF CONTRACTOR'S AND/OR ITS AGENTS', EMPLOYEES', OFFICERS', DIRECTORS', CONTRACTORS', OR SUBCONTRACTORS' ACTUAL OR ALLEGED NEGLIGENCE OR INTENTIONAL ACTS OR OMISSIONS IN CONNECTION WITH ITS PERFORMANCE UNDER THIS AGREEMENT, WHETHER CONTRACTOR IS IMMUNE FROM LIABILITY OR NOT. CONTRACTOR SHALL REQUIRE ITS SUBCONTRACTORS (AND THEIR SUBCONTRACTORS) TO RELEASE AND INDEMNIFY THE CITY TO THE SAME EXTENT AND IN SUBSTANTIALLY THE SAME FORM AS ITS RELEASE AND INDEMNITY TO THE CITY.

H. INDEMNIFICATION AND DEFENSE-PATENT AND COPYRIGHT INFRINGEMENT

- (1) **EXCEPT AS PROVIDED BELOW, CONTRACTOR WILL DEFEND CITY AGAINST ANY CLAIM, SUIT, ACTION OR PROCEEDING ALLEGING THAT EQUIPMENT SUPPLIED BY CONTRACTOR TO CITY UNDER THIS AGREEMENT ("CONTRACTOR SUPPLIED EQUIPMENT") INFRINGES A VALID U.S. PATENT OR**

COPYRIGHT ("CLAIM"), AND CONTRACTOR WILL INDEMNIFY AND HOLD HARMLESS CITY AGAINST ANY AND ALL FINALLY AWARDED COSTS AND EXPENSES, INCLUDING ATTORNEY'S FEES, IN CONNECTION WITH ANY SUCH CLAIM.

- (2) IF THE USE OF ANY CONTRACTOR SUPPLIED EQUIPMENT IS ENJOINED OR SUBJECT TO A CLAIM AS DESCRIBED ABOVE, CONTRACTOR MAY, AT ITS OPTION AND EXPENSE, EITHER PROCURE FOR CITY THE RIGHT TO CONTINUE TO USE THE EQUIPMENT, REPLACE THE EQUIPMENT, OR RELEVANT COMPONENT, WITH SUBSTANTIALLY EQUIVALENT, NON-INFRINGEMENT EQUIPMENT, OR RELEVANT COMPONENT, OR MODIFY THE EQUIPMENT, OR RELEVANT COMPONENT, SO THAT IT BECOMES NON-INFRINGEMENT. IN THE EVENT THAT NONE OF THE FOREGOING OPTIONS IS COMMERCIALY REASONABLE TO CONTRACTOR, CONTRACTOR WILL REMOVE THE INFRINGEMENT CONTRACTOR SUPPLIED EQUIPMENT AND REFUND TO CITY THE PURCHASE PRICE FOR THE EQUIPMENT LESS DEPRECIATION FOR ITS USE. DEPRECIATION SHALL BE CALCULATED ON A STRAIGHT-LINE BASIS, ASSUMING A USEFUL LIFE OF FIVE (5) YEARS.
- (3) CONTRACTOR SHALL HAVE NO OBLIGATION FOR (a) ANY COSTS, FEES OR EXPENSES INCURRED BY CITY WITHOUT CONTRACTOR'S PRIOR WRITTEN CONSENT, PROVIDED SUCH CONSENT SHALL NOT BE UNREASONABLY WITHHELD; (b) ANY ALLEGATION, ASSERTION, OR CLAIMS OF INTELLECTUAL PROPERTY INFRINGEMENT INCLUDING CONTRIBUTORY INFRINGEMENT OR INDUCEMENT TO INFRINGE, ARISING OUT OF OR RELATED TO ANY CLAIM INVOLVING; (i) AUTOMATED CALL PRPROCESSING, AUTOMATED VOICE SERVICE, AUTOMATED CITY SERVICE OR COMBINED LIVE OPERATOR/AUTOMATED SYSTEMS PROCESSING USED IN PROCESSING OR COMPLETING CALLS, (ii) AUTOMATED BRIDGING OF MORE THAN TWO CALLERS UTILIZING SOME FORM OF "LISTEN ONLY" (UNILATERAL) COMMUNICATION COMBINED WITH SOME FORM OF INTERACTIVE COMMUNICATION, (iii) PREPAID CALLING PRODUCTS OR SERVICES, (iv) WIRELESS TELECOMMUNICATIONS SERVICES OR SUPPORT THEREFOR, OR (v) "MUSIC ON HOLD," SERVICE; OR (c) ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES ARISING OUT OF ANY CLAIM.
- (4) ANY OBLIGATION ON THE PART OF CONTRACTOR TO DEFEND AND INDEMNIFY SHALL NOT APPLY TO ANY CLAIM OR PORTION THEREOF THAT ARISES FROM (i) ANY NEGLIGENT OR WILLFUL ACT OR OMISSION BY OR ATTRIBUTABLE TO CITY, (ii) USE OR OPERATION OF THE CONTRACTOR SUPPLIED EQUIPMENT IN COMBINATION WITH EQUIPMENT OR SERVICES PROVIDED BY CITY OR ANY THIRD PARTY; (iii) ANY ADDITION TO OR MODIFICATION OF THE CONTRACTOR SUPPLIED EQUIPMENT BY CITY, ANY THIRD PARTY OR CONTRACTOR AT CITY'S REQUEST; (iv) USE OF OTHER THAN THE THEN CURRENT UNALTERED RELEASE OF ANY SOFTWARE USED IN THE CONTRACTOR SUPPLIED EQUIPMENT; OR (v) ANY EQUIPMENT, SYSTEM, PRODUCT, PROCESS, METHOD OR SERVICE OF CITY WHICH OTHERWISE INFRINGED THE U.S. PATENT OR COPYRIGHT ASSERTED

AGAINST CITY PRIOR TO THE SUPPLY OF THE EQUIPMENT TO CITY BY CONTRACTOR UNDER THE AGREEMENT.

- (5) **THE FOREGOING STATES THE ENTIRE OBLIGATION OF CONTRACTOR TO CITY AND IS CITY'S SOLE AND EXCLUSIVE REMEDY WITH RESPECT TO ANY CLAIM OF INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT OF ANY KIND, AND CONTRACTOR DISCLAIMS ALL OTHER WARRANTIES AND OBLIGATION WITH RESPECT TO ANY SUCH CLAIMS.**

I. INDEMNIFICATION PROCEDURES

- (1) Notice of Claims. If the City or Contractor receives notice of any claim or circumstances which could give rise to an indemnified loss, the receiving party shall give written notice to the other party within 10 days. The notice must include the following:
- (a) a description of the indemnification event in reasonable detail,
 - (b) the basis on which indemnification may be due, and
 - (c) the anticipated amount of the indemnified loss.

This notice does not estop or prevent the City from later asserting a different basis for indemnification or a different amount of indemnified loss than that indicated in the initial notice. If the City does not provide this notice within the 10 day period, it does not waive any right to indemnification except to the extent that Contractor is prejudiced, suffers loss, or incurs expense because of the delay.

(2) Defense of Claims

- (a) Assumption of Defense. Contractor may assume the defense of the claim at its own expense with counsel chosen by it that is reasonably satisfactory to the City. Contractor shall then control the defense and any negotiations to settle the claim. Within 10 days after receiving written notice of the indemnification request, Contractor must advise the City as to whether or not it will defend the claim. If Contractor does not assume the defense, the City shall assume and control the defense, and all defense expenses constitute an indemnification loss.
- (b) Continued Participation. If Contractor elects to defend the claim, the City may retain separate counsel to participate in (but not control) the defense and to participate in (but not control) any settlement negotiations. Contractor may settle the claim without the consent or agreement of the City, unless it (i) would result in injunctive relief or other equitable remedies or otherwise require the City to comply with restrictions or limitations that adversely affect the City, (ii) would require the City to pay amounts that Contractor does not fund in full, (iii) would not result in the City's full and complete release from all liability to the plaintiffs or claimants who are parties to or otherwise bound by the settlement. Any required City approval shall not be unreasonably withheld.

J. Insurance

Contractor shall maintain in effect certain insurance coverage, which is described as follows:

- (1) Minimum Insurance Requirements. Contractor shall maintain the following insurance coverage in the following amounts:

<u>(Coverage)</u>	<u>(Limit of Liability)</u>
Workers' Compensation	Statutory for Workers' Compensation
Employer's Liability	Bodily Injury by accident \$500,000 (each accident) Bodily Injury by Disease \$500,000 policy limit) Bodily Injury by Disease \$500,000 (each employee)
Commercial General Liability: Including Broad Form Coverage, Contractual Liability, Bodily and Personal Injury, and Completed Operations	Bodily Injury and Property Damage, Combined Limits of \$1,000,000 each Occurrence and \$2,000,000 aggregate
Automobile Liability Insurance (for vehicles Contractor uses in performing under this Agreement, including Employer's Non-Owned and Hired Auto Coverage)	\$1,000,000 combined single limit per occurrence

Defense costs are excluded from the face amount of the policy.
Aggregate Limits are per 12-month policy period
unless otherwise indicated.

- (2) Issuers of Policies

The issuer of any policy shall have a Certificate of Authority to transact insurance business in Texas or shall be an eligible non-admitted insurer in the State of Texas and have a Best's rating of at least B+ and a Best's Financial Size Category of Class VI or better, according to the most current edition Best's Key Rating Guide.

- (3) Insured Parties

Each policy, except those for Workers' Compensation, Employer's Liability, and Professional Liability, must name the City (and its officers, agents, and employees) as Additional Insured parties on the original policy and all renewals or replacements.

- (4) Deductibles

Contractor shall be responsible for and bear any claims or losses to the extent of any deductible amounts and waives any claim it may have for the same against the City, its officers, agents, or employees.

(5) Cancellation

Each policy must state that it may not be canceled, materially modified to reduce the coverage below the amounts set forth in (1) above or to delete any of the requirements in this Section III.J., or nonrenewed unless the insurance company gives the Director 30 days' advance written notice. Contractor shall give written notice to the Director within five days of the date on which total claims by any party against Contractor reduce the aggregate amount of coverage below the amounts required by this Agreement. In the alternative, the policy may contain an endorsement establishing a policy aggregate for the particular project or location subject to this Agreement.

(6) Subrogation

Each policy, except Professional Liability (if any), must waive any claim or right of subrogation to recover against the City, its officers, agents, or employees.

(7) Endorsement of Primary Insurance

Each policy, except Workers' Compensation and Professional Liability (if any), must state that the policy is primary to any other insurance available to the Additional Insured with respect to claims arising under this Agreement.

(8) Liability for Premium

Contractor shall pay all insurance premiums, and the City shall not be obligated to pay any premiums.

(9) Subcontractors

Contractor shall require all subcontractors to carry insurance naming the City as an additional insured and meeting all of the above requirements except amount. The amount must be commensurate with the amount of the subcontract, but in no case less than \$500,000 per occurrence. Contractor shall provide copies of insurance certificates to the Director.

(10) Proof of Insurance

- (a) Prior to execution of this Agreement, Contractor shall furnish the Director with Certificates of Insurance, along with an Affidavit from Contractor confirming that the Certificates accurately reflect the insurance coverage maintained.
- (b) Contractor shall continuously and without interruption, maintain in force the required insurance coverages specified in this Section. If Contractor does not comply with this requirement, the Director, at his or her sole discretion, may:
 - (1) immediately suspend Contractor from any further performance under this Agreement and begin procedures to terminate for default, or
 - (2) purchase the required insurance with City funds and deduct the cost of the premiums from amounts due to Contractor under this Agreement.

The City shall never waive or be estopped to assert its right to terminate this Agreement because of its acts or omissions regarding its review of insurance documents.

K. Warranties

Contractor warrants that it shall perform all work in a good and workmanlike manner meeting the standards of quality prevailing in Harris County, Texas, for work of this kind. Contractor shall perform all work using trained and skilled persons having substantial experience performing the work required under this Agreement.

With respect to any parts, instruments, equipment, and goods it furnishes, Contractor warrants:

- (1) that all items are free of defects in title, material, and workmanship,
- (2) that each item meets or exceeds the manufacturer's specifications and requirements for the equipment, structure, or other improvement in which the item is installed,
- (3) that each replacement item is new, in accordance with original equipment manufacturer's specifications, and of a quality at least as good as the quality of the item which it replaces (when the replaced item was new),
- (4) that to the best of its knowledge no items or their use infringe any patent, copyright, or other proprietary rights; provided, however, in the event Contractor becomes aware of such an infringement, Contractor's sole obligation and the City's sole remedy shall be the Contractor's indemnification obligations in accordance with Section III.H.; and
- (5) that for one year from the date of any installation ("Warranty Period"), Contractor shall provide all parts, instruments, equipment, and goods required to complete all Preventive and Remedial Maintenance required under this Agreement at no cost to the City. This warranty is in addition to Contractor's obligation to provide Basic Services under this Agreement. When the manufacturer's warranty period for any parts, instruments, equipment, and goods is greater than one (1) year, the City must claim directly against the manufacturer unless the City is at that time under a maintenance contract with Contractor, provided such warranties are assigned to the City. Any warranty applicable to parts, instruments, equipment, goods and software provided to the City pursuant to this Agreement would be owned by the City.

Contractor shall manage and enforce on the City's behalf (excluding litigation) all manufacturer warranties issued before the Effective Date of this Agreement, during the Term of this Agreement, and any extensions. Contractor shall not be entitled to any additional compensation for the management and enforcement of these manufacturer warranties. If Contractor does not exhaust all remedies, excluding litigation, against a manufacturer who fails to honor all or a part of a warranty, it shall not receive additional compensation from the City for the labor and material costs it incurs to repair or replace the item that otherwise would have been under warranty.

L. Maintenance Audit

- (1) At any time during the term of this Agreement or any extensions, the Director, without notice to the Contractor and at HAS' expense, may provide for a third party maintenance audit. After a

minimum of 15 days to review the findings of the audit, Contractor shall rectify any legitimate deficiencies in performance discovered by such audit for which Contractor is responsible to the Director's reasonable satisfaction at no cost to the City within 10 days after the review of such audit findings. Further, the Contractor shall provide the Director with a written explanation for such deficiency in performance and a plan to prevent future deficiencies within 15 days of completion of the review of such audit findings. Failure of the Contractor to timely rectify legitimate deficiencies or provide a written explanation and plan to the Director shall be grounds for termination for cause as provided in Section V. If Contractor disagrees with such audit findings then Contractor shall commence the dispute resolution process described in Section R to obtain a final ruling on the audit findings.

- (2) At any time during the term of this Agreement or any extensions, the Director, without notice to the Contractor, may conduct his own inspections of Contractor's work performance, equipment, inventory, logs and work sites. Contractor shall rectify any deficiencies discovered by such inspection to the Director's reasonable satisfaction within 10 days following completion of its review of the Director's findings at no cost to the City if caused by the Contractor or its subcontractors.

M. Confidentiality

Contractor, its agents, employees, contractors, and subcontractors shall hold all City information, data, and documents (collectively, "the Information") that they receive, prepare, or to which they have access, in strictest confidence. Contractor, its agents, employees, contractors, and subcontractors shall not disclose, disseminate, or use the Information other than in furtherance of the services under this Agreement, unless the Director authorizes it in writing or as may be required by law. Contractor shall establish procedures to ensure confidentiality of the Information and to prevent its unauthorized use and disclosure. Contractor shall obtain written agreements from its agents, employees, contractors, and subcontractors who perform work under this Agreement, which bind them to maintain the confidentiality of the Information.

N. Use of Work Products

Contractor conveys and assigns to the City its entire interest and full ownership worldwide in and to any work, invention, and all Documents, and the copyrights, patents, trademarks, trade secrets, and any other proprietary rights therein (collectively "Proprietary Rights") that Contractor, its agents, employees, contractors, and subcontractors (collectively "Authors") develop, write, or produce under this Agreement that are expressly described as custom made for the City (collectively "Works"). Works do not include Contractor, or third party Documents, ideas, "know how," works or inventions of Contractor or third party Documents developed by them in the ordinary course of their business and not expressly commissioned for the City under this Agreement, and shall remain the property of Contractor or the third party, as applicable. Third party software is licensed to the City pursuant to the licensor's license and not included within Works.

The Authors shall not claim or exercise any Proprietary Rights related to the Works. If requested by the Director, Contractor shall place a conspicuous notation on any Works which indicates that the City owns the Proprietary Rights.

Contractor shall execute all documents required by the Director to further evidence this assignment and ownership. Contractor shall cooperate with the City in registering, creating, and enforcing Proprietary

Rights arising under this Agreement. If Contractor's assistance is requested and rendered under this Section, the City shall reimburse Contractor for all out-of-pocket expenses it incurs in rendering assistance, subject to the availability of funds. On termination of this Agreement, or if requested by the Director, Contractor shall deliver all Works to the City. Contractor shall obtain written agreements from the Authors which bind them to the terms in this Section.

All Works developed, written, or produced under this Agreement for the City for use as a contribution to a collective work; a part of a motion picture or other audiovisual work; a translation; a supplementary work; a compilation; an instructional text; a test; answer material for a test; or an atlas, are "works made for hire."

Contractor may retain copies of the Works for its archives. Contractor shall not otherwise use, sell, license, or market the Works.

O. Licenses and Permits

Contractor shall obtain, maintain, and pay for all licenses, permits, and certificates including all professional licenses required by this Agreement, any statute, ordinance, rule, or regulation. This requirement includes, without limitation, certification of the on-site technicians. Contractor shall immediately notify the Director of any suspension, revocation, or other detrimental action against required licenses or certifications.

P. Compliance with Laws

Contractor shall comply with all applicable state and federal laws and regulations; the City Charter and Code of Ordinances; and HAS' rules and regulations.

Q. Compliance with Equal Opportunity Ordinance

Contractor shall comply with the City's Equal Employment Opportunity Ordinance as set out in Exhibit "E."

R. Minority and Women Business Enterprises

It is the City's policy to ensure that Minority and Women Business Enterprises ("MWBEs") have the full opportunity to compete for and participate in City contracts. The objectives of Chapter 15, Article V of the City of Houston Code of Ordinances, relating to City-wide Percentage Goals for contracting with MWBEs, are incorporated into this Agreement.

Contractor shall make good faith efforts to award subcontracts or supply agreements in at least 12% of the value of this Agreement to MWBEs. The City's policy does not require Contractor to in fact meet or exceed this goal, but it does require Contractor to objectively demonstrate that it has made good faith efforts to do so. To this end, Contractor shall maintain records showing:

- (1) subcontracts and supply agreements with Minority Business Enterprises,
- (2) subcontracts and supply agreements with Women's Business Enterprises, and

- (3) specific efforts to identify and award subcontracts and supply agreements to MWBEs. Contractor shall submit periodic reports of its efforts under this Section to the Affirmative Action Director in the form and at the times he or she prescribes.

Contractor shall require written subcontracts with all MWBE subcontractors and suppliers and shall submit all disputes with MWBE subcontractors to binding arbitration in Houston, Texas, if directed to do so by the Affirmative Action Director. All agreements must contain the terms set out in Exhibit "F." If Contractor is an individual person (as distinguished from a corporation, partnership, or other legal entity), and the amount of the subcontract is \$50,000 or less, then the subcontract must also be signed by the attorneys of the respective parties.

S. Performance Bond

Contractor shall furnish a performance bond in the amount of 50% of the total contract amount for the initial three-year term, conditioned on Contractor's full and timely performance of the Agreement (and payment of subcontractors). If the City exercises any option years, Contractor shall maintain a Performance Bond in the amount equal to 50% of the contract amount for the option year, as determined by the Director. The bond must be in substantially the form attached as Exhibit "G" and issued by a corporate surety authorized and admitted to write surety bonds in Texas. If the amount of the bond exceeds \$100,000, the surety must be listed on the current list of accepted sureties on federal bonds published by the United States Treasury Department or reinsured for any liability in excess of \$100,000 by a reinsurer listed on the U.S. Treasury list.

T. Drug Abuse Detection and Deterrence

- (1) It is the policy of the City to achieve a drug-free workforce and workplace. The manufacture, distribution, dispensation, possession, sale, or use of illegal drugs or alcohol by contractors while on City Premises is prohibited. Contractor shall comply with all the requirements and procedures set forth in the Mayor's Drug Abuse Detection and Deterrence Procedures for Contractors, Executive Order No. 1-31 ("Executive Order"), which is incorporated into this Agreement and is on file in the City Secretary's Office.
- (2) Before the City signs this Agreement, Contractor shall file with the Contract Compliance Officer for Drug Testing ("CCODT"),
 - (a) a copy of its drug-free workplace policy,
 - (b) the Drug Policy Compliance Agreement substantially in the form set forth in Exhibit "H," together with a written designation of all safety impact positions and,
 - (c) if applicable (e.g. no safety impact positions), the Certification of No Safety Impact Positions, substantially in the form set forth in Exhibit "I."

If Contractor files a written designation of safety impact positions with its Drug Policy Compliance Agreement, it also shall file every 6 months during the performance of this Agreement or on completion of this Agreement if performance is less than 6 months, a Drug Policy Compliance Declaration in a form substantially similar to Exhibit "J". Contractor shall submit the Drug Policy Compliance Declaration to the CCODT within 30 days of the expiration of each 6-month period of performance and within 30 days of completion of this Agreement. The first 6-month period begins to run on the date the City issues its

Notice to Proceed or if no Notice to Proceed is issued, on the first day Contractor begins work under this Agreement.

- (3) Contractor also shall file updated designations of safety impact positions with the CCODT if additional safety impact positions are added to Contractor's employee work force.
- (4) Contractor shall require that its subcontractors comply with the Executive Order and Contractor shall secure and maintain the required documents for City inspection.

U. Environmental Laws

Contractor shall comply with all rules, regulations, statutes, or orders of the Environmental Protection Agency ("EPA"), the Texas Commission on Environmental Quality ("TCEQ"), and any other governmental agency with the authority to promulgate environmental rules and regulations ("Environmental Laws") to the extent applicable to the Work. Contractor shall promptly reimburse the City for any fines or penalties levied against the City because of Contractor's failure to comply.

Contractor shall not possess, use, generate, release, discharge, store, dispose of, or transport any Hazardous Materials on, under, in, above, to, or from the site except in strict compliance with the Environmental Regulations. "Hazardous Materials" mean any substances, materials, or wastes that are or become regulated as hazardous or toxic substances under any applicable federal, state, or local laws, regulations, ordinances, or orders. Contractor shall not deposit oil, gasoline, grease, lubricants, or any ignitable or hazardous liquids, materials, or substances in the City's storm sewer system or sanitary sewer system or elsewhere on City Property in violation of the Environmental Laws.

Subject to the appropriation of funds by City Council to perform obligations set forth in III.U., if during performance of Services, Contractor's employees or agents encounter any asbestos or other hazardous substance (as defined by any applicable state, federal or local hazardous waste or environmental law or regulation) at any location where Contractor is to perform services under this Agreement, upon written notice from Contractor, the City agrees to take all necessary steps, at its own expense, to remove or contain the asbestos or other hazardous substance and to test the premises to ensure that exposure does not exceed the lawful exposure limit for the protection of workers. Contractor may suspend performance of services impacted by the asbestos or hazardous substance locations under this Agreement until the removal or containment has been completed and approved by the appropriate governmental agency and City. Performance obligations under this Agreement may be extended for the period of delay caused by said cleanup or removal upon mutual agreement of the parties. City's failure to remove or contain hazardous substances shall entitle Contractor to terminate this Agreement without further liability, in which event City shall permit Contractor to remove any equipment that has not been accepted, shall reimburse Contractor for expenses incurred in performing this Agreement until termination and shall complete payment for any portion of the System that Contractor has been accepted.

V. Airport Security

Contractor shall comply with all HAS, TSA, FAA and any other governmental agency security directives, rules and regulations. The FAA and/or the TSA may assess fines and/or penalties for Contractor's non-compliance with the provisions of 49 CFR 1540 and 1542, as amended from time to time, or by other agencies for noncompliance with laws or regulations applicable to Contractor's operations. Within 10 days of notification in writing, Contractor shall reimburse the City for any fine or penalty assessed against the City because of Contractor's non-compliance with 49 CFR 1540 and 1542 or other applicable laws or

regulations, provided that such decision is a final, unappealable decision resulting from an action caused by Contractor or its subcontractors.

W. Conflicts of Interest

If a potential or actual conflict of interests arises between the City's interests and the interests of other clients Contractor represents, Contractor shall immediately notify the City Attorney and Mayor by fax transmission or telephone and request consent. The City shall be deemed to consent to the conflict unless the Mayor or City Attorney sends a written notice that the City declines to consent within 3 business days after the City receives the notice. If the City does not consent, Contractor shall immediately take steps to resolve the conflict.

IV. DUTIES OF CITY

A. Payment Terms

- (1) Subject to all the terms and conditions of this Agreement, the City shall pay to Contractor, and Contractor accepts the fees specified in Exhibit "B," Fee Schedule, for all work provided by Contractor and its subcontractors under this Agreement. If hourly rates and fees for Other Work/Services are not stated in Exhibit "B", the rates will be based on the Parties' written agreement. Additionally, if System Upgrades/Modifications are not specified in Exhibit "B", the hourly rates and fees will be based on the Parties' written Agreement. All such rates and fees must be ordinary and reasonable for the type of work performed.
- (2) If the City pays Contractor for work performed by any subcontractor or for parts, supplies, equipment, or materials provided by any supplier, and Contractor withholds or has withheld payment to the subcontractor or supplier because of a deficiency in the quality or quantity of that subcontractor's or supplier's work or materials, the City may withhold a corresponding amount from any pending or future payments to Contractor until the next regular payment to Contractor occurring after the City receives reasonable documentation that the deficiency has been remedied.
- (3) All invoices are subject to approval by the Director and are due and payable in accordance with Section 2251.021 of the Texas Government Code. All payments must be made by check made payable to Contractor. The City will not unreasonably delay or withhold payment or approval of any invoice. Neither payments made nor approval of invoices or services by the Director shall be construed as final acceptance or approval of that part of Contractor's services to which such payment or approval relates. Such payments do not relieve Contractor of any of its obligations under this Agreement.

B. Taxes

The City is exempt from payment of Federal Excise and Transportation Tax and Texas Limited Sales and Use Tax. Contractor's invoices to the City must not contain assessments of any of these taxes. The Director will furnish the City's exemption certificate and federal tax identification number to Contractor if requested.

C. Method of Payment - Disputed Payments

If the City disputes any items in an invoice Contractor submits for any reason, including lack of supporting documentation, the Director shall temporarily delete the disputed item and pay the remainder of the invoice. The Director shall promptly notify Contractor of the dispute and request remedial action. After the dispute is settled, Contractor shall include the disputed amount on a subsequent regularly scheduled invoice or on a special invoice for the disputed item only.

D. Limit of Appropriation

- (1) The City's duty to pay money to Contractor for any purpose under this Agreement is limited in its entirety by the provisions of this Section.
- (2) In order to comply with Article II, Sections 19 and 19a of the City's Charter and Article XI, Section 5 of the Texas Constitution, the City has appropriated and allocated the sum of \$1,177,678.50 to pay money due under this Agreement (the "Original Allocation"). The executive and legislative officers of the City, in their discretion, may allocate supplemental funds for this Agreement, but they are not obligated to do so. Therefore, the parties have agreed to the following procedures and remedies.
- (3) The City makes a supplemental allocation by sending a notice signed by the Director and the City Controller to Contractor and, where in excess of the amount specified in Paragraph (4) below, approved by motion or ordinance of City Council in substantially the following form:

"NOTICE OF SUPPLEMENTAL ALLOCATION OF FUNDS"

TO: [Name of Contractor]

FROM: City of Houston, Texas (the "City")

DATE: [Date of notice]

SUBJECT: Supplemental allocation of funds for the purpose of the "[title of this Agreement]" between the City and (name of Contractor) countersigned by the City Controller on (Date of Countersignature) (the "Agreement").

I, (name of City Controller), City Controller of the City of Houston, certify that the supplemental sum of \$_____, upon the request of the below-signed Director, has been allocated for the purposes of the Agreement out of funds appropriated for this purpose by the City Council of the City of Houston. This supplemental allocation has been charged to such appropriation.

The aggregate of all sums allocated for the purpose of such Agreement, including the Original Allocation, and all supplemental allocations (including this one), as of the date of this notice, is \$_____.

SIGNED:

(Signature of the City Controller)
City Controller of the City

REQUESTED:

(Signature of the Director)
Director

- (4) City Council delegates to the Director the authority to approve up to \$10,166,709.10 in supplemental allocations for this Agreement without returning to Council.
- (5) The Original Allocation plus all supplemental allocations are the Allocated Funds, which includes a contingency in the amount of \$917,671.60. For purposes of Change Orders in IV.E.(3)(c) below, the Original Agreement Amount is \$10,426,716.00. The City shall never be obligated to pay any money under this Agreement in excess of the Allocated Funds. Contractor must assure itself that sufficient allocations have been made to pay for services it provides. If Allocated Funds are exhausted, Contractor's only remedy is suspension or termination of its performance under this Agreement and it has no other remedy in law or in equity against the City and no right to damages of any kind.

E. Changes

- (1) At any time during the Agreement Term, the Director may issue a Change Order to increase or decrease the scope of services or change plans and specifications, as he or she may find necessary to accomplish the general purposes of this Agreement. All Change Orders shall be in writing, mutually agreed upon, and signed by both parties. Contractor shall furnish the services or deliverables in the Change Order in accordance with the requirements of this Agreement plus any special provisions, specifications, or special instructions issued to execute the extra work.
- (2) The Director will issue the Change Order in substantially the following form:

CHANGE ORDER

TO: [Name of Contractor]

FROM: City of Houston, Texas (the "City")

DATE: [Date of Notice]

SUBJECT: Change Order under the Agreement between the City and [Name of Contractor] countersigned by the City Controller on [Date of countersignature of the Agreement]

Subject to all terms and conditions of the Agreement, the City requests that Contractor provide the following:

**[Here describe the additions to or changes to the equipment
or services and the Change Order Charges applicable to each.]**

Signed:

[Signature of Director]

- (3) The Director may issue more than one Change Order, subject to the following limitations:
 - (a) Council expressly authorizes the Director to approve a Change Order up to \$25,000. A Change Order in excess of \$25,000 must be approved by the City Council.
 - (b) If a Change Order describes items that Contractor is otherwise required to provide under this Agreement, the City is not obligated to pay any additional money to Contractor.
 - (c) The Total of all Change Orders issued under this section may not increase the Original Agreement amount by more than 25%.
- (4) Whenever Contractor receives a Change Order, Contractor shall furnish all material, equipment, and personnel necessary to perform the work described in the Change Order. Contractor shall complete the work within the time prescribed. If no time for completion is prescribed, Contractor shall complete the work within a reasonable time. If the work described in any Change Order causes an unavoidable delay in any other work Contractor is required to perform under this Agreement, Contractor may request a time extension for the completion of the work. The Director's decision regarding a time extension is final.
- (5) A product or service provided under a Change Order is subject to inspection, acceptance, or rejection in the same manner as the work described in the Original Agreement, and is subject to the terms and conditions of the Original Agreement as if it had originally been a part of the Agreement.
- (6) Change Orders are subject to the Allocated Funds provisions of this Agreement.

F. Access to Site

Subject to FAA, TSA and HAS rules and regulations, Contractor may enter and leave work sites at all reasonable times without charge. Contractor and its employees may use the common areas and roadways at the Airport where the work sites are located. This excludes parking for Contractor's personnel and does not extend to any restricted area of the Airport, including without limitation, the AOA, which requires the Director's prior written approval and an HAS escort. Contractor shall repair any damage caused by it or its employees, suppliers or subcontractors as a result of their use of the common areas other than ordinary wear and tear.

V. TERM AND TERMINATION

A. Contract Term

This Agreement is effective on the Effective Date and continues for 3 consecutive years from the date set forth in the Notice to Proceed, unless sooner terminated under this Agreement. Performance begins on the date specified in the Notice to Proceed issued by the Director. Contractor acknowledges that time is of the essence of this Agreement.

B. Renewals

If the Director, at his or her sole discretion, gives written notice of renewal to Contractor at least 30 days before expiration of the then-current term and if sufficient funds are allocated then, upon expiration of the initial term, this Agreement is renewed for up to 2 successive one-year terms under the same terms and conditions.

C. Termination for Convenience by City

The Director may terminate this Agreement at any time by giving 30 days written notice to Contractor. The City's right to terminate this Agreement for convenience is cumulative of all rights and remedies which exist now or in the future.

On receiving the notice, Contractor shall, unless the notice directs otherwise, immediately discontinue all services under this Agreement and cancel all existing orders and subcontracts that are chargeable to this Agreement. As soon as practicable after receiving the termination notice, Contractor shall submit an invoice showing in detail the services performed under this Agreement up to the termination date. The City shall then pay the fees to Contractor for services actually performed, but not already paid for, in the same manner as prescribed in Section IV(A) unless the fees exceed the allocated funds remaining under this Agreement.

TERMINATION OF THIS AGREEMENT AND PAYMENT FOR SERVICES RENDERED ARE CONTRACTOR'S ONLY REMEDIES FOR THE CITY'S TERMINATION FOR CONVENIENCE, WHICH DOES NOT CONSTITUTE A DEFAULT OR BREACH OF THIS AGREEMENT. CONTRACTOR WAIVES ANY CLAIM (OTHER THAN ITS CLAIM FOR PAYMENT AS SPECIFIED IN THIS SECTION), IT MAY HAVE NOW OR IN THE FUTURE FOR FINANCIAL LOSSES OR OTHER DAMAGES RESULTING FROM THE CITY'S TERMINATION FOR CONVENIENCE.

D. Termination for Cause by City

If Contractor defaults under this Agreement, the Director may either terminate this Agreement upon 30 day's prior written notice, or allow Contractor to cure the default as provided below. The City's right to terminate this Agreement for Contractor's default is cumulative of all rights and remedies which exist now or in the future. Default by Contractor occurs if:

- (1) Contractor fails to perform any of its material duties under this Agreement;
- (2) Contractor becomes insolvent;
- (3) all or a substantial part of Contractor's assets are assigned for the benefit of its creditors; or
- (4) a receiver or trustee is appointed for Contractor.

If a default occurs, the Director may, but is not obligated to, deliver a written notice to Contractor describing the default and the termination date. The Director, at his or her sole option, may extend the termination date to a later date. If the Director allows Contractor to cure the default and Contractor does so to the Director's satisfaction before the termination date, then the termination is ineffective. If Contractor does not cure the default before the termination date, then the Director may terminate this Agreement on the termination date, at no further obligation of the City.

To effect final termination, the Director must notify Contractor in writing. After receiving the notice, Contractor shall, unless the notice directs otherwise, immediately discontinue all services under this Agreement, and promptly cancel all orders or subcontracts chargeable to this Agreement.

If, after termination for failure to fulfill contract obligations, it is determined that Contractor had not so failed, the termination shall be deemed to have been effected for the convenience of the City. In such event, Contractor shall be paid in accordance with the provisions of Section V.C. of the Agreement.

E. Termination for Cause by Contractor

Contractor may terminate its performance under this Agreement if the City defaults and fails to cure the default within 30 days after the Director receives written notice of it; or where required by law. Default by the City occurs if the City fails to perform one or more of its material duties under this Agreement, including failure to pay. If a default occurs and Contractor wishes to terminate the Agreement, then Contractor must deliver a written notice to the Director describing the default and the proposed termination date. The date must be at least 30 days after the Director receives the notice. Contractor, at its sole option, may extend the proposed termination date to a later date. If the City cures the default before the proposed termination date, then the proposed termination is ineffective. If the City does not cure the default before the proposed termination date, then Contractor may terminate its performance under this Agreement on the termination date.

VI. MISCELLANEOUS

A. Independent Contractor

Contractor is an independent contractor and shall perform the services provided for in this Agreement in that capacity. The City has no control or supervisory powers over the manner or method of Contractors' performance under this Agreement. All personnel Contractor uses or provides are its employees or subcontractors and not the City's employees, agents, or subcontractors for any purpose whatsoever. Contractor is solely responsible for the compensation of its personnel, including but not limited to: the withholding of income, social security, and other payroll taxes and all worker's compensation benefits coverage.

B. Force Majeure

1. Timely performance by both parties is essential to this Agreement. However, neither party is liable for reasonable delays in performing its obligations under this Agreement to the extent the delay is caused by Force Majeure that directly impacts the City or Contractor. The event of Force Majeure may permit a reasonable delay in performance but does not excuse a party's obligations to complete performance under this Agreement. Force Majeure means: fires, interruption of utility services, epidemics in the City, floods, hurricanes, tornadoes, ice storms and other natural disasters, explosions, war, terrorist acts against the City or Contractor, riots, strikes, court orders, and the acts of superior governmental or military authority, and which the affected party is unable to prevent by the exercise of reasonable diligence. The term does not include any changes in general economic conditions such as inflation, interest rates, economic downturn or other factors of general application; or an event that merely makes performance more difficult, expensive or impractical. Force Majeure does not entitle Contractor to extra Reimbursable Expenses or payment.

2. This relief is not applicable unless the affected party does the following:
- (a) uses due diligence to remove the effects of the Force Majeure as quickly as possible and to continue performance notwithstanding the Force Majeure; and
 - (b) provides the other party with prompt written notice of the cause and its anticipated effect.
3. The City may perform contract functions itself or contract them out during periods of Force Majeure. Such performance is not a default or breach of this Agreement by the City.
4. If the Force Majeure continues for more than 14 days from the date performance is affected, the Director may terminate this Agreement by giving 7 days' written notice to Contractor. This termination is not a default or breach of this Agreement. **CONTRACTOR WAIVES ANY CLAIM IT MAY HAVE FOR FINANCIAL LOSSES OR OTHER DAMAGES RESULTING FROM THE TERMINATION EXCEPT FOR AMOUNTS DUE UNDER THE AGREEMENT UP TO THE TIME THE WORK IS HALTED DUE TO FORCE MAJEURE.**

C. Severability

If any part of this Agreement is for any reason found to be unenforceable, all other parts remain enforceable unless the result materially prejudices either party.

D. Entire Agreement

This Agreement merges the prior negotiations and understandings of the Parties and embodies the entire agreement of the Parties. No other agreements, assurances, conditions, covenants (express or implied), or other terms of any kind, exist between the Parties regarding this Agreement.

E. Written Amendment

Unless otherwise specified elsewhere in this Agreement, this Agreement may be amended only by written instrument executed on behalf of the City (by authority of an ordinance adopted by the City Council) and Contractor. The Director is only authorized to perform the functions specifically delegated to him or her in this Agreement.

F. Applicable Laws

This Agreement is subject to the laws of the State of Texas, the City Charter and Ordinances, the laws of the federal government of the United States, and all rules and regulations of any regulatory body or officer having jurisdiction.

Venue for any litigation relating to this Agreement is Harris County, Texas.

G. Notices

All notices required or permitted by this Agreement must be in writing and are deemed delivered on the earlier of the date actually received or the third day following: (1) deposit in a United States Postal Service post office or receptacle; (2) with proper postage (certified mail, return receipt requested); and (3)

addressed to the other party at the address set out in the preamble of this Agreement or at such other address as the receiving party designates by proper notice to the sending party.

H. Captions

Captions contained in this Agreement are for reference only, and, therefore, have no effect in construing this Agreement. The captions are not restrictive of the subject matter of any section in this Agreement.

I. Non-Waiver

If either party fails to require the other to perform a term of this Agreement, that failure does not prevent the party from later enforcing that term and all other terms. If either party waives the other's breach of a term, that waiver does not waive a later breach of this Agreement.

An approval by the Director, or by any other employee or agent of the City, of any part of Contractor's performance does not waive compliance with this Agreement or establish a standard of performance other than that required by this Agreement and by law. The Director is not authorized to vary the terms of this Agreement.

J. Inspections and Audits

City representatives may perform, or have performed, (1) audits during Contractor's normal business hours and upon reasonable notice; only books and records pertaining specifically to transactions under this Agreement are subject to audit; and (2) inspections of all places where work is undertaken in connection with this Agreement. Contractor shall keep such books and records available for this purpose for four (4) years after this Agreement terminates. This provision does not affect the applicable statute of limitations.

K. Enforcement

The City Attorney or his or her designee may enforce all legal rights and obligations under this Agreement without further authorization. Contractor shall provide to the City Attorney all documents and records, or portions of documents and records, that do not contain privileged information that the City Attorney requests to assist in determining Contractor's compliance with this Agreement, with the exception of those documents made confidential by federal or State law or regulation.

L. Ambiguities

If any term of this Agreement is ambiguous, it shall not be construed for or against any party on the basis that the party did or did not write it.

M. Survival

Contractor shall remain obligated to the City under all clauses of this Agreement that expressly or by their nature extend beyond the expiration or termination of this Agreement, including but not limited to, the indemnity provisions.

N. Publicity

Contractor shall make no announcement or release of information concerning this Agreement unless the release has been submitted to and approved, in writing, by the Director.

O. Parties In Interest

This Agreement does not bestow any rights upon any third party, but binds and benefits the City and Contractor only.

P. Successors and Assigns

This Agreement binds and benefits the Parties and their legal successors and permitted assigns; however, this provision does not alter the restrictions on assignment and disposal of assets set out in the following paragraph. This Agreement does not create any personal liability on the part of any officer or agent of the City.

Q. Business Structure and Assignments

Contractor shall not assign this Agreement at law or otherwise or dispose of all or substantially all of its assets without the Director's prior written consent, provided, however, Contractor may, upon written notice, assign this Agreement to any successor entity upon the merger, reorganization, consolidation or sale of all or substantially all of Contractor's assets. Nothing in this clause, however, prevents the assignment of accounts receivable or the creation of a security interest under §9.406 of the Texas Business & Commerce Code. In the case of such an assignment, Contractor shall immediately furnish the City with proof of the assignment and the name, telephone number, and address of the Assignee and a clear identification of the fees to be paid to the Assignee.

Contractor shall not delegate any portion of its performance under this Agreement without the Director's written consent, which shall not be unreasonably withheld.

R. Dispute Resolution

For purposes of this Section "Project Administrator" means the person the Director designates to monitor the progress of all Parties' performance under this Agreement.

Except as may otherwise be provided by law, a dispute that (1) does not involve a question of law; (2) arises during the performance of this Agreement; and (3) is not resolved between the Project Administrator and Contractor must be handled as described below:

- (a) The Project Administrator shall put its decision in writing and mail or otherwise furnish Contractor with a copy. Contractor may abide by the decision or may appeal the decision to the Director.
- (b) If Contractor desires to appeal a decision of the Project Administrator, Contractor must submit a written appeal to the Director. Contractor must file its written appeal within 7 working days following receipt of the Project Administrator's original decision. The Director shall provide Contractor with a written response to the appeal within 14 working days following its receipt. The decision of the Director is final, subject to judicial review.

S. Remedies Cumulative

Unless otherwise specified elsewhere in this Agreement, the rights and remedies contained in this Agreement are not exclusive, but are cumulative of all rights and remedies which exist now or in the future. Neither party may terminate its duties under this Agreement except in accordance with its provisions.

T. Contractor Debt

IF CONTRACTOR, AT ANY TIME DURING THE TERM OF THIS AGREEMENT, INCURS A DEBT, AS THE WORD IS DEFINED IN SECTION 15-122 OF THE HOUSTON CITY CODE OF ORDINANCES, IT SHALL IMMEDIATELY NOTIFY THE CITY CONTROLLER IN WRITING. IF THE CITY CONTROLLER BECOMES AWARE THAT CONTRACTOR HAS INCURRED A DEBT, SHE SHALL IMMEDIATELY NOTIFY CONTRACTOR IN WRITING. IF CONTRACTOR DOES NOT PAY THE DEBT WITHIN 30 DAYS OF EITHER SUCH NOTIFICATION, THE CITY CONTROLLER MAY DEDUCT FUNDS IN AN AMOUNT EQUAL TO THE DEBT FOR ANY PAYMENTS OWED TO CONTRACTOR UNDER THIS AGREEMENT, AND CONTRACTOR WAIVES ANY RECOURSE THEREFOR.

U. Limitation of Liability

EXCEPT FOR PAYMENTS OWED UNDER THIS AGREEMENT, IN NO EVENT WILL EITHER PARTY BE LIABLE TO THE OTHER PARTY FOR SPECIAL, INDIRECT, INCIDENTAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES, WHETHER ARISING IN CONTRACT, TORT (INCLUDING A PARTY'S NEGLIGENCE) OR OTHERWISE, INCLUDING WITHOUT LIMITATION DAMAGES ARISING FROM LOSS OF GOODWILL, LOST PROFITS (ACTUAL OR ANTICIPATED), EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

EXCEPT WITH RESPECT TO THE INDEMNIFICATION OBLIGATIONS SET OUT IN SECTION III.G. AND H., CONTRACTOR'S ENTIRE LIABILITY FOR ANY OTHER DAMAGE WHICH MAY ARISE HEREUNDER, FOR ANY CAUSE WHATSOEVER, AND REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT OR IN TORT, INCLUDING CONTRACTOR'S NEGLIGENCE, OR OTHERWISE, SHALL BE LIMITED TO 120% OF THE TOTAL CONTRACT PRICE. CONTRACTOR SHALL BEAR NO LIABILITY FOR USE OF EQUIPMENT, SOFTWARE OR SERVICES PROVIDED UNDER THIS AGREEMENT IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR DEVICES OR PUBLIC SAFETY SYSTEMS. EXCEPT AS EXPRESSLY STATED OTHERWISE HEREIN, CONTRACTOR SHALL HAVE NO LIABILITY OR RESPONSIBILITY FOR INTEROPERABILITY OR COMPATIBILITY OF THE SYSTEM WITH THIRD-PARTY PRODUCTS OR SYSTEMS THAT THE CITY MAY UTILIZE IN CONJUNCTION WITH THE SYSTEM OR TO WHICH THE CITY MAY CONNECT THE SYSTEM.

EXHIBIT "A"
SCOPE OF WORK

EXHIBIT "A"
SCOPE OF WORK
TELECOMMUNICATION SERVICES

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EXHIBIT "A"
SCOPE OF WORK
TELECOMMUNICATION SERVICES

1.0 BACKGROUND

The Houston Airport System (HAS) operates the City of Houston's three (3) major airports: George Bush Intercontinental Airport/Houston (IAH); William P. Hobby Airport (HOU), and Ellington Field (EFD). Management of the Airport system includes coordination with FAA, air carriers, and other Federal and state agencies to maintain the highest standards of service and safety to Airport patrons. Telephone communications serves a vital role in the efficient operation of the Houston Airport System. First-class communications capability is essential for safety and uninterrupted Airport operations.

2.0 GENERAL

The Contractor shall provide Basic PBX Maintenance Services in accordance with this Agreement, and upon written notice, of the Director, provide Other Work/Services at IAH, HOU, and EFD,

2.1 Basic Services includes the following:

Basic PBX Maintenance Services consist of on-site maintenance, administration, and routine installation activities to support multiple Nortel Meridian 1 Option 81C PBX's, multiple fiber and carrier remote units, telephone instruments, software updates, Call Accounting software and hardware, Nicelog Digital Recording Systems software and hardware support, Voice Mail and ACD Systems, and all ancillary equipment which is related or connected to the operation of the telephone systems.

2.2 Other Work/Services include, but are not limited to, the following:

2.2.1 Systems, equipment, software, and cable services, required to meet desired conditions and/or repairs not covered in the Basic PBX Maintenance Services.

2.3 Audit

An independent Audit of PBX systems at the HAS, to include equipment, software, and response times to Basic Services and Other Work/Service, will be conducted once a year, as requested by the Director. The Audit will be done in electronic file form, 30 days after receiving the request in writing by the Director. The Audit procedure used by the Contractor shall be submitted with the Agreement.

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3.0 BASIC SERVICES

3.1 Basic PBX Maintenance Services

3.1.1 Beginning on the start date specified in the Notice to Proceed, Contractor shall provide on-site personnel during Normal Business Hours to perform System maintenance in strict compliance with the terms and conditions of the Agreement throughout its term. System maintenance services include, but are not limited to, Preventive Maintenance, Remedial Maintenance, MAC's, ISI Call Accounting (Infotel Select version 7.1.2), PBX Network Fault & Performance Monitoring, Nicelog Digital Recording, Nortel SRS and other connectivity responsibilities described herein. All software problems and the applicable updates and patches of software shall be offered at no cost to the City within a mutually agreed upon timeframe upon release from the manufacturer.

3.1.1.1 Nortel Software Subscription Service (SRS) includes the following locations:

- Terminal D PBX
- Administration Building PBX
- HOU PBX
- Call Pilot (located in Terminal D)
- Symposium (located in Terminal D)

Contractor shall pay all of its Administrative/Overhead Cost including, but not limited to, payroll (vacation, sick time, training, etc.) processing orders, tracking invoices, sales quotations, and engineering documents. Such costs shall not be billed to the City.

3.1.2 Contractor shall provide on site personnel, including but not limited to, those below:

3.1.2.1 One (1) On-Site Coordinator/Administrative Coordinator

In addition to the requested on-site staff, HAS anticipates that the following Contractor tasks will be required to ensure contractual compliance. These management and administrative tasks should be performed at no additional cost. However, HAS acknowledges that these tasks would be more productively performed by an on-site resource who can be actively engaged in the day-to-day operations at HAS. Therefore, HAS is willing to provide an on-site work space for the "Site Coordinator" upon request from Contractor.

The On-Site Coordinator/Administrative Coordinator shall

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perform the following duties:

- **Oversee technicians**
 - Dispatch technicians via HAS HEAT system.
 - Establish and adjust priorities as requested by the Director or as workload requires.
 - Perform quality control inspections.
 - Analyze technician workload and efficiency; produce reports for HAS.
- **Process payroll (vacation, sick, training)**
- **Process orders**
- **Track invoices**
- **Provide sales quotations & engineering documentation**
- **Perform other tasks requested by the Director**

3.1.2.2 **Two (2) Customer Service/Data Entry Reps (CSR)**

The CSRs perform the following duties:

- **Project coordination (large moves, system upgrades & interfaces, etc.)**
- **PBX, voicemail, Nicelog programming, etc.**
- **Coordination of multi-vendor applications (i.e. long distance troubleshooting, tenant trunking issues, etc.)**
- **Perform other tasks requested by the Director**

3.1.2.3 **Three (3) Certified PBX Technicians**

The PBX Technicians shall perform the following duties:

- **Install and configure all types of telephones (analog, digital, IP), ACD groups, Group Call, hotline extensions, etc.**
- **Trunk administration**
- **Maintain multi-site numbering plan**
- **Program authorization codes**
- **Install additional PBX components**
- **Perform Preventative Maintenance on PBX and battery components**
- **Software upgrades**
- **Perform other tasks requested by the Director**

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3.1.2.4 Two (2) Helper Technicians

The Helper Technicians shall perform the following duties:

- Placing telephone sets
- Simple telephone programming
- Testing and troubleshooting
- Perform other tasks requested by the Director

3.1.2.5 Two (2) Cable Technicians (sub-contracted to Systimax VAR)

The Cable Technicians shall perform the following duties:

- Install horizontal cables (routinely)
- Audit cable records
- Perform cross connects / configure fiber optic circuits
- Install backbone fiber/copper; conduit; cable trays
- Perform other tasks requested by the Director

3.1.3 Beginning on the start date specified in the Notice to Proceed, System maintenance is to be performed by the full-time on-site personnel during Normal Business Hours at the monthly rates specified in the Fee Schedule (Exhibit "B"). The monthly rates shall include the on-site labor and supervision for any work performed during Normal Business Hours as well as Remedial Maintenance performed after Normal Business Hours and all supplies, parts, instruments, and equipment required to complete all Preventive and Remedial Maintenance as itemized herein. Hardware required to perform SRS-related software upgrades is covered by SRS, and will be provided at no additional charge. HAS will purchase all other hardware upgrades by the OSR process, as described in 4.0.

3.1.4 When requested by HAS, under an approved OSR, as specified herein, supplies, parts, instruments, or equipment required to complete MAC's will be supplied by the Contractor at prices specified in the Fee Schedule (Exhibit "B").

3.2 PREVENTIVE MAINTENANCE (PM)

3.2.1 The Contractor shall perform PM on the Telecommunication System in accordance with standards, procedures, and frequencies recommended by the original equipment manufacturer ("OEM") as required for keeping the System in a First Class Condition. The Contractor's PM shall include all procedures designed to reduce product failure and extend useful product life. Contractor shall submit proposed PM procedures, itemized by task, schedule, and report format for approval by the Director prior to the start date.

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- 3.2.2 The Contractor's PM shall include all supplies, parts (including replacement of sub-component parts) labor, and incidentals required to prevent the occurrence of an internal or external System failure. PM shall include (but not be limited to) replacing worn, damaged, or destroyed parts; inspecting, testing, cleaning and adjusting System components as necessary to maintain a fully operational System.
- 3.2.3 The Contractor PM shall also include any software/database management required to keep memory or disk storage at optimum levels.
- 3.2.4 Contractor shall test the PBX batteries for the back-up power system in accordance with standards, procedures, and frequencies recommended by Nortel. Any batteries not meeting the required specifications shall be replaced by and at the expense of the Contractor. Contractor shall submit a PM schedule for battery testing.
- 3.2.5 PM responsibilities on the part of the Contractor shall begin immediately after the start date as specified in the Notice to Proceed.
- 3.2.6 Upon initiation of any PM procedures, the Contractor shall proceed continuously to completion as rapidly as possible.
- 3.2.7 Contractor shall submit completed PM reports to the Director within 5 working days of completing PM activity.
- 3.2.8 All components shall be routinely examined at least once each month and replaced if found defective.
- 3.2.9 All service-affecting preventative maintenance shall be conducted and scheduled with HAS personnel designated by the Director at least seven (7) calendar days in advance. The Contractor shall notify HAS personnel so designated by the Director in writing of planned Preventive Maintenance schedules.

3.3 REMEDIAL MAINTENANCE (RM)

- 3.3.1 RM applies whether or not there is actually an outage and whether or not any outage involved is caused by an internal failure. HAS requires continuous telecommunications capability for ongoing operations. Accordingly, whenever HAS places a trouble call to the Contractor, or when the Contractor receives an alarm directly from the system(s) or Contractor's Technical Assistance Center, the Contractor shall respond in an appropriate manner, dispatching Contractor's maintenance personnel to arrive at the premises with their tools and spare parts within the appropriate time period specified in 7.2, Response Times.

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- 3.3.2 If an outage is caused by internal failure, the Contractor shall perform RM to correct internal failures and return the System to full operating condition. (If temporary replacement of a component is made, permanent repairs or replacement shall be completed as soon as possible thereafter). Once the Contractor begins major on-site corrective maintenance, it shall continue uninterrupted as long as reasonable progress, as determined by the Director, is being made until the System is operational.
- 3.3.3 If an outage is not caused by an internal failure, or if there is no outage at all, RM shall be completed when the Director accepts completed work to repair the defect. This work may be a System diagnosis and report. The Director will promptly confirm HAS acceptance in writing.

3.4 MOVES/ADDS/CHANGES (MACs)

The Contractor shall be responsible for, but not necessarily limited to, the following MAC items:

- 3.4.1 Individual Telephone Changes
- 3.4.2 Installing new telephones and associated cabling and programming to make operational. Cable installation will be performed by Cabling Service sub-contractors.
- 3.4.3 Removing existing telephones
- 3.4.4 Modifying existing PBX Database utilizing trained personnel in the following areas, including (but not limited to):
- 3.4.4.1 Set-based feature changes including analog, digital, and IP phones.
 - 3.4.4.2 Attendant Console
 - 3.4.4.3 Automatic Call Distribution (ACD)
 - 3.4.4.4 Symposium Administration and Scripting
 - 3.4.4.5 Group Call configurations for Emergency Notification Systems
 - 3.4.4.6 Interpreting and changing System Configuration definitions for system hardware and software parameters
 - 3.4.4.7 System Speed Call feature for abbreviated dialing
 - 3.4.4.8 Configure or change Customer Data Block capabilities
 - 3.4.4.9 Tenant Service
 - 3.4.4.10 Paging Access
 - 3.4.4.11 Trunk Administration, including Analog and DTI/PRI transmission
 - 3.4.4.12 Foreign Exchange Trunks
 - 3.4.4.13 Fiber Intergroup Switching
 - 3.4.4.14 ISDN Calling Line ID enhancements

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- 3.4.4.15 Maintain Multi-Site Numbering Plan or modify/design new numbering plan
- 3.4.4.16 Trunk Access Restriction (TARG)
- 3.4.4.17 Trunk Group Access Restriction (TGAR)
- 3.4.4.18 Authorization Codes
- 3.4.4.19 Network Alternate Routing Selection (BARS/NARS)
- 3.4.4.20 Coordinated Dialing Plan
- 3.4.4.21 Call Detail
- 3.4.4.22 Music Broadcast
- 3.4.4.23 Recorded Announcement (RAN)
- 3.4.4.24 Call Pilot VoiceMail user administration
- 3.4.4.25 VoiceMail Remote Notification assignments and schedule
- 3.4.4.26 VoiceMail Network and Access administration

The Contractor shall be responsible for maintaining the existing System connectivity as well as for maintaining connectivity to ancillary transmission equipment, non-switching equipment, and data equipment, although such connectivity may not be directly related to the Telecommunication System. When no additional connectivity (i.e. cable) is available to establish new connectivity, the installation of new connectivity will be performed as Other Work/Services.

4.0 OTHER WORK/SERVICES

Within the general scope of the Agreement, Other Work/Services may be required for systems, equipment, and cable services to meet desired conditions and/or services not covered in the Basic Services of the Agreement. Other Work/Services shall be performed in accordance with all provisions of the Agreement plus any special provisions issued with authorization for work that are consistent with this Agreement. Other Work/Services shall be provided by Contractor on an "as needed" basis and then, only after receipt of a written Other Work/Services Request ("OSR"), signed by the Director, or his designee. Other/Work Services include, but are not limited to, the following:

- Optional Upgrades/Modifications
 - Defibrillator Communications Installation
 - Additional telephones and/or software phones as needed for replacements and expansion
 - New software upgrades not included in the Agreement
 - Cards to support new telephones and features
 - Peripheral Upgrades/Modifications
 - Cabling materials and services for voice, data, and video devices
 - Repair or replace components damaged by vandalism, force majeure, or other third parties as determined by the Director
- 4.1 With the exception of certain defined and priced Other Work/Services priced in the Fee Schedule (Exhibit "B"), prior to issuing an OSR, the Director will first issue a written notice to Contractor detailing the specific Other Work/Services to

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be performed by the Contractor.

- 4.2 In response to any such written notice, Contractor shall provide the Director with a written proposal within five (5) business days of receipt of the notice. Such proposal shall include, but not be limited to, a description of the services to be performed, applicable labor rates set forth in the Fee Schedule (Exhibit "B"), estimated labor hours, performance schedule, total estimated cost, and any other requirements set forth in the Director's written notice to Contractor.
- 4.3 Upon receipt of the proposal, the Director shall have the options to reject the proposal and require resubmission with revised or additional information, or issue an OSR. Contractor will resubmit a modified proposal within two (2) business days of receipt of the Director's written rejection.
- 4.4 Upon approval by the Director of the modified proposal, an OSR will be issued. Contractor shall commence performance on the date set forth in the OSR issued under this Section and shall complete the work in accordance with the terms and conditions of this Agreement and the approved proposal.
- 4.5 For Emergency Service Requests issued after Normal Business Hours, Contractor may perform Other Work/Services upon the verbal approval of the Director. However, as soon as it is reasonably practical thereafter, HAS shall issue within one business day a written OSR relating to the verbal Emergency Service Request.
- 4.6 Other Service Request (OSR) Forms - With the exception of Emergency Service Requests issued after Normal Business Hours, or Urgent Service Requests, where a request may be verbal and followed immediately in writing, all requests for Other Work/Services will be in writing in a form provided by the Director and signed by the Director or his designated representative.
- 4.7 Other Work/Service Labor Compensation Limits - The Contractor may be compensated for labor under the Other Work/Services' rate schedule for MAC's, only when the on-site technician's workload is such that the work cannot be completed during Normal Business Hours and an additional technician(s) is required or when the work is performed after Normal Business Hours. Additional compensation for labor must be approved in writing in advance of work being performed with the only exception being emergency services as described above.
- 4.8 Compensation For Other Work/Services - Compensation for Other Work/Services may include the following:
 - 4.8.1 Labor - Additional labor needed (help for the On-site Technician) for MAC activities that occur during or after Normal Business Hours. The Contractor's mark-up on cost of parts and sub-contracted labor shall be

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five percent (5%), exclusive of tax or freight.

- 4.8.2 Parts, Supplies, Equipment - When MAC orders requested by HAS require parts, supplies, or equipment; Contractor will be compensated for parts, supplies, or equipment as specified below only if the additional compensation is approved in writing in advance of parts being installed in accordance with the established Other/Work Services procedures.

5.0 INCREASE OR DECREASE OF WORK - INCLUSION/EXCLUSION

During the Contract Term, the existing telecommunications PBX equipment or systems may be upgraded and/or new equipment or systems may be added to meet the changing needs of the HAS. At HAS's option, such upgrades or additions may be supplied and installed by the telecommunications services Contractor or others. The Contractor shall be responsible for maintenance of any upgrades and/or new equipment or systems following completion of installation, acceptance, and the warranty period. Such system upgrades, new equipment or components installed as an integral part of existing systems without increasing overall system requirements more than 5% are to be maintained by Contractor without additional compensation. Cost adjustments for inclusion or exclusion of equipment that increases or decreases overall system requirements by more than 5% shall be at the rates stipulated in the Fee Schedule (Exhibit "B"), or if not stated therein, ordinary and reasonable rates as mutually agreed upon between the Director and Contractor. A per Port monthly fee will apply during the term of this Agreement for increase or decrease in the number of in-use ports by more than 5%.

5.1 Inclusion Notice

- 5.1.1 Inclusion Notices for additional HAS equipment will describe the additional unit(s) by manufacturer, model, serial number, HAS property tag numbers where applicable, and a brief description of the unit. Contractor shall be responsible for all parts and labor to maintain or replace the unit once the unit is added to the Agreement.

5.2 Exclusion Notice

- 5.2.1 Any equipment or service that is subject to the Agreement may be excluded from the Agreement by means of an Exclusion Notice. Price adjustment as a result of exclusion shall be mutually agreed upon by both parties in accordance with Section 5.0 above. The Exclusion Notice will describe the unit by manufacturer and serial number, and include a brief description of the unit to be excluded.

- 5.3 From time to time during a City of Houston construction project, Contractor may be required to move or add new equipment, etc. on Houston Airport System

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property. The Contractor may be required to enter into an agreement with a construction Contractor. The Contractor will be reimbursed for this work performed via an allowance in the construction contract as long as the City of Houston has appropriated and authorized the funds. At the time of system acceptance, the Houston Airport System will process an inclusion notice to incorporate new equipment into this agreement. Maintenance costs will commence upon expiration of the warranty period and in accordance with this agreement.

6.0 GENERAL REQUIREMENTS

- 6.1 The Contractor shall begin maintenance of the Telecommunication Systems and ancillary equipment on the start date specified in the Notice to Proceed and shall complete all requirements of such maintenance in accordance with the terms of this Agreement.
- 6.2 The Contractor's on-site personnel will be expected to retrieve and update the status of work assignments via City-provided computers and applications such as HEAT (for work order/trouble tickets), Microsoft Outlook (email system), and Network Engineer (cable management system).
- 6.3 The Contractor's on-site technicians may be expected to maintain/update cable management records in the cable management application (Network Engineer) on an individual work order/trouble ticket basis. Contractor's Cabling Services technicians shall be required to periodically perform physical cable inventories and assist with the reconciliation of the cable management database.
- 6.4 The Contractor's on-site technicians will be required to monitor/update/repair/poll the Call Detail Recording interfaces from the PBX to the Call Accounting application.
- 6.5 The following details are provided in Exhibit "D" - PBX System Details and Locations:
 - 6.5.1 Drawing 1 graphically depicts existing and proposed future PBX equipment and device locations.
 - 6.5.2 Table 1 provides a detailed description of the IAH- Administration Building PBX system, Serial No. Z02012, capacity, the existing Fiber IPE and Multi-IPE Remote system capacities, and proposed future system capacities.
 - 6.5.3 Table 2 provides a detailed description of the IAH- International Airlines Building PBX system, Serial No. J00110, capacity, associated Fiber Multi-IPE and Carrier IPE Remote systems and devices.

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6.5.4 Table 3 provides a detailed description of the HOU Nortel Meridian 1 Option 81C, Serial No. Z00922, and associated Fiber IPE Remote system and Carrier Remote system.

6.5.5 The following information from a LD22-SLT report reflects system conditions in February, 2006.

	IAH TOTAL	IAH LEFT	IAH USED	HOU TOTAL	HOU LEFT	HOU USED	ADMIN TOTAL	ADMIN LEFT	ADMIN USED
TNS	3500	941	2559	2000	1384	616	2000	1304	696
AGNT	500	449	51	20	8	12	60	40	20
ACDN	1000	904	96	1000	972	28	1000	986	14
AST	2000	2000	0	0	0	0	0	0	0
BRI DSL	50	50	0	50	50	0	50	50	0
LTID	96	96	0	96	96	0	96	96	0
DCH	64	62	2	64	63	1	64	62	2
AML	16	15	1	16	5		16	15	1
MUS CON							2	2	0
TRUNKS	355			86			108		0

7.0 PERFORMANCE/TECHNICAL REQUIREMENTS

7.1 Sub-Standard Performance Action

If Contractor fails to provide the services in accordance with the required service levels, the City shall not pay Contractor for such sub-standard service.

Where Contractor has failed to provide service levels in accordance with this Agreement, Contractor shall not charge HAS for service that does not meet contract specifications. Contractors shall:

7.1.1 Maintain a 24/7 Technical Assistance Center utilizing a computerized dispatch system for monitoring and managing system alarms. The system shall be capable of tracking all events related to service requirements and provide progressive management escalation based on the agreed service levels until resolved. Contractor shall utilize this system to perform root cause analysis to (1) identify the cause of all sub-standard performance events, (2) take corrective action, (3) provide HAS electronic text message or email with each alarm and a monthly report detailing the cause, and (4) specify steps taken to preclude such events in the future.

7.1.2 Respond to Emergency Service Requests. Contractor's failure to meet the Response Times in Section 7.2.1 is an indication of sub-standard performance and will cause damage to the City; however, such damages cannot be accurately measured or will be difficult to ascertain.

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Consequently, the Contractor shall provide out of service credits at the rate of \$200.00 per hour, or any portion of an hour, during which Contractor exceeds the Response Times set forth in Section 7.2.1. The assessment of out of service credits by the City for failure to meet the Response Times in section 7.2.1 shall never be construed as an exclusive remedy available to the City as to any other event of default by Contractor under this Agreement, and the City shall always have the right to avail itself of other remedies that may be available to it in law or equity as to any other event of default.

- 7.1.3 Ensure safe and uninterrupted Airport operations at all times. It is essential that the communications system be maintained in a manner that will ensure there are no Major Failures of the communication system, especially during Normal Business Hours. Major Failures during Normal Business Hours is an indication of sub-standard performance and will cause damage to the City; however, such damages cannot be accurately measured or will be difficult to ascertain. Consequently, Contractor shall provide out of service credits at the rate of ten (10) percent of the current monthly Basic Services Fee (labor and material) for the first hour when any of the Major Failure criteria occurs during Normal Business Hours and five (5) percent per hour thereafter. The out of service credits for Major Failures After Normal Business Hours shall be 1/2 of the rates for Major Failures during Normal Business Hours. The assessment of out of service credits by the City for Major Failures shall never be construed as an exclusive remedy available to the City as to any other event of default by Contractor under this Agreement, and the City shall always have the right to avail itself of other remedies that may be available to it in law or equity as to any other event of default.
- 7.1.4 Repeated failures of the same component is an indication of sub-standard performance which may result in Major and Minor Failures causing damage to the City; however, such damages cannot be accurately measured or will be difficult to ascertain. Consequently, Contractor shall provide out of service credits of \$200.00 in the event three (3) Minor Failures occur within a ninety (90) day period due to the failure of the same component. The assessment of out of service credits by the City for repeated failures of the same component shall never be construed as an exclusive remedy available to the City as to any other event of default by Contractor under this Agreement, and the City shall always have the right to avail itself of other remedies that may be available to it in law or equity as to any other event of default.

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7.2 Response Times

7.2.1 In addition to its other responsibilities set forth herein, Contractor shall respond to all Emergency or Urgent Service Requests within the following Response Times. The determination of the request classification shall be in the sole judgment of the Director.

<u>Service Classification</u>	<u>Response Time (not to exceed)</u>
7.2.1.1 Major Failure during Normal Business Hours	Fifteen(15) Minutes
7.2.1.2 Major Failure after Normal Business Hours	Two (2) Hours
7.2.1.3 Minor Failure or Non-critical Failure During Normal Business Hours	Four (4) Hours
7.2.1.4 Minor Failure or Non-critical Failure after Normal Business Hours	Six (6) Hours

7.3 Cabling Services Requirements

Any cabling services that may be required as a part of Basic Services or Other/Work Services shall comply with the following:

7.3.1 Contractor shall adhere to the HAS Technology Standards as specified in Exhibit C – Houston Airport System Standards. The standards are subject to change by HAS periodically to maintain current technology standards. Contractor is required to comply with changes to the HAS Technology standards within 30 days of notice of revisions. "Notice of revisions" shall be accomplished by way of posting revised electronic documents to designated areas within the HAS data network or on HAS web site, and will be posted with revision dates. Contractor shall have access to these areas, and must proactively verify Contractor is using the most current standard each time new cabling, conduit, or equipment is installed.

7.3.2 The Contractor shall provide the certified Systimax warranty certificates for all new inside plant cabling installations.

7.3.3 Pull strings shall be left in all conduits for future cable/wire runs.

7.3.4 Voice cable distribution shall terminate on 110 blocks. However, upon receipt of written notice from the Director, the voice cable terminations

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may change in the future to patch panels. Data [station] cables shall terminate in patch panels.

- 7.3.5 Each newly constructed or rewired workplace shall be cabled and terminated with a minimum of eight pairs using two, four pair cables in separate sheaths with appropriate terminations as specified in the Cable Infrastructure Standards, Exhibit "C" - Houston Airport System Standards.
- 7.3.6 New communications cabling may not lay loose above ceiling tiles. At a minimum, cables shall be supported by cable tray, or conduit, as approved by the Director.
- 7.3.7 The acceptance of any material, workmanship or equipment by HAS personnel shall not preclude the subsequent rejection of such items by the Director, should such items be found defective, as determined by the Director in his sole discretion.
- 7.3.8 All outside plant cable shall be buried to a depth of at least 48 inches, in conduit encased by concrete, and which does not interfere with other utilities or surface operations of HAS. Refer to HAS Underground Ductbank Standards, Exhibit "C" - Houston Airport System Standards.

Any other method of cable installation must be approved in advance and in writing by the Director.

- 7.3.9 Bend radius shall not exceed the manufacturer's specifications. No more than two-90 degree bends shall be placed in any cable pull between pull box locations.

7.4 Cable Records and Documentation

- 7.4.1 The Contractor shall establish a final written and electronic set of cable records, for Basic Service and OSR projects, as required by the Director and shall provide it within 15 days of HAS acceptance (i.e. substantial completion) of each cable installation. These cable records shall include, but are not necessarily limited to, cable schedules, test results, and AutoCAD drawings showing all cable paths and labels. Cable records shall be submitted in a format specified by HAS. Upon review/approval of the data, Contractor personnel may be required to populate the cable record data into HAS's existing cable management system, Network Engineer.
- 7.4.2 The Contractor shall record GPS data in accordance with HAS GIS standards for outside plant cabling and associated structures (i.e. handholes, splices, etc.).

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7.4.3 At the time of installation cabling shall be labeled at each end, at all access points, and every fifty feet.

7.5 Cable Testing and Acceptance

7.5.1 Contractor shall perform pre-construction tests on the outside cable plant with a representative of HAS present. Testing shall include, but not be limited to, tests for shorts, grounds, sheath continuity, and conformance to HAS Cable Infrastructure Standards (Exhibit "C" - Houston Airport System Standards), and acceptance to meet manufacturer's standards.

7.6 Software Issues

7.6.1 Upgrades

7.6.1.1 Software upgrades to the System shall be implemented at the City's direction. Contractor shall propose schedule to upgrade the SRS-supported applications at least annually.

7.6.1.2 Contractor shall keep the System current with any internal and national (area code) dialing plan changes as they occur.

7.7 HAS's Technology Standards

7.7.1 The Contractor agrees to meet or exceed HAS's standards, now or hereinafter in effect as same may be amended at any time, which are referenced in Exhibit "C" Houston Airport System Standards.

7.7.2 In the event that any conflict arises between the provisions of the Scope of Work and HAS Technology Standards, the provisions of the Technology Standards shall govern. Contractor shall adhere to revised standards within 30 days of posted revisions as stated in 7.3.1.

8.0 CONTRACTOR STAFF QUALIFICATIONS

8.1 All of Contractor's PBX technicians shall be properly trained in the maintenance routines required to diagnose, service, and repair the Telecommunication System. This shall include, but not be limited to, the following:

8.1.1 Current PBX hardware and software releases.

8.1.2 Current Voice Mail hardware and software releases.

8.1.3 Data networking as it pertains to implementing and supporting VoIP products.

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- 8.1.4 Any future PBX and/or Voice Mail hardware/software application acquired during the term of this Agreement.
- 8.1.5 Any existing or future ancillary equipment such as digital announcers, crash alarm systems, maintenance administration tools, music-on-hold interfaces, PA system interfaces, etc.
- 8.1.6 Cabling Services sub-contractors must be current Systemax Value Added Resellers (VARs); and must be capable of providing numbered warranty/registration certificates for cabling installations. All of the Contractor's Cabling technicians shall be properly trained as specified in Houston Airport System Technology Standards. HAS reserves the right to request that the Contractor change the cabling services sub-contractors at any time.
- 8.1.7 All Cabling Services performed under the term of this agreement shall be inspected and approved by the Director. The Director will not approve payment for any cabling services where quality, scope or workmanship issues are not resolved promptly.

9.0 PERSONNEL OF CONTRACTOR

9.1 Personnel Requirements

- 9.1.1 The Contractor shall provide sufficient personnel to meet the performance requirements of this Agreement. The following full-time on-site staff will be required to perform the Basic Services specified
 - 9.1.1.1 On-Site Coordinator/Administrative Coordinator) - HAS - All Locations
 - 9.1.1.2 Two -CSR/Data Entry - HAS - All Locations
 - 9.1.1.3 Certified PBX Technician - IAH – Terminal D 81C PBX, Terminal 'A' Fiber Remote 1, 3838 Sam Houston Parkway Carrier Remote
 - 9.1.1.4 Certified PBX Technician - IAH - Admin 81C PBX, Terminal 'A' Fiber Remote 2, ASC, CRCF
 - 9.1.1.5 Helper PBX Technician - IAH - All Locations
 - 9.1.1.6 Certified PBX Technician - HOU/EFD - HOU 81C PBX, HOU Electrical Fiber Remote, EFD Carrier Remote
 - 9.1.1.7 Helper PBX Technician - HOU/EFD



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- 9.1.1.8 Two (2) Cabling Technicians – IAH/HOU/EFD
- 9.1.2 The Contractor shall designate in writing to the Director an On-site Coordinator for this Agreement. Such On-site Coordinator must be approved in writing by the Director before commencing performance herein. The Contractor's On-site Coordinator shall be available at all times during the performance of Contractor's obligations under this Agreement.
- 9.1.2.1 The Contractor's On-site Coordinator shall have full authority to represent the Contractor in making decisions and in the execution of the services to be performed under the Agreement.
- 9.1.2.2 The On-site Coordinator shall not be removed from performing under this Agreement by Contractor without the prior written consent of the Director. The Director shall have the right to approve or disapprove any successor On-site Coordinator prior to performance under this Agreement.
- 9.1.3 The Contractor's designated on-site technicians shall be fully qualified to maintain the Telecommunication Systems and shall hold Certified Technician Certificates issued by Nortel, Inc., and any other manufacturer whose equipment, software, materials or parts comprise a part of the Telecommunication System. Certificates must reflect training specifically for the hardware and software components described in this Agreement.
- 9.1.4 Any sub-contractor personnel required to perform cabling services shall be certified and trained by Systimax to install the Systimax products specified in Exhibit "C", Houston Airport System Technology Standards (Voice and Data Cabling Infrastructure #16740).
- 9.1.5 Copies of all applicable certifications shall be provided to the Director prior to commencement of work by a technician. Resumes of the Contractor's On-site Coordinator and technicians performing work under this Agreement shall be submitted to the Director prior to beginning work and from time to time under this Agreement. Such resumes shall include a listing of all vendor certifications held, technical school courses and seminars, and other technical experience of each technician.
- 9.1.6 Further, the Contractor on or before the start date specified in the Notice To Proceed, shall assign in writing the certified technicians and helper technicians, dedicated solely to this Agreement. Such technicians shall have no other employment obligations to Contractor or other third parties, and must be approved in writing by the Director before commencing performance herein. The designated certified technicians shall be on-site at the assigned Airport locations during Normal Business Hours and shall not be removed by Contractor from performing under this Agreement

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without the prior written consent of the Director.

- 9.1.6.1 The Director shall have the right to approve or disapprove any successor on-site certified technician(s) prior to their performance under this Agreement.
- 9.1.6.2 Upon written request of the Director, Contractor shall provide additional technicians on an "as-needed" basis per the pricing in Exhibit "B" - Fee Schedule.
- 9.1.6.3 Although the dedicated on-site PBX and helper technicians will be assigned primary Airport locations, HAS reserves the right to utilize any/all-dedicated technicians at any/all HAS locations.
- 9.1.6.4 Contractor shall furnish adequate certification papers and documentation of on-site personnel qualifications and must obtain the written approval of the Director prior to on-site assignment under this Agreement.
- 9.1.6.5 Resumes shall be updated by Contractor annually on the agreement anniversary date throughout the Term of the Agreement.
- 9.1.7 The Contractor may change personnel only with equally qualified personnel and then only after obtaining the Director's written approval.
- 9.1.8 The Contractor shall replace any personnel assigned to provide services under this Agreement whose work product or conduct is not satisfactory to the Director, in his sole discretion.
- 9.1.9 All personnel assigned to this Agreement by Contractor will be required to dress in a professional manner. The Contractor's personnel will present a clean and neat appearance at all times.
- 9.1.10 The Contractor technicians will be expected to work in accordance with the City holiday schedule rather than Contractor's holiday schedule at no additional cost. Substitute technicians must be approved in advance and assigned to accommodate normal onsite technician absences due to training, vacation, Contractor holiday, etc.
- 9.1.11 The Contractor shall make arrangements for primary on-site PBX technicians and Cabling Services technicians to be on-call 24 hours per day, 7 days per week, 365 days per year, (including all City holidays) to respond to urgent/emergency telecommunications outages and OSRs. When primary on-site PBX technicians or Cabling Services technicians are not available, Contractor must provide an equally qualified certified

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technician, and must inform HAS in advance.

9.1.12 The Contractor shall make arrangements for a sub-set of "standby", equally qualified substitute technicians who may be called upon to fulfill the duties of assigned on-site technicians during vacations, training, or absences due to illness. Substitute technicians must hold valid HAS badges for the respective airports, and must be included in the airport familiarization process. Contractor may not substitute technicians who are unfamiliar with the airport facilities, tenants, and personnel.

9.1.13 The Contractor shall provide HAS with an Organization Chart complete with names and resumes for each position on the Chart.

10.0 SUB-CONTRACTORS

10.1 The Contractor may use only sub-contractors approved in writing and in advance by the Director in connection with the performance of work under this Agreement. Resumes of sub-contractor's technicians performing work under this Agreement shall be submitted to the Director prior to beginning work and from time to time under this Agreement. Contractor shall be fully liable to the City for any damages caused by the intentional or negligent acts or omissions of its sub-contractor and shall be responsible for making all payments to sub-contractors for materials and/or services.

11.0 TRAINING

11.1 The Contractor technicians shall receive training prior to implementing any upgrades to the PBX, Voice Mail, or ancillary systems. The cost of such training shall be included in the ongoing maintenance costs of the City's Equipment set forth in Exhibit "B"- Fee Schedule. Additional training, as required by the Director, shall be provided by Contractor at no additional cost to the City.

11.2 The Contractor shall provide designated HAS personnel with training manuals for any/all new equipment/software and shall train such personnel on PBX console terminology, operation and features.

11.3 The Contractor shall train designated HAS personnel, as necessary and as required by the Director to function as customer coordinators or trainers to accommodate future projects.

12.0 EQUIPMENT, PARTS, MATERIALS AND INSTRUMENTS.

12.1 The Contractor shall furnish a Manufacturer's price list for all Nortel Meridian 1 PBX and Succession components, Meridian digital telephone sets, IP telephones and hardware/software components, and all universal analog and ancillary equipment in the Contractor's inventory generally used in conjunction

EXHIBIT "A"
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with Nortel Meridian 1 and Succession platforms. All price changes are subject to Directors approval.

- 12.2 The Contractor shall furnish equipment required to perform all specified services in accordance with the applicable Houston Airport System Standards provided in Exhibit "C."
- 12.3 The Contractor shall provide current revised equipment lists to incorporate product number changes as well as new products. Price list(s) shall be submitted on electronic media in ASCII, comma-delimited format.
- 12.4 All equipment, parts, and/or components replaced or newly installed in the Telecommunication System by the Contractor shall be factory new and free of defects in title, materials and workmanship at the time of their delivery and installation. Each component of the Telecommunication System shall conform to the specifications published by the manufacturer of the component. HAS reserves the right to request or permit the substitution of rebuilt or reconditioned parts, but such substitutions will not be used without the prior express written consent of the Director.
- 12.5 In addition to any other warranty provisions, at any time during the Term of this Agreement or any extensions thereto, if a specific part or component requires in excess of three (3) maintenance calls within one (1) month, Contractor shall replace the defective part or component at Contractor's expense.

13.0 EQUIPMENT, PARTS, SUPPLIES AND INSTRUMENTS PRICING

- 13.1 All equipment, parts, supplies, and instruments required to complete all Preventive and Remedial Maintenance for Basic Services for any newly installed Contractor supplied item, are to be provided at no additional cost to the City.
 - 13.1.1 Preventive and Remedial Maintenance are included in the Basic Services PBX Maintenance Per-Port Agreement portion of this Agreement. No additional amounts will be paid to the Contractor for any parts, supplies, or equipment used for Preventive or Remedial Maintenance of the System.
 - 13.1.2 Prices equipment, parts, and supplies, which may be required for authorized Other/Work Services Requests, for which prices are not otherwise established herein, shall be based on the percentage of discount or mark-up stipulated in Exhibit "B" - Fee Schedule, as applied to the current price list(s) of the manufacturers listed below. To the extent that Contractor documents that its discounts are increased or decreased, then Verizon may adjust the discounts in Exhibit "B" and in Sections 13.1.3 – 13.1.4 by a corresponding amount. Throughout the term of the contract the Contractor shall base pricing upon the manufacturer's current price list at the time of the proposed purchase. Contractor must supply current

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manufacturer price list(s) – or links to the manufacturer's published lists – upon request by HAS for the purpose of verifying Contractor's charges.

13.1.3 Nortel, Inc.

- 13.1.3.1 55% discount off of MSRP for PBX equipment, including core equipment, IPE modules, station and trunk cards, and similar hardware.
- 13.1.3.2 38% discount off of MSRP for software, telephones, PBX cables, DC power equipment, applications such as Call Pilot or Symposium, etc.
- 13.1.3.3 13.5% discount off of MSRP for User's Guides, literature and like items.

13.1.4 Cisco Systems, Inc.

- 13.1.4.1 36% discount off of Cisco published list price

13.1.5 Systimax

- 13.1.5.1 Systimax product discounts shall be according to the sub-contractor specific discounts. Devolve Corp has committed to a 10% markup over cost.

13.1.6 Ceeco

- 13.1.6.1 Ceeco products shall be priced at 5% markup over cost.

13.1.7 Cabling Services – Flat Rate for horizontal cabling

- 13.1.7.1 Contractor agrees to provide one (1) 2071 Cat 6 Systimax cable with faceplate, jack and label. The flat rate price listed below is based on an average 225 foot cable. Pricing includes Cat 6 cable, faceplate, jack, label, and labor.
- 13.1.7.2 The prices in 13.1.7.3 and 13.1.7.4 are good for the first 12 months of the contract, and shall be re-negotiated each 12 months for contract Years 2, 3, and if exercised, Years 4 and 5. The labor component of the annually re-negotiated price may not exceed 3.9% increase per year, and the material component may not exceed cost plus 10%. Contractor must submit documentation from Systimax that reasonably substantiates both Contractor cost and overall market pricing conditions. In the event that HAS initiates a change to its technology standards, and the cabling material prices are affected by the new standard, HAS agrees to re-negotiate the flat-rate price to adjust the material portion of

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- the flat-rate according to the terms above.
- 13.1.7.3 The flat rate price for Year 1 during Business Hours shall be \$294.83 (total, with no additional markup by the Contractor).
 - 13.1.7.4 The flat rate price for Year 1 outside of Business Hours shall be \$346.97 (total, with no additional markup by the Contractor).

14.0 TEST EQUIPMENT

14.1 The Contractor and cabling services sub-contractor shall furnish and maintain adequate quantities and types of on-site test equipment as required for diagnostics and repairs at all HAS facilities. The Contractor shall be responsible for calibrating, repairing, and maintaining test equipment in a First Class Condition throughout the Term of this Agreement and any extensions thereto. At Agreement expiration or termination, Contractor shall remove all Contractor - provided test equipment from Airport premises. By way of example and not by way of limitation, the required test equipment includes, but is not limited to, the following:

14.1.1 Fiber/Copper Test Equipment

- 14.1.1.1 Fiber optic OTDR
- 14.1.1.2 Fiber optic connector inspection scope
- 14.1.1.3 Fiber optic cable tracer
- 14.1.1.4 Fiber optic talk set
- 14.1.1.5 Fiber optic power and light source
- 14.1.1.6 Cable fault locator
- 14.1.1.7 Power multimeter
- 14.1.1.8 Wire finder
- 14.1.1.9 Thermometer- digital Voice/data transmission tester
- 14.1.1.10 Transmission loop tester
- 14.1.1.11 Special service signal tester
- 14.1.1.12 Loop current alternator
- 14.1.1.13 Telephone line analyzer
- 14.1.1.14 Tone test set
- 14.1.1.15 Line aid inductive amplifier
- 14.1.1.16 Load coil detector
- 14.1.1.17 Tone tracker
- 14.1.1.18 Craft test set
- 14.1.1.19 Protector ground test kit
- 14.1.1.20 Voice network analyzer
- 14.1.1.21 Ground impedance tester
- 14.1.1.22 Ground check tester
- 14.1.1.23 Open fault meter
- 14.1.1.24 Fiber optic multiplexed test equipment

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14.1.2 Data Test Equipment

- 14.1.2.1 Status indicators
- 14.1.2.2 Wire analyzer
- 14.1.2.3 Cable scanner
- 14.1.2.4 Pair scanner
- 14.1.2.5 Data check
- 14.1.2.6 Data tracker
- 14.1.2.7 Data communications test set
- 14.1.2.8 Data analyzer
- 14.1.2.9 Link tester
- 14.1.2.10 Ethernet line tester
- 14.1.2.11 Bit error rate tester
- 14.1.2.12 Data communications analyzer
- 14.1.2.13 Video conferencing test equipment
- 14.1.2.14 Ladders, flashlights, screwdrivers, and other equipment necessary to gain access to areas where cabling may be installed, tested, or damaged

- 14.1.3 The Contractor shall provide proof of the above equipment to be stored at both IAH and HOU facilities, to be used exclusively for the HAS agreement, and all other test equipment not listed above should it be required to properly maintain the Telecommunication System. All Contractor technicians shall be properly trained and certified on all diagnostic and test equipment.

15.0 COORDINATE PERFORMANCE

15.1 HAS Contacts

The Contractor shall coordinate all of its performance with such person(s) as the Director designates in writing to the Contractor. The Contractor shall keep said person(s) currently advised of developments relating to the performance of this Agreement, and the Contractor shall at all appropriate times advise and consult with the Director's designee(s). Representative(s) of HAS may remain with Contractor's personnel during performance of any work or services required under this Agreement.

15.2 Pre-performance Conference

Prior to commencing performance under this Agreement, Contractor shall attend a pre-performance conference with the Director and other representatives of HAS. The Director shall specify the time and place of such meeting in a written notice to Contractor. Representatives of Contractor attending the pre-performance conference shall include, but not be limited to, the on-site certified technician(s) (as hereinafter described) whom Contractor has assigned to this

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Agreement, together with the On-site Coordinator (as hereinafter described) who is authorized to bind Contractor in matters relating to the following pre-performance conference items. In the above mentioned notice, the Director shall have the right, in his sole discretion, to further designate other representatives of Contractor who must attend the pre-performance conference and such designated representatives shall attend same. Items to be addressed at the pre-performance conference include, but are not limited to, the following:

- 15.2.1 Phase-In schedule from incumbent Contractor to new Contractor.
- 15.2.2 Work scheduling.
- 15.2.3 Agreement administration.
- 15.2.4 Facilities utilization.
- 15.2.5 Channels of communication.
- 15.2.6 Maintenance requirements.
- 15.2.7 Logistical management of Contractor furnished supplies and equipment.
- 15.2.8 Implementation of additional procedures to ensure Agreement is performed in accordance with its terms.

15.3 Coordination Meetings

Throughout the Term of this Agreement and any extensions hereto, Contractor shall meet with the Director, as determined necessary by him, to identify and resolve performance issues. Notice of any such performance meeting may be given by the Director to Contractor either orally or in writing and shall designate the time, date, location, Contractor attendees, and general purpose. Contractor's designated attendees shall be present at any such performance meeting for its duration and shall prepare minutes. The meeting minutes shall be transcribed by Contractor in typewritten form and shall be submitted to the Director for his approval within five (5) days of any such meeting. The Director shall have the right to dispute the accuracy of the minutes and shall so note the discrepancies in the minutes prior to his approval. Once approved, the original will be retained by HAS and a copy thereof shall be submitted to Contractor.

16.0 PHASE-IN/PHASE OUT SERVICES

16.1 CONTRACTOR 'S PHASE-IN –

- 16.1.1 Contractor (at no extra charge to the City) shall have up to a thirty (30) day phase-in period to accomplish a smooth and successful transition of

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operations and services. Contractor's Phase-in period shall begin upon receipt of a start phase-in notice from the Director (such notice not to be construed as an official Notice to Proceed, but being anticipatory of phase-in only) and shall last approximately thirty (30) days preceding the receipt of Notice to Proceed.

- 16.1.2 The incumbent Contractor will be responsible for performing the duties and services listed in its contract during Contractor's Phase-in period, and will be available for a maximum of 30 days to answer questions and resolve issues or any misunderstandings.
- 16.1.3 During the Phase-in period, Contractor shall arrange to have necessary supervisory, technical, and other personnel on site to observe the operation and maintenance of the equipment.
- 16.1.4 The Contractor may use this Phase-in period to recruit and transfer personnel, train personnel, arrange for security badging, establish management procedures, set up records, ensure adequate parts, tools and equipment are in place for systems operation and maintenance, and otherwise prepare for the assumption of technical control without disruption of operations.
- 16.1.5 During the Phase-in Period, it shall be the responsibility of Contractor to develop and implement a full project schedule detailing the responsibilities of assigned personnel and submit it to HAS for approval. Contractor will have no responsibilities for operating or maintaining the systems or equipment during the Phase-in period.
- 16.1.6 The Phase-in period will end on the start date specified in the official Notice to Proceed, at which time Contractor shall assume full responsibility for the maintenance of the systems and equipment.

16.2 CONTRACTOR'S PHASE-OUT –

- 16.2.1 The Contractor recognizes that the services provided by the Contract are vital to the City's overall efforts to provide first-class communication systems which are essential for safety and uninterrupted Airport services and that continuity thereof must be maintained at a consistently high level without interruption; that upon expiration of the Contract a successor may continue these services; that its successor Contractor will need Phase-in training; and that Contractor must cooperate in order to effect an orderly and efficient transition.
- 16.2.2 Accordingly, Contractor will be required to provide Phase-out services for up to thirty (30) days prior to contract expiration to its successor Contractor at no extra charge to the City.

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- 16.2.3 Orientation may include system operations and maintenance procedures, record keeping, reports, and procurement procedures, etc.
- 16.2.4 The Contractor shall be totally responsible for providing the services called for by the Contract during its Phase-out period.
- 16.2.5 The Contractor agrees to cooperate with its successor Contractor in allowing as many personnel as practical to remain on the job in order to enhance the continuity and consistency of the services in the Contract.
- 16.2.6 The Contractor agrees to disclose necessary personnel records and allow its successor to conduct on-site interviews with its employees, provided Contractor obtains the consent of said employees to disclose their records and to conduct such interviews and provided such disclosure and interviews are conducted in accord with all applicable laws, statutes, rules, regulations, and ordinances which have been passed, enacted or promulgated by any governmental body having jurisdiction over such matters.

17.0 EQUIPMENT CONDITION AT EXPIRATION

The Contractor shall turn over all equipment and systems in First Class Condition. Any item not operating in accordance with its required function shall be repaired or replaced. Preventive maintenance work shall have been performed as required per the PM schedule.

- 17.1 Within six (6) Months of expiration of the Agreement Term, Contractor shall inspect and test all equipment and repair or replace any equipment or components in accordance with findings in the inspection and test.
- 17.2 Within sixty (60) days of expiration of the Agreement Term, Contractor shall perform a complete inspection of all controls and instrumentation. Any item outside First Class Condition shall be corrected.
- 17.3 Within thirty (30) days of expiration of the Agreement Term, Contractor shall adjust all systems equipment and complete spare parts inventory and report. Contractor shall provide HAS a complete final report on the condition of all systems and equipment, including inspection and test reports, and certified statements signed by an agent of Contractor testifying to the First Class Condition of all equipment and systems.
- 17.4 HAS shall have the right of inspection during or after any of this work, and shall notify Contractor, within seven (7) calendar days of receipt of Contractor's certified statement, of any noted discrepancies. Contractor shall then proceed to correct any discrepancies within or after the end of the Agreement Term as

EXHIBIT "A"
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required to complete the work. Contractor shall complete all work within thirty (30) days and notify the Director in writing upon completion of all work. Contractor shall assist HAS with any inspections required by the Director at no additional cost to HAS.

- 17.5 Should Contractor fail to perform or complete any required work prior to expiration of the Contract, HAS may have such work performed at Contractor's expense.
- 17.6 Contractor shall assure that all equipment is in First Class Condition at the expiration or termination of the Agreement.

18.0 SECURITY AND BADGING

- 18.1 Contractor shall comply with all applicable Federal rules governing security at the Airport, as may be amended from time to time.
- 18.2 All on-site personnel of Contractor, including subcontractors, are required to undergo a fingerprint-based criminal history records check.
- 18.3 The cost of badges, which is subject to change, is currently \$45.00 each at IAH/HOU and \$6.00 each at EFD. Costs for the fingerprint-based criminal history records check are reflected in the cost of the badges. Contractor must pay for the cost of badges, including replacements thereof. Contractor personnel losing badges will be charged for replacement badges at the then current rate.
- 18.4 Contractor acknowledges that fines or penalties associated with non-compliance with security regulations must be reimbursed to HAS.

19.0 TRANSPORTATION AND PARKING

The Contractor shall park its vehicles in areas designated by the Director at its own cost, if any. HAS will provide a limited number of vendor parking spaces at no charge. All transportation activities and related costs of Contractor, or its sub-contractors, necessary to perform under this Agreement shall be provided by Contractor. All of Contractor's and its sub-contractor's vehicles shall be clearly identified as required by the Director.

20.0 TRAVEL TIME

When required and authorized, the Contractor shall be compensated for services required beyond the flat rate monthly fees at the rates stipulated in Exhibit "B" – Fee Schedule for the actual time required to perform the required services after arrival at the job site. Contractor shall not be entitled to compensation for travel time to and from the job site.

EXHIBIT "A"
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21.0 RECORDS AND REPORTS

The Contractor shall submit all reports and records as may be required by the Director.

22.0 EQUIPMENT REGISTRATION COMMITMENT

The Contractor shall register any new equipment it provides and/or installs with the manufacturer before the date of acceptance and provide documentation to substantiate the manufacturer's support commitment for the installed equipment.

23.0 HOUSEKEEPING

The very sensitive equipment to be maintained by the Contractor is secured in rooms accessible to a very limited number of authorized personnel having an appreciation of the critical nature of the equipment. Therefore, all Contractor personnel granted access to the rooms shall perform all housekeeping tasks and provide all materials and equipment for cleaning of all such areas and the associated equipment.

If any room is found not to be clean and orderly, the last Contractor that entered the room shall be notified and given 24 hours to resolve and correct the matter. If the room is still not cleaned within such twenty-four hour period, a cleaning fee for each occurrence shall be assessed against the Contractor to enable HAS to have the cleaning accomplished by others.

EXHIBIT "B"
FEE SCHEDULE

EXHIBIT "B"
FEE SCHEDULE

ITEM	DESCRIPTION	PROPOSED AMOUNT
A	Basic Services – 5 Year Total	\$ 5,620,205.00
B	Other/Work Services Labor & Material/Supplies - 5 Year Total	\$ 3,556,511.00
PROPOSED 5 YEAR GRAND TOTAL		<hr/> \$ 9,176,716.00

THE ABOVE RATES ARE "SUMMARY "ROLL - UP" PRICING" FROM THE ATTACHED PAGES.

SUMMARY PRICING FORM

A. BASIC SERVICES

Item A-1	(Year One)	\$1,039,885.00
Item A-2	(Year Two)	\$1,080,353.00
Item A-3	(Year Three)	\$1,122,399.00
Item A-4	(Year Four – Option Year One)	\$1,166,087.00
Item A-5	(Year Five Option Year Two)	<u>\$1,211,480.00</u>
TOTAL BASIC SERVICES YEARS 1- 5 ENTER ON ITEM “A” FEE SCHEDULE		\$5,620,205.00

B. OTHER WORK/SERVICES (Labor & Materials)

Item B-1	(Year One)	\$ 700,182.20
Item B-2	(Year Two)	\$ 705,742.20
Item B-3	(Year Three)	\$ 711,302.20
Item B-4	(Year Four – Option Year One)	\$ 716,862.20
Item B-5	(Year Five (Option Year Two)	<u>\$ 722,422.20</u>
TOTAL OTHER/WORK SERVICES LABOR AND MATERIALS YEARS 1-5 ENTER ON ITEM “B” FEE SCHEDULE		\$3,556,511.00

BASIC SERVICES

Flat rate for all labor, supervision, materials, parts, supplies, instruments, tools, equipment, transportation, and software support required to perform all Preventative and Remedial Maintenance and labor for MAC's.

A-1	Year 1	Monthly Fee	Annual Fee
1.	Site Coordinator/Administrative Coordinator	\$ <u>0</u>	\$ <u>0</u>
2.	CSR/Data Entry (2) - HAS - All Locations	\$ <u>14,022.50</u>	\$ <u>168,270.00</u>
3.	Certified PBX Technician (3) – All Locations	\$ <u>26,412.50</u>	\$ <u>316,950.00</u>
4.	Helper PBX Technician (2)- All Locations	\$ <u>15,258.33</u>	\$ <u>183,100.00</u>
5.	Cabling Technician- (2) All Locations (Sub Contracted)	\$ <u>14,607.50</u>	\$ <u>175,290.00</u>
6.	Annual Audit	\$ <u>0</u>	\$ <u>3,000.00</u>
7.	PBX Maintenance Per Port Per Agreement	\$ <u>16,106.25</u>	\$ <u>193,275.00</u>

Basic Services (A-1) Year 1 Total **\$1,039,885.00**

A-2	Year 2	Monthly Fee	Annual Fee
1.	Site Coordinator/Administrative Coordinator	\$ <u>0</u>	\$ <u>0</u>
2.	CSR/Data Entry (2) - HAS - All Locations	\$ <u>14,569.25</u>	\$ <u>174,837.00</u>
3.	Certified PBX Technician (3) – All Locations	\$ <u>27,443.33</u>	\$ <u>329,320.00</u>
4.	Helper PBX Technician (2)- All Locations	\$ <u>15,853.83</u>	\$ <u>190,246.00</u>
5.	Cabling Technician- (2) All Locations (Sub Contracted)	\$ <u>15,177.58</u>	\$ <u>182,131.00</u>
6.	Annual Audit	\$ <u>0</u>	\$ <u>3,000.00</u>
7.	PBX Maintenance Per Port Per Agreement	\$ <u>16,734.83</u>	\$ <u>200,818.00</u>

Basic Services (A-2) Year 2 Total **\$1,080,353.00**

A-3	Year 3	Monthly Fee	Annual Fee
1.	Site Coordinator/Administrative Coordinator	\$ <u>0</u>	\$ <u>0</u>
2.	CSR/Data Entry (2) - HAS - All Locations	\$ <u>15,138.42</u>	\$ <u>181,661.00</u>
3.	Certified PBX Technician (3) – All Locations	\$ <u>28,514.42</u>	\$ <u>342,173.00</u>
4.	Helper PBX Technician (2)- All Locations	\$ <u>16,472.58</u>	\$ <u>197,671.00</u>
5.	Cabling Technician- (2) All Locations (Sub Contracted)	\$ <u>15,769.92</u>	\$ <u>189,239.00</u>
6.	Annual Audit	\$ <u>0</u>	\$ <u>3,000.00</u>
7.	PBX Maintenance Per Port Per Agreement	\$ <u>17,388.00</u>	\$ <u>208,656.00</u>

Basic Services (A-3) Year 3 Total **\$1,122,399.00**

A-4	Year 4 (Option Year-1)	Monthly Fee	Annual Fee
1.	Site Coordinator/Administrative Coordinator	\$ <u>0</u>	\$ <u>0</u>
2.	CSR/Data Entry (2) - HAS - All Locations	\$ <u>15,729.25</u>	\$ <u>188,751.00</u>
3.	Certified PBX Technician (3) – All Locations	\$ <u>29,627.25</u>	\$ <u>355,527.00</u>
4.	Helper PBX Technician (2)- All Locations	\$ <u>17,115.50</u>	\$ <u>205,386.00</u>
5.	Cabling Technician- (2) All Locations (Sub Contracted)	\$ <u>16,385.42</u>	\$ <u>196,625.00</u>
6.	Annual Audit	\$ <u>0</u>	\$ <u>3,000.00</u>
7.	PBX Maintenance Per Port Per Agreement	\$ <u>18,066.58</u>	\$ <u>216,799.00</u>

Basic Services (A-4) Option Year-1 Total \$1,166,087.00

A-5	Year 5 (Option Year-2)	Monthly Fee	Annual Fee
1.	Site Coordinator/Administrative Coordinator	\$ <u>0</u>	\$ <u>0</u>
2.	CSR/Data Entry (2) - HAS - All Locations	\$ <u>16,343.08</u>	\$ <u>196,117.00</u>
3.	Certified PBX Technician (3) – All Locations	\$ <u>30,783.50</u>	\$ <u>369,402.00</u>
4.	Helper PBX Technician (2)- All Locations	\$ <u>17,783.42</u>	\$ <u>213,401.00</u>
5.	Cabling Technician- (2) All Locations (Sub Contracted)	\$ <u>17,024.42</u>	\$ <u>204,299.00</u>
6.	Annual Audit	\$ <u>0</u>	\$ <u>3,000.00</u>
7.	PBX Maintenance Per Port Per Agreement	\$ <u>18,771.66</u>	\$ <u>225,260.00</u>

Basic Services (A-5) Option Year-2 Total \$1,211,480.00

YEAR ONE (B-1) – OTHER WORK / SERVICES

OTHER WORK/SERVICES

Other Work/Services may be required for the Telecommunications Services to meet desired conditions and/or repairs not covered in the Basic Services. Any amounts listed below are estimated amounts for Other Work/Services for each year of the Agreement. The actual dollar amount for Other Work/Services may be higher or lower than the estimates, and the Contractor shall only be paid for actual work performed, subject to HAS direction and approval. **If Other Work/Services are performed by the on-site crew in conjunction with their regular duties, Contractor shall not receive additional compensation for their labor.**

a. Estimated (HAS) Other Work/ Services Labor (Quantities are estimated for budget purposes only)

No.	Description	Est. Annual Labor Hours	X	Cost per Hour	=	Annual Cost
1.	<u>CSR/DATA ENTRY</u>					
	a. Normal Work Hours	1480	X	\$62.00 /hr.	=	\$ 91,760.00
	b. After Normal Work Hours	200	X	\$93.00 /hr.	=	\$ 18,600.00
2.	<u>CERTIFIED PBX TECHNICIAN</u>					
	a. Normal Work Hours	1800	X	\$65.00 /hr.	=	\$117,000.00
	b. After Normal Work Hours	400	X	\$97.50 /hr.	=	\$ 39,000.00
3.	<u>PBX TECHNICIAN HELPER</u>					
	a. Normal Work Hours	600	X	\$45.00 /hr.	=	\$ 27,000.00
	b. After Normal Work Hours	60	X	\$67.50 /hr.	=	\$ 4,050.00
4.	<u>CABLE TECHNICIAN</u> <u>(SUB CONTRACTED)</u>					
	a. Normal Work Hours	600	X	\$40.25 /hr.	=	\$ 24,150.00
	b. After Normal Work Hours	60	X	\$60.37 /hr.	=	\$ 3,622.20

Total Estimated Other Work / Services Labor Annual Costs YEAR ONE **\$325,182.20**
(item a total)

b. Estimated (HAS) Other Work/Services Materials/Parts/Supplies/Equipment
(Quantities are estimated for budget purposes only)

Description	<u>Est. Annual Expenditure</u>	X	<u>% Markup</u>	=	<u>Total Annual Cost</u>
Estimated Maintenance Materials/Parts/Supplies/Equipment	\$ 355,000	X	5%	=	<u>\$ 375,000.00</u>
					Total Estimated Other Work/Services Equipment/Materials Annual Costs YEAR ONE (Item b total)

TOTAL ESTIMATED (HAS) OTHER WORK/SERVICES LABOR & MATERIAL YEAR ONE (B-1) *(add a & b)* **COST** **\$ 700,182.20**

YEAR TWO (B-2) – OTHER WORK / SERVICES

OTHER WORK/SERVICES

Other Work/Services may be required for the Telecommunications Services to meet desired conditions and/or repairs not covered in the Basic Services. Any amounts listed below are estimated amounts for Other Work/Services for each year of the Agreement. The actual dollar amount for Other Work/Services may be higher or lower than the estimates, and the Contractor shall only be paid for actual work performed, subject to HAS direction and approval. **If Other Work/Services are performed by the on-site crew in conjunction with their regular duties, Contractor shall not receive additional compensation for their labor.**

a. **Estimated (HAS) Other Work/ Services Labor** (Quantities are estimated for budget purposes only)

No.	Description	Est. Annual Labor Hours	X	Cost per Hour	=	Annual Cost
1.	<u>CSR/DATA ENTRY</u>					
	a. Normal Work Hours	1480	X	\$63.00 /hr.	=	\$ 93,240.00
	b. After Normal Work Hours	200	X	\$94.50 /hr.	=	\$ 18,900.00
2.	<u>CERTIFIED PBX TECHNICIAN</u>					
	a. Normal Work Hours	1800	X	\$66.00 /hr.	=	\$118,800.00
	b. After Normal Work Hours	400	X	\$99.00 /hr.	=	\$ 39,600.00
3.	<u>PBX TECHNICIAN HELPER</u>					
	a. Normal Work Hours	600	X	\$46.00 /hr.	=	\$ 27,600.00
	b. After Normal Work Hours	60	X	\$69.00 /hr.	=	\$ 4,140.00
4.	<u>CABLE TECHNICIAN</u> <u>(SUB CONTRACTED)</u>					
	a. Normal Work Hours	600	X	\$41.25 /hr.	=	\$24,750.00
	b. After Normal Work Hours	60	X	\$61.87 /hr.	=	\$ 3,712.20

Total Estimated Other Work / Services Labor Annual Costs YEAR TWO **\$330,742.20**
(item a total)

b. **Estimated (HAS) Other Work/Services Materials/Parts/Supplies/Equipment**
(Quantities are estimated for budget purposes only)

Description	<u>Est. Annual Expenditure</u>	X	<u>% Markup</u>	=	<u>Total Annual Cost</u>
Estimated Maintenance Materials/Parts/Supplies/Equipment	\$ 355,000	X	5%	=	<u>\$ 375,000.00</u>
					Total Estimated Other Work/Services Equipment/Materials Annual Costs YEAR TWO (Item b total)

TOTAL ESTIMATED (HAS) OTHER WORK/SERVICES LABOR & MATERIAL ANNUAL YEAR TWO (B-2) **(add a & b) COST \$ 705,742.20**

YEAR THREE (B-3) – OTHER WORK / SERVICES

OTHER WORK/SERVICES

Other Work/Services may be required for the Telecommunications Services to meet desired conditions and/or repairs not covered in the Basic Services. Any amounts listed below are estimated amounts for Other Work/Services for each year of the Agreement. The actual dollar amount for Other Work/Services may be higher or lower than the estimates, and the Contractor shall only be paid for actual work performed, subject to HAS direction and approval. **If Other Work/Services are performed by the on-site crew in conjunction with their regular duties, Contractor shall not receive additional compensation for their labor.**

a. Estimated (HAS) Other Work/ Services Labor (Quantities are estimated for budget purposes only)

No.	Description	Est. Annual Labor Hours	X	Cost per Hour	=	Annual Cost
1.	<u>CSR/DATA ENTRY</u>					
	a. Normal Work Hours	1480	X	\$64.00 /hr.	=	\$ 94,720.00
	b. After Normal Work Hours	200	X	\$96.00 /hr.	=	\$ 19,200.00
2.	<u>CERTIFIED PBX TECHNICIAN</u>					
	a. Normal Work Hours	1800	X	\$67.00 /hr.	=	\$120,600.00
	b. After Normal Work Hours	400	X	\$100.50 /hr.	=	\$ 40,200.00
3.	<u>PBX TECHNICIAN HELPER</u>					
	a. Normal Work Hours	600	X	\$47.00 /hr.	=	\$28,200.00
	b. After Normal Work Hours	60	X	\$70.50 /hr.	=	\$ 4,230.00
4.	<u>CABLE TECHNICIAN</u> <u>(SUB CONTRACTED)</u>					
	a. Normal Work Hours	600	X	\$42.25 /hr.	=	\$25,350.00
	b. After Normal Work Hours	60	X	\$63.37 /hr.	=	\$ 3,802.20
Total Estimated Other Work / Services Labor Annual Costs YEAR THREE (item a total)						<u>\$336,302.20</u>

b. Estimated (HAS) Other Work/Services Materials/Parts/Supplies/Equipment
(Quantities are estimated for budget purposes only)

Description	<u>Est. Annual Expenditure</u>	X	<u>% Markup</u>	=	<u>Total Annual Cost</u>
Estimated Maintenance Materials/Parts/Supplies/Equipment	\$ 355,000	X	5%	=	<u>\$ 375,000.00</u>
Total Estimated Other Work/Services Equipment/Materials Annual Costs YEAR THREE (Item b total)					

TOTAL ESTIMATED (HAS) OTHER WORK/SERVICES LABOR &

MATERIAL ANNUAL YEAR THREE (B-3)

(add a & b)

COST

\$711,302.20

YEAR FOUR (OPTION YEAR ONE) (B-4) – OTHER WORK / SERVICES

OTHER WORK/SERVICES

Other Work/Services may be required for the Telecommunications Services to meet desired conditions and/or repairs not covered in the Basic Services. Any amounts listed below are estimated amounts for Other Work/Services for each year of the Agreement. The actual dollar amount for Other Work/Services may be higher or lower than the estimates, and the Contractor shall only be paid for actual work performed, subject to HAS direction and approval. **If Other Work/Services are performed by the on-site crew in conjunction with their regular duties, Contractor shall not receive additional compensation for their labor.**

a. Estimated (HAS) Other Work/ Services Labor (Quantities are estimated for budget purposes only)

No.	Description	Est. Annual Labor Hours	X	Cost per Hour	=	Annual Cost
1.	<u>CSR/DATA ENTRY</u>					
	a. Normal Work Hours	1480	X	\$65.00 /hr.	=	\$ 96,200.00
	b. After Normal Work Hours	200	X	\$97.50 /hr.	=	\$ 19,500.00
2.	<u>CERTIFIED PBX TECHNICIAN</u>					
	a. Normal Work Hours	1800	X	\$68.00 /hr.	=	\$122,400.00
	b. After Normal Work Hours	400	X	\$102.00 /hr.	=	\$ 40,800.00
3.	<u>PBX TECHNICIAN HELPER</u>					
	a. Normal Work Hours	600	X	\$48.00 /hr.	=	\$ 28,800.00
	b. After Normal Work Hours	60	X	\$72.00 /hr.	=	\$ 4,320.00
4.	<u>CABLE TECHNICIAN</u> <u>(SUB CONTRACTED)</u>					
	a. Normal Work Hours	600	X	\$43.25 /hr.	=	\$ 25,950.00
	b. After Normal Work Hours	60	X	\$64.87 /hr.	=	\$ 3,892.20

Total Estimated Other Work / Services Labor Annual Costs YEAR FOUR (item a total) \$341,862.20

b. Estimated (HAS) Other Work/Services Materials/Parts/Supplies/Equipment (Quantities are estimated for budget purposes only)

Description	Est. Annual Expenditure	X	% Markup	=	Total Annual Cost
Estimated Maintenance Materials/Parts/Supplies/Equipment	\$ 355,000	X	5%	=	<u>\$ 375,000.00</u>

Total Estimated Other Work/Services Equipment/Materials Annual Costs YEAR FOUR (Item b total)

TOTAL ESTIMATED (HAS) OTHER WORK/SERVICES LABOR & MATERIAL ANNUAL YEAR FOUR (B-4) (add a & b) COST \$716,862.20
FIVE (OPTION YEAR TWO) (B-5) – OTHER WORK / SERVICES

OTHER WORK/SERVICES

Other Work/Services may be required for the Telecommunications Services to meet desired conditions and/or repairs not covered in the Basic Services. Any amounts listed below are estimated amounts for Other Work/Services for each year of the Agreement. The actual dollar amount for Other Work/Services may be higher or lower than the estimates, and the Contractor shall only be paid for actual work performed, subject to HAS direction and approval. **If Other Work/Services are performed by the on-site crew in conjunction with their regular duties, Contractor shall not receive additional compensation for their labor.**

a. Estimated (HAS) Other Work/ Services Labor (Quantities are estimated for budget purposes only)

No.	Description	Est. Annual Labor Hours	X	Cost per Hour	=	Annual Cost
1.	<u>CSR/DATA ENTRY</u>					
	a. Normal Work Hours	1480	X	\$66.00 /hr.	=	\$ 97,680.00
	b. After Normal Work Hours	200	X	\$99.00 /hr.	=	\$ 19,800.00
2.	<u>CERTIFIED PBX TECHNICIAN</u>					
	a. Normal Work Hours	1800	X	\$69.00 /hr.	=	\$124,200.00
	b. After Normal Work Hours	400	X	\$103.50 /hr.	=	\$ 41,400.00
3.	<u>PBX TECHNICIAN HELPER</u>					
	a. Normal Work Hours	600	X	\$49.00 /hr.	=	\$ 29,400.00
	b. After Normal Work Hours	60	X	\$73.50 /hr.	=	\$ 4,410.00
4.	<u>CABLE TECHNICIAN</u> <u>(SUB CONTRACTED)</u>					
	a. Normal Work Hours	600	X	\$44.25 /hr.	=	\$ 26,550.00
	b. After Normal Work Hours	60	X	\$66.37 /hr.	=	\$ 3,982.20

Total Estimated Other Work / Services Labor Annual Costs YEAR FIVE \$347,422.20
(item a total)

b. Estimated (HAS) Other Work/Services Materials/Parts/Supplies/Equipment
 (Quantities are estimated for budget purposes only)

Description	Est. Annual Expenditure	X	% Markup	=	Total Annual Cost
Estimated Maintenance Materials/Parts/Supplies/Equipment	\$ 355,000	X	5%	=	<u>\$ 375,000.00</u>

Total Estimated Other Work/Services Equipment/Materials Annual Costs YEAR FIVE (item b total)

TOTAL ESTIMATED (HAS) OTHER WORK/SERVICES LABOR & MATERIAL ANNUAL YEAR FIVE (B-5) (add a & b) COST \$722,422.20

EXHIBIT "C"

HOUSTON AIRPORT SYSTEM STANDARDS

EXHIBIT "C"

HOUSTON AIRPORT SYSTEM STANDARDS

SECTION 16111 CONDUIT FITTINGS AND BODIES

SECTION 16170 GROUNDING AND BONDING

SECTION 16190 SUPPORTING DEVICES

SECTION 16402 UNDERGROUND DUCT BANKS

SECTION 16720 ACCESS CONTROL SYSTEM

SECTION 16740 VOICE AND DATA CABLING

INFRASTRUCTURE

SPEC 17120 COMMUNICATIONS MEDIA

INFRASTRUCTURE

SPEC 17130 INTERIOR COMMUNICATION

PATHWAYS

SPEC 17140 EXTERIOR COMMUNICATION

PATHWAYS

SPEC 17165 TELECOMMUNICATIONS GROUNDING

& BONDING

SECTION 16111 CONDUIT FITTINGS AND BODIES

SECTION 16111
CONDUIT, FITTINGS AND BODIES

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Conduit, fittings and bodies.

1.02 REFERENCES

- A. Follow Section 01423 and following.
- B. American National Standards Institute (ANSI):
1. C80.1 Rigid Steel Conduit - Zinc Coated
 2. C80.4 Fittings for Rigid Metal Conduit
- C. Federal Specifications (FS):
1. W-C-58C Conduit Outlet Boxes, Bodies Aluminum and Malleable Iron
 2. W-C-1094 Conduit and Conduit Fittings Plastic, Rigid
 3. WW-C-566C Flexible Metal Conduit
 4. WW-C-581D Coatings on Steel Conduit
- D. National Electrical Manufacturers Association (NEMA):
1. RN1 Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Electrical metallic Tubing
 2. TC2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
 3. TC3 PVC Fittings for Use with Rigid PVC Conduit and Tubing
- E. Underwriters' Laboratories (UL):
1. 1 Flexible Metal Electrical Conduit
 2. 6 Rigid Metal Electrical Conduit
 3. 514 B Fittings for Conduit and Outlet Boxes
 4. 651 Schedule 40 and 80 Rigid PVC Conduit
 5. 651A Type EB and A Rigid PVC Conduit and HDPE Conduit
 6. 886 Electrical Outlet Boxes and Fittings for Use in Hazardous Locations
- F. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA):
1. 569 Commercial Building Standard for Telecommunications Pathways and Spaces
- G. Building Industry Consulting Services International (BICSI):
1. Telecommunications Distribution Methods Manual

1.03 MEASUREMENT AND PAYMENT

- A. Basis of Measurement: By the linear foot of conduit.
- B. Basis of Payment: Conduit, fittings, bodies, supports for un-encased work.

1.04 SUBMITTALS

- A. Follow Section 01340.
- B. Product Data: Manufacturer's cut sheets and catalog data.
- C. Installation, terminating and splicing procedures.
- D. Instructions for handling and storage.
- E. Dimensions and weight.
- F. Code compliance certifications.
- G. Record Documents: Follow Section 01700.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Follow Section 01450.
- B. Package conduits in bundles maximum 10 feet long, with conduit and coupling thread protectors for indoor/outdoor storage. Package fittings in manufacturer's standard quantities and packaging suitable for indoor storage. Protect coating on plastic-coated rigid conduit, fittings, and bodies from damage during shipment and storage.
- C. Store conduit above ground on horizontal racks. Prevent corrosion and entrance of debris.
- D. Protect plastic conduit from sunlight.

PART 2- PRODUCTS

2.01 MANUFACTURERS AND FABRICATION

- A. Rigid Steel Conduit: Allied Tube and Conduit, Wheatland Tube Company or Triangle Wire and Cable, Inc.
 - 1. Rigid Steel Conduit: Pass bending, ductility, and thickness of zinc coating in ANSI C80.1.
- B. PVC Coated Steel Conduit: Robroy Industries, Inc. (Rob-Roy Red) or Occidental Coating Company (O-Cal Blue).
- C. PVC Rigid Conduit: Carlon Industries, Inc., Robroy Industries, Inc. or Cantex.

CONDUIT, FITTINGS AND BODIES

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- D. Nonmetallic Conduit and Fittings: Pass NEMA TC2, UL 651 and 651A and FS W-C-1094A.
- E. Conduit Fittings and Bodies: Crouse-Hinds, Appleton Electric, Killark Electric Manufacturing Company or O-Z/Gedney.
- F. Liquidtight Flexible Conduit: Electriflex Company, Anamet, Inc. or Triangle Wire and Cable, Inc.
 - 1. Flexible Conduit: Pass tension, flexibility, impact, and zinc coating test in UL 1.
- G. Tags and Labels: Tyton, Panduit, or Brady.
 - 1. Metallic Tags: Identification plates.
 - 2. Nylon Tags: Nylon marker plates, attached with nylon cable ties.
 - 3. Marker Ties: Nylon marker ties with built-in cable ties.
 - 4. Labels: Polyolefin, adhesive wrap-around tape.
 - 5. Tags and labels shall be permanent (will not fade, peel, or deteriorate due to environment or time).

2.02 REQUIREMENTS

- A. Fabricate conduit, fittings, and bodies for service following Section 16010 and this Section to form a continuous support system for power, control, instrument, and communications cables or any combination thereof.
- B. PVC-Coated Rigid Steel Conduit and Fittings: Follow NEMA RN1 (Type A).
- C. Rigid Steel Galvanized Conduit and Fittings Before Coating: Follow FS WW-C-581d, ANSI C80.1, and UL 6.
- D. Conduit Bodies: Follow UL 514B and FS W-C-58C. Furnish sufficient coating for touch up after installation.
- E. Flexible and Liquidtight Flexible Metal Conduit and Fittings:
 - 1. Follow UL 1 and FS WW-C-566C. Furnish PVC-coated fittings used with liquidtight flexible metal conduit of type and design to thoroughly ground the conduit to the fittings, and through it to the box or enclosure to which it is attached.
 - 2. Follow UL 886, NEC article 501-4 (a&b), and FS W-C-586C for flexible couplings and fittings used in hazardous areas.
- F. PVC Conduit and Fittings: Follow NEMA TC2, W-C-A, and NBC article 347-17 for above ground and underground installation, using Schedule 40 conduit.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Follow Section 01450.

3.02 PREPARATION

- A. Verify conduit system is properly sized for cables (minimum 1 inch).
- B. Verify general conduit route following Drawings and Section 01726.
- C. Verify substrates to which work is connected and determine detail requirements for proper support.
- D. Verify proper location and type of rough-in for conduit terminations.

3.03 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data.
- B. Locations and Types:
 - 1. Install PVC coated conduits in outdoor above-ground locations, inside valve vaults and wet wells, and in corrosive and wet environments.
 - 2. Install PVC conduits in buried duct banks or encased in concrete. Use PVC coated rigid steel elbows for stubouts.
 - 3. Install exposed conduit parallel or perpendicular to lines of existing construction and grouped together where possible, without interfering with use of premises or working areas. Prevent safety hazards and interference with operating and maintenance procedures.
 - 4. Conduit may pass through areas with temperature differential of 20 degrees F or more. Seal with proper fitting at barrier between areas of differing temperature.
 - 5. Do not install conduit in interference with equipment placement or operation; piping; structural members; maintenance access; indicated future equipment.
 - 6. Follow drawings of other disciplines to determine availability of space for installation.
- C. Support:
 - 1. Support un-encased conduit with clamps, hangers, straps and metal framing channel attached to building structure.
 - 2. For conditions where existing supports are insufficient, install rigid support system, securely attached to building structural members only, plumb, level and in

CONDUIT, FITTINGS AND BODIES

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true alignment with related and adjoining work.

3. Support conduit 2 inches and larger at 10 feet on center maximum, and conduit 1-1/2 inch and smaller at 8 feet on center maximum.
4. Fasten 1 1/2 inch and smaller conduit to concrete, masonry or steel with either 1-hole malleable iron conduit straps, or "Korn" clamps, or U-bolts; for larger diameters, use 2-hole straps. Use "clamp backs" for strapping conduits to planar surfaces.
5. Provide PVC-coated or stainless steel supports for PVC-coated conduit.

D. Clearance:

1. Allow minimum 1/4 inch clearance from vertical surfaces to prevent dirt and moisture buildup behind conduit.

E. Design Considerations:

1. Fabricate bends free of indentations or elliptical sections.
2. The bend radius is 6 times the conduit I.D. for a 2 inch conduit or less.
3. The bend radius is 10 times the conduit I.D. for a conduit greater than 2 inches.
4. Below grade conduit should extend 4 inches above finished floor with a bushing.
5. Sleeves should extend 3 inches above finished floor with a bushing.
6. Ceiling conduit or sleeves should extend 4 inches below finished ceiling with a bushing.
7. Provide 12 AWG steel wire with greater than 200 lb. pulling tension in the entrance conduits.
8. There should be no continuous conduit sections longer than 100 feet.
9. There should be no more than two 90 degree bends between conduit pull boxes.
10. Communications: Junction boxes or pull boxes will be used instead of 90 degree turns. These boxes will be a minimum size of 4 inch X 4 inch.
11. Electrical: Do not install more than 3 equivalent 90 degree bends between outlets or pull boxes. Provide bonded expansion fittings at expansion joints.
12. Terminate conduit in sheet metal enclosures, furnished with threaded hubs. Make side penetrations in the lower 1/3 of the enclosure.
13. Make changes in direction of conduit with elbows or fittings. Do not use pull boxes unless specifically designated otherwise.

CONDUIT, FITTINGS AND BODIES

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F. Installation:

1. Tag conduit at termination points such as light fixtures, control panels, receptacles, and junction boxes, or as otherwise specified in other Sections.
2. Install conduit mechanically secure, mechanically protected from physical harm, electrically continuous, and neat in appearance. Ensure interior of conduit is clean and smooth to permit pulling conductors without damage to insulation. Wrench tighten threaded connections.
3. Cut conduit ends square, leaving a flat conduit face. Do not use plumbing pipe cutters.
4. Deburr ends.
5. Cut threads with standard conduit dies providing 3/4 inch taper per foot and of proper length to make joints and terminals tight and without deformation.
6. Use thread cutting oil continuously during threading. Remove metal cuttings and oil after cutting and before painting (if any).
7. Use non-corrosive "Carbozinc No. 11" manufactured by Carboline Company, coal tar enamel or zinc rich epoxy primer on threads of steel conduit before connection.
8. Use only strap wrenches to tighten joints in plastic coated rigid steel conduit. Replace conduit and fittings showing cuts, nicks and threader chuck jaw marks and other damage. Use solvent, or the same patching material, to seal around edges of conduit fitting covers.
9. Protect conduit terminations from mechanical damage, and prevent entry of moisture and foreign matter into the conduit system by properly capping terminations.
10. Do not install trapped runs of conduit, if possible. When necessary, drain runs with a "tee" conduit equipped with a drain.
11. Fit conduit crossing structure expansion joints with approved expansion fittings and bonding jumpers.
12. Provide flexible metallic conduit where necessary to allow for movement; to localize sound or vibration, at transformers, at rotating equipment; at light fixture pigtails if not factory pigtailed; at other locations where shown on the Drawings.
13. Seal annular space at conduit penetrations through structures and pavement airtight and watertight.
14. Provide CSBE-type removable sealing fitting to seal pump cables in lift stations.

CONDUIT, FITTINGS AND BODIES

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3.04 IDENTIFICATION DEVICES

- A. Label conduit every 100 feet and at each conduit termination with firmly attached tags or permanent tape and stenciling.
 - 1. Electrical: Identify circuit phase-to-phase voltage and circuit number.
 - 2. Communications: Identify cable origination and destination.

3.05 CLEANING

- A. Follow Section 01505 for disposal of debris and excess products, and interim cleaning.
- B. Follow Section 01770 for final cleaning.

END OF SECTION

SECTION 16170 GROUNDING AND BONDING

SECTION 16170
GROUNDING AND BONDING

RELATED SECTIONS - For use by Specifier. Do not include list in Project Specifications.
Section 16111 - Conduit
Section 16120 - Wire and cable
Section 16670 - Lightning Protection System

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.
- D. Power system grounding.
- E. Communication system grounding.
- F. Electrical equipment and raceway grounding and bonding.
- G. Control equipment grounding.

1.02 REFERENCES

- A. Follow Section 01423 and following.
- B. American Society for Testing and Materials (ASTM):
 - 1. B 3 Soft or Annealed Copper Wires
 - 2. B 8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
 - 3. B 33 Tinned Soft or Annealed Copper Wire for Electrical Purposes
- C. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. 142-82 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. 383-2.5 IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations.
 - 3. 1100-1992 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems.

- D. Underwriters' Laboratories (UL):
 - 1. 83 Thermoplastic Insulated Wire and Cables
 - 2. 96 Lightning Protection Components
 - 3. 96A System Installation
 - 4. 467 Grounding and Bonding Equipment
 - E. National Fire Protection Association (NFPA):
 - 1. 780 Lightning Protection Code
 - 2. 70 National Electrical Code (NEC)
 - 3. NEC Article No. 250 - Grounding
 - F. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA):
 - 1. TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - G. Building Industry Consulting Services International (BICSI):
 - 1. Telecommunications Distribution Methods Manual
 - H. Local, county, state and federal regulations and codes in effect as of date of purchase shall be complied with.
 - I. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components which may be of foreign manufacture, if any, and the country of origin.
- 1.03 DESIGN REQUIREMENTS
- A. Design grounding system following NEC Article No. 250 - Grounding, and IEEE 142-82 - Recommended Practice for Grounding of Industrial and Commercial Power Systems, by a firm acceptable to Owner's insurance underwriter.
 - B. Design Standards:
 - 1. Completely protect above-surface structures and equipment.
 - 2. Calculate system on the basis of existing soil resistivity.
 - 3. If cathodic protection for underground sewer pipe is installed (see applicable Division 2 Sections), ensure the pipe is not connected to the general grounding system, either directly through grounding cable or indirectly through grounded electrical devices connected to the pipe. Electrically isolate electrical devices from sewer pipe.

1.04 SUBMITTALS

- A. Follow Section 01340 for the following:
- B. Product Data:
 - 1. Manufacturer's catalog data and applicable special fabrication and installation details.
 - 2. Installation, terminating and splicing procedures.
 - 3. Instructions for handling and storage.
 - 4. Dimensions and weights.
 - 5. Conformance Certificate and Quality Assurance Release: Signed by QAP Manager (Section 01450). Specifically identify products and include purchase order number, supplements, and item number where applicable. Indicate that requirements are met and identify approved deviations.
- C. Record Documents: Follow Section 01700.

1.05 QUALITY ASSURANCE

- A. Follow Section 01450.
- B. Furnish products of latest proven design, new and in current production. Do not use obsolete components or out-of-production products.
- C. Tests for Insulated Cable: Pass vertical tray flame test following IEEE 383-2.5.

1.06 SHIPPING AND HANDLING

- A. Follow Section 01450.
- B. Ship on manufacturer's standard reel sizes of one continuous length. Where cut lengths are specified, mark reel quantity accordingly.
- C. Protect wire wood lagging or suitable barrier across the traverse of reels. Provide heat-shrink self-sealing end caps on cable.

PART 2- PRODUCTS

2.01 MANUFACTURERS

- A. CABLE MANUFACTURERS
 - 1. Houston Wire and Cable Company
 - 2. Okonite Company
 - 3. Anixter
 - 4. Cablec Continental Cables Company
 - 5. Pirelli Cable Corporation
 - 6. Triangle Wire and Cable, Inc.

B. GROUND ROD AND CONNECTOR MANUFACTURERS

1. Copperweld
2. Thomas & Betts
3. Blackburn

C. EXOTHERMIC CONNECTOR MANUFACTURERS

1. Erico Products (Cadweld)
2. Burndy Corporation (Therm-O-Weld)

D. GROUNDING CONNECTOR MANUFACTURERS

1. Thomas & Betts
2. Burndy Corporation
3. O.Z. Gedney

2.02 MATERIALS

A. Grounding Conductors: Bare or insulated copper AWG wire following ASTM-B3, ASTM-B8 and ASTM-B33, of following sizes:

1. Main ground loop or grid; switchgear, motor control centers and power transformers; motors 200 Hp and above; building columns: No. 4/0 minimum, Class C stranded, bare cable.
2. Power panels (AC and DC); control panels and consoles: No. 2/0, Class C stranded, bare cable.
3. A minimum of 6 AWG, stranded, insulated copper conductor should be used for communications since this accommodates different code requirements and allows for future changes.

B. Grounding Connectors: It is recommended that connectors should be one of the following:

1. Tin-plated copper.
2. Copper.
3. Copper alloy.

C. Ground Rods: A minimum of 10 feet long, 3/4 inch diameter, copper-clad steel.

D. Where single conductor insulated grounding conductors are required, furnish green color (or tape marking) insulation rated for 600 volts.

E. Telecommunications Main Grounding Busbar (TMGB):

1. The TMGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used.
2. The TMGB shall be sized for the immediate requirements and allow for growth.
3. The minimum dimensions are 6 mm thick x 100 mm wide, with variable length.
4. The busbar should be electrotin plated for reduced contact resistance.

- F. Telecommunications Grounding Busbar (TGB):
1. The TGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used.
 2. The TGB shall be sized for the immediate requirements and allow for growth.
 3. The minimum dimensions are 6 mm thick x 50 mm wide, with variable length.
 4. The busbar should be electrotin plated for reduced contact resistance.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Follow Section 01450.

3.02 PREPARATION

- A. Complete site preparation and soil compaction before trenching and driving ground rods for underground grid.
- B. Verify exact location of stub-up points for grounding of equipment, fences and building or steel structures.
- C. Verify wiring for lighting systems is single conductor cables in conduit and each conduit contains a green-color insulated equipment grounding conductor connected to lighting system. If no ground conductor is present, install conductors as required.
- D. Copper and copper alloy connections should be cleaned prior to connection.
- E. In new construction, the electrical contractor must provide accessible means to a direct electrical service ground, which is one of the best points for grounding communications systems. NEC Section 250-71(b) requires an intersystem bonding connection accessible at the electrical service equipment, such as:
1. Approved external connection on the power service panel. The NEC allows direct connection to a provided 6 AWG copper conductor.
 2. Exposed metallic service raceway (using an approved bonding connector).
 3. Grounding electrode conductor.

3.03 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data.
- B. Bonding conductors shall be routed with minimum bends or changes in direction and should be made directly to the points being bonded.

- C. Bonding connections should be made by using:
 - 1. Bolt or crimp connectors, clamps, or lugs. Use listed hardware that has been laboratory tested to eliminate most field problems.
 - 2. Exothermic welding (see NEC Section 250-81) within the ground electrode system, for parts of a grounding system that are subject to corrosion or that must carry high currents reliably, or for locations that require minimum maintenance.
- D. Install main ground loop minimum 1-1/2 feet below ground surface.
- E. Drive rods vertically, leaving top 18 inches exposed above finished grade. Exothermic-weld below-grade grounding connections, except at ground rods. Install additional ground rods as required to pass resistance test.
- F. Make connections to dry surfaces with paint, rust, oxides, scales, grease and dirt removed. Ensure proper conductivity.
- G. Make above-grade grounding connections with mechanical connectors or thermal connections.
 - 1. Ground small groups of isolated equipment with No. 2 AWG minimum insulated conductor connected to the main loop.
 - 2. Through-ground local pushbutton and selector switch stations, two-wire control devices, disconnect switches, lighting transformers, panelboards, operator panels, benchboards, and enclosures of other electrical apparatus. Install equipment grounding conductor with power supply or control circuit conductors.
- H. Equipment Grounding:
 - 1. Make grounding connections to electrical equipment, vessels, mechanical equipment and ground rods.
 - 2. Make grounding connections to tanks and vessels to integral structural supports or to existing grounding lugs or pads, and not to the body of the tank or vessel.
 - 3. Make ground connections to equipment in visible locations and protect with PVC non-metallic conduit.
 - 4. Make connections to motor frames and ground buses with lugs bolted to equipment. Do not use motor anchor bolts and equipment housing for fastening lugs of grounding cable.
 - 5. Ground medium voltage motors, in addition to grounding conductors in motor feeder cable, with a separate No. 4/0 cable to motor frame.
 - 6. Ground motors having power supplied by multiconductor cable with a separate grounding conductor in the cable and where supplied by single conductor cable in conduit by a grounding conductor pulled in the conduit. Connect ground conductors to ground bus in motor control center and to ground terminal in motor conduit box. Do not ground the insulated bearing pedestals of large motors.
- I. Raceway and Support Systems Grounding:
 - 1. Bond and ground raceway, cable rack or tray and conduit together and permanently ground to the equipment grounding busbar. Connection to conduit may be with grounding bushing or ground clamp.

SECTION 16190 SUPPORTING DEVICES

SECTION 16190
SUPPORTING DEVICES

Edit following for project requirements.

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Steel channel and ladder cable tray support devices for domestic power and lighting systems and voice and data systems.
- B. Accessories for installation.
- C. Follow provisions of Section 16010.

1.02 REFERENCES

- A. Follow Section 01423 and following.
- B. National Fire Protection Association (NFPA):
 - 1. 70 National Electrical Code (NEC)
 - 2. NEC Article No. 318 - Cable Trays
- C. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA):
 - 1. 569 Commercial Building Standard for Telecommunications Pathways and Spaces.
- D. Building Industry Consulting Services International (BICSI):
 - 1. Telecommunications Distribution Methods Manual

1.03 DEFINITIONS

- A. Channel Cable Tray - A channel section, raceway, or wireway with a one-piece bottom, no more than 6 inches wide. The bottom may be ventilated or solid.
- B. Ladder Cable Tray - Two side rails connected by individual transverse members.

1.04 SUBMITTALS

- A. Follow Section 01340 for product data, shop drawings and samples.
- B. Product Data: Manufacturer's technical data and installation instructions.

C. Shop Drawings:

1. Indicate routing of ladder cable trays.
2. Indicate arrangement of channel framing.
3. Indicate attachments to substrates.

D. Record Documents: Follow Sections 01700.

PART 2- PRODUCTS

2.01 MANUFACTURERS

- A. B-Line Systems, Inc.

2.02 MATERIALS

A. Channel Systems

1. Continuous Slot Metal Channel System: Single channel, accepting spring-held steel nuts; 1-5/8 inch square by 12 gauge, galvanized steel, ASTM A153 or A386, and ASTM A569.
2. Furnish UL-5 product where used as support for light fixtures with electric discharge lamps.

B. Ladder Cable Tray

1. All cable tray must be a prefabricated structure consisting of two side rails connected by individual transverse members (aluminum ladder cable tray).
2. The ladder cable tray should not be more than 6 inches deep or less than 4 inches deep, and should not exceed 24 inches in width.
3. The cable tray should be able to support 100 lbs. of cable per linear foot. Loading of cable trays and wireways shall comply with the applicable electrical code.
4. Mono-systems (fish bone style systems) are not recommended.

C. Fasteners/Hangers

1. B-Line fastener (catalog number BW-2 or equivalent)
2. J-Supports (hooks)

2.03 ACCESSORIES

- A. Pipe Clamps and General Fittings Finish: Hot-dip galvanized after fabrication ASTM A386 or A153, as applicable.
- B. Nuts, Bolts and Screws: Galvanized, ASTM B633, Class Fe/Zn 5, Type III.
- C. Hanger Rods: ASTM A575 or A576, threaded, hot-rolled steel, galvanized, ASTM B 633, Fe/Zn 5, Type III, 3/8 inch diameter.

2.04 BUILT-IN ITEMS

- A. Timely furnish to proper installer all items required to be built in to concrete and masonry. Furnish templates and setting drawings as required to control proper placement.

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PART 3- EXECUTION

3.01 EXAMINATION

- A. Follow Section 01450.
- B. Verify built-in items are properly installed.

3.02 PREPARATION

- A. All communications cables should be installed in a cable tray or conduit and cross perpendicular to fluorescent lighting and electrical power cables or conduits.
- B. Where cable tray and conduit are not applicable, support the cable with a B-line fastener (catalog number BW-2 or equivalent).
- C. Do not install communications cables in elevator shafts as this will cause electrical interference. In the event that the elevator shaft is the only cable path available, communications cables shall be placed in grounded conduit and located in the farthest corner of the shaft from the elevator.
- D. Ceiling support wire or rod shall not be the means of supporting cables.
- E. Communications cable shall not be laid directly on ceiling tiles.
- F. Communications cables shall not be supported from conduits or wireways containing power circuits.
- G. The sum of the cross-sectional areas of all cables shall not exceed 50 percent of the interior cross-sectional area of the cable tray.
- H. A minimum of 12 inches access headroom shall be provided above a cable tray. Ensure that other building components do not restrict access to the cable trays.

3.03 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data.
- B. Channel Framing
 - 1. Install products following drawings, manufacturer's instructions and approved submittal data.
 - 2. Securely fasten channels to built-in items, substrates and support structures.
 - 3. Set channels parallel, level and straight.
 - 4. Install minimum 1 fastener per 24 inches of channel, 1 fastener at each leg of corner channels, and 1 fastener at each end of channels.
 - 5. At drywall and plaster, fasten channels to studs inside partitions. At masonry and concrete, fasten with minimum 3/16 inch diameter drill-in expansion bolts. Plastic shields are not permitted.

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C. Ladder Cable Tray

1. Install products following drawings, manufacturer's instructions and approved submittal data.
2. The inside of the cable tray shall be free of burrs, sharp edges, or projections that can damage cable insulation.
3. Support cable trays directly from building structure, at maximum 8 feet on center with brackets or threaded rods securely fastened to structure. Do not support cable trays from pipes, ductwork or ceilings.
4. Vertical ladder racks should run and tie into the horizontal tray. In addition, the vertical ladder racks should be mounted on plywood or solidly anchored to the wall so as not to pull loose.
5. Ladder cable tray should be installed parallel to furred out wall, 6 to 12 inches inside the main communications equipment room. Tie into cable trays, routed throughout the building, to have a continuous path for all cables to run in.
6. Although it may be allowed by building codes, placing communications and power cables in the same cable tray is strongly discouraged. Cable trays and wireways may be divided with a grounded metallic barrier to allow the placement of both power and telecommunications cables as required by the electrical code.
7. A cable tray passing through a wall or partition shall be an unbroken length.
8. Metal cable trays shall be bonded to ground.
9. Do not use cable trays as a walkway or ladder.

D. Fasteners/Hangers

1. When cable tray is not available, center fasteners or hangers 4 to 5 feet apart to support communications cables.

3.04 ADJUSTING

A. Adjust work to proper function and performance.

B. Communications Cable Pathway Clearances

1. Motors or transformers: 4 feet
2. Power cables and conduit: 1 foot
3. Fluorescent lighting: 5 inches
4. Above the ceiling tiles: 3 inches
5. Access above the cable tray: 1 foot

C. Communications Cable Pathway Routes

1. Pathways should cross perpendicular to fluorescent lighting and power.

END OF SECTION

SUPPORTING DEVICES

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[2-4-98]

SECTION 16402 UNDERGROUND DUCT BANKS

SECTION 16402
UNDERGROUND DUCT BANKS

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Underground Electrical and Communications duct banks, handholes and manholes.

1.02 REFERENCES

- A. Follow Section 01423, Section 16111, and following.
- B. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA):
 - 1. 569 Commercial Building Standard for Telecommunications Pathways and Spaces
- C. Building Industry Consulting Services International (BICSI):
 - 1. Telecommunications Distribution Methods Manual

1.03 MEASUREMENT AND PAYMENT

- A. Basis of Measurement: By the linear foot of ductbank.
- B. Basis of Payment: By the cubic yard for colored concrete and for reinforcing combined; tape label; conduit, fittings, bodies for encased work.

1.04 SUBMITTALS

- A. Follow Section 01340.
- B. Submit plan and section drawings showing total requirement for duct banks.
- C. Submit calculations associated with sizing and arrangements of ducts and cables.
- D. Submit catalog cut sheets of ducts and spacers

1.05 QUALITY ASSURANCE

- A. Follow Section 01450.
- B. Verify ductbanks do not interfere with existing or new underground facilities. Follow Section 01726.
- C. Follow Appendix B of NEC.

1.06 SHIPPING AND HANDLING

- A. Follow Section 01450.
- B. Clearly mark containers "For Electrical Duct Banks Only" (or Communications, as applicable).

PART 2- PRODUCTS

2.01 MANUFACTURERS

- A. Ducts: Follow Section 16111.
- B. Duct Spacers and Hardware: Underground Devices Inc.; substitutions following Section 01630.

2.02 MATERIALS

- A. Ducts: Schedule 40 rigid PVC following Section 16111, with non-magnetic universal interlocking type spacers for both horizontal and vertical duct arrangements.
- B. Hand holes: Shall be at least 4 inches x 4 inches and constructed of 2 inch thick cement covered with 3/8 inch steel plate.
- C. Concrete and Reinforcing Steel for Encasement: Furnish products following Section 02521, except strengths as follows:
 - 1. Compressive Strength: 2500 psi at 28 days, class A.
 - 2. Flexural Strength: 500 psi at 28 days.

2.03 ACCESSORIES

- A. Continuous Tape Label for Underground Conduit: Minimum 12 mil thick by 4 inch wide plastic, background color similar to concrete color, with minimum 1 inch high copy at maximum 24 inches o.c., identifying encasement contents.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Follow Section 01450.

3.02 PREPARATION

- A. Verify materials are on site in proper condition and of sufficient quantity.
- B. Verify proper excavation depth (minimum 48 inches below finished grade) (Section 02227), width, route and support of work. Verify proper location of handholes and manholes (minimum every 350 feet). Communications facilities must be placed in separate handholes and manholes from Electrical facilities.
- C. Trenches greater than or equal to 5 feet deep:
 - 1. Shall be shored to prevent cave-in.
 - 2. Shall have 2 feet clearance from the dirt pile.

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- D. Directional boring is a suitable substitute when trenching is impractical or impossible. Locating existing underground utilities is crucial when directional boring is planned because of the potential for the drilling unit to encounter high voltages. Although directional boring machines are manufactured with electrical strike sensing capabilities which can warn the operator of any contact with a high voltage source, accidents may still occur.
 - 1. Operators of directional boring machines require special protection due to the potential for exposure to high voltage. Therefore, operators must always have a ground mat grid underfoot as insulation protection. In addition, operators must wear insulating boots and gloves, along with hard hats and safety glasses.
- E. Minimum electrical/communications underground cable separation:
 - 1. Concrete: 3 inches
 - 2. Masonry: 4 inches
 - 3. Well-tamped earth: 12 inches
- F. Before encasement, verify ducts are free of debris and properly installed in support and spacer system, are properly fitted together and hold-down hardware is properly installed.

3.03 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data.
- B. Install conduit in excavations following Drawings. If directional boring is utilized, cable or flexible conduits can be attached to the unit and pulled back to the origination point (after the drilling unit reaches its destination).
- C. Hand holes will be at least 4 inches x 4 inches and shall be constructed of 2 inch thick cement covered with 3/8 inch steel plate. The handhole or manhole will rest on a 4 inch blanket of sand, and 4 inches around the side walls will be filled with sand.
- D. Each hand hole or man hole which contains a pedestal will have four bollards installed 18 inches diagonally from each corner, with a cross member welded at 30 inches connecting the four corners. These barriers will be constructed of 4 inch ridged conduit filled with concrete, driven four feet in the ground and extending 36 inches above the protective cover.
- E. Install watertight penetrations through foundation, handhole and manhole walls. Wherever a hand hole is used to simply pass through, the conduit entrances and exits will be situated at opposite ends of the handhole instead of 90 degree angles.
- F. Assemble duct banks with non-magnetic saddles, spacers and separators. Position separators for 2 inch minimum concrete separation between outer surfaces of adjacent ducts.
 - 1. Make uniform required bends with a minimum of a 24 inch radius for conduits less than 3 inch diameter, and a 48 inch radius for conduits 3 inches and larger.
 - 2. Maintain vertical or horizontal separations of 12 inches of well-packed topsoil

UNDERGROUND DUCT BANKS

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from any Electrical service conduit run parallel to Communications conduits.

- G. Install reinforcing. Install concrete encasement fully surrounding reinforcing steel and ducts, following Section 02521.
 - 1. Unless otherwise noted on the drawings, reinforce with No. 5 longitudinal steel bars placed at each corner and along each face at maximum parallel spacing of 12 inches o.c., and No. 5 tie-bars transversely placed at 12 inches o.c. maximum longitudinal. Maintain maximum clearance of 2 inches from bars to edge of forms and ducts.
 - 2. Add colorants at mixing site at the rate of ten pounds per cubic yard.
 - a. Red: For cable with greater than 600 volts.
 - b. Standard Gray: For cable with 600 volts or less.
 - c. Yellow: For voice and data cable.
 - 3. Place concrete with minimum 3 inch cover surrounding ducts and reinforcement.
 - 4. Maintain ducts in proper place during concrete placement.
- H. Transition from non-metallic to PVC coated metallic conduit where duct banks enter structures or turn upward for continuation above grade.
- I. Where ducts enter structures such as handholes, manholes, pullboxes, or buildings, terminate ducts in proper end bells, insulated L-bushings, Meyers hubs or couplings on steel conduits.
- J. Extend below grade conduits to 4 inches above the finished floor inside a building.
- K. Tag conduits entering pull boxes with stamped stainless steel tags following cable and conduit schedule.
- L. Backfill following Section 02227 after concrete cures 24 hours.
- M. Install one bare stranded copper duct bank ground following Section 16170 in each duct bank envelope. Make ground electrically continuous throughout duct bank system. Connect to switchgear and MCC ground buses and to steel conduit extensions of underground duct system.
- N. Pull a 12 inch long mandrel (1/4 inch smaller than duct diameter) through ducts. Pull a rag swab or sponge through to remove debris, until it shows clean.
- O. Where fiber optic cables will be used, place three innerducts inside each Trade Size 4 inch conduit designated for this purpose.
- P. Provide a plastic or nylon line with a minimum test rating of 200 lbs. pulling tension in all underground conduits.
- Q. Install continuous, orange warning ribbon, PVC tape (detectable, i.e., containing metallic tracings), 3 inches wide, permanently imprinted with "CAUTION-- BURIED ELECTRIC (or COMMUNICATIONS, as applicable) LINE BELOW" in black letters, approximately 12 inches below finished grade following line of duct banks. This warning ribbon shall be 18 inches above the cable.

END OF SECTION

UNDERGROUND DUCT BANKS

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SECTION 16720 ACCESS CONTROL SYSTEM

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

SECTION 16720

ACCESS CONTROL SYSTEM

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. This section includes performance specifications, materials and installation configurations for all parts of the Access Control System except for the main system computer.

1.02 REFERENCES

- A. Follow Section 01423 and following.

1.03 DESIGN AND PERFORMANCE STANDARDS

- A. **CARD READER:** Provide card readers, which will use the existing Barium Ferrite encoded cards presently in use. The card reader shall operate using the existing airport badges. The reader shall support an optional keypad. Adding the keypad shall not require discarding the reader. The reader is to be compatible with the supplied Field Controllers. The reader unit is to be a sealed, slotless; unit that is capable of reading a barium ferrite card placed flush to the read plate. It is to be capable of either surface or pedestal mount. Reader is to be 12 VDC, 200 ma where power is supplied by the controller. It shall support a two color LED that changes from red to green to indicate access grant due to presentation of a valid badge. The card reader is to be capable of operating between the temperatures of -22 to 158 degrees Fahrenheit and in non-condensing humidity of 0% to 90%. It is to be impervious to rain, sleet and snow, and overall suitable for outdoor use.
- B. **CARD READER (EXTERNAL ONLY):** The card reader shall operate using the existing airport badges. The reader shall support an optional keypad. Adding the keypad shall not require discarding the reader. The reader is to be compatible with the supplied Field Controllers. The reader unit is to be a sealed, slotless; unit that is capable of reading a barium ferrite card placed flush to the read plate. It is to be capable of either surface or pedestal mount. Reader is to be 12 VDC, 200 ma where power is supplied by the controller. It shall support a two color LED that to changes from red to green to indicate access grant due to presentation of a valid badge. The card reader is to be capable of operating between the temperatures of -22 to 158 degrees Fahrenheit and in non-condensing humidity of 0% to 90%. It is to be impervious to rain, sleet and snow, and overall suitable for outdoor use.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- C. PIN/PAD (EXTERNAL ONLY): To be compatible with the Card Reader provided in paragraph 1.03.B, above. It is to meet or exceed the environmental standards of that paragraph.
- D. CARD READER/PIN: The card reader shall operate using the existing airport badges. The reader shall support an optional keypad. Adding the keypad shall not require discarding the reader. The reader is to be compatible with the supplied Field Controllers. The reader unit is to be a sealed, slotless; unit that is capable of reading a barium ferrite card placed flush to the read plate. It is to be capable of either surface or pedestal mount. Reader is to be 12 VDC, 200 ma where power is supplied by the controller. It shall support a two color LED that changes from red to green to indicate access grant due to presentation of a valid badge. The card reader is to be capable of operating between the temperatures of -22 to 158 degrees Fahrenheit and in non-condensing humidity of 0% to 90%. It is to be impervious to rain, sleet and snow, and overall suitable for outdoor use.
- E. CONTACT: Provide high security magnetic door contacts at door locations as indicated on the drawings. Door contacts shall have the following features and characteristics:
 - 1. Construction - totally encapsulated brushed housing.
 - 2. Life Expectancy - Greater than 10,000,000 cycles.
 - 3. Gap distance - 5/8" or greater for contacts on pedestrian doors; 2" or greater for overhead doors.
 - 4. UL listing - UL listed 634 for use with security systems.
 - 5. Door Contacts - The contacts shall be recessed, normally closed with a wide gap; supervision is not required but preferred.
- F. MAGNETIC LOCK: Provide magnetic lock complete with necessary mounting brackets, adapter plates, and mounting hardware at door locations as indicated on the prints. Locks shall have the following features and characteristics:
 - 1. Construction -lock body constructed of steel with aluminum finish. Strike plate constructed of 1/2" cadmium plated steel.
 - 2. Holding force - 1200 lbs. or greater for doors without panic hardware, 500 lbs. or greater for doors equipped with panic hardware.
 - 3. Mounting - surface mounted on frame and door. Provide brackets and adapters as required.
 - 5. Power -24 VDC, not more than 0.2 amps for 500 lb. Units and not more
 - 6. than 0.5 amps for the 1200 lb. units.
 - 7. Door Status Sensing - Dry contact closure to the field controller or
 - 8. reader/or reader controls to indicate that the magnetic bond is present between the lock and the strike plate.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

9. Remote Control - Accept control via power interruption from the field controller or reader (or reader controller) to lock/unlock the door.
10. Locks shall be fail safe.

G. FIELD CONTROLLERS (FC), CARD READER INTERFACE (CRI), MULTIPLEXER(MUX): The MUX shall be connected to the security host by means of data network and shall respond to commands from the host. Each CRI shall connect into the data network at a MUX. The MUX shall forward to the host information regarding access, status and alarms, which the CRI has gathered from the readers and sensor devices that the CRI controls. The FC shall meet or exceed the following functional requirements:

1. Each FC shall be identifiable from the central host by means of a unique device address.
2. The FC shall operate normally as an online device under host control.
3. In its offline mode, the FC shall be able to save (buffer) 15000 access transactions.
4. When the FC returns to online mode from its stand-alone (offline) mode of operation, the transactions it stored shall be transmitted to the host during the subsequent polling sequences. Such transmissions shall be grouped so as not to interfere with ongoing transactions. The host shall be able to differentiate between historical and current transactions.
5. Any portal controlled by a FC shall be capable of being opened or closed by the issuance of a command from the host.
6. Each Multiplexer, CE-1600 shall be capable of supporting 16 readers for badge access, and/or at least 64 digital input points for monitoring devices.
7. The Card Reader Interface, (Access Specialties RI-130) shall support readers which utilize current Barium Ferrite (BaFe) badge technology that is in use at Bush IAH. The contractor shall be responsible to maintain and extend the BaFe reader technology, so as to accommodate expansion at the Airport.
8. Time shall be generated locally at each CRI, and the local time shall be capable of being updated for accuracy from a host master clock at anytime.
9. The FC's shall be in current factory production.
10. The FC shall include power backup in the form of rechargeable batteries. In the event of an AC power failure, the battery backup shall protect any data or software stored in the memory of the FC for not less than 8 hours.
11. The FC shall be installed with capacity to connect one additional card reader for each 3-card reader actually installed.
12. Operation from -1 to +40 degrees Celsius, at up to 85% non-condensing relative humidity.
13. Enclosures shall be NEMA 1 type equivalent. FCs may be rack mounted if it is determined that this configuration would result in a more reliable, simple-to-service, and less costly system. Surface mounting of these devices is also approved.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

14. The MUX shall be communicated via an RS232 Electrical interface. The communication shall be asynchronous ASCII, 600 BPS, Capi-Rusco 913/921 protocol where the host shall poll.
- H. INTELLIGENT FIELD CONTROLLERS (IFC's): The Intelligent Field Controller shall be connected to the security host, by means of a data network or Dial Up Connection via Plain Old Telephone System (POTS). It shall respond to commands from the host. Each IFC shall connect into the data network through a Communications Control Point (CCP). The IFC shall forward to the host information regarding access, status and alarms, which the IFC has gathered from the readers and sensor devices that the IFC controls. The IFC shall meet or exceed the following functional requirements:
1. Each IFC shall be identifiable from the central host by means of a unique device address.
 2. The IFC shall operate normally as an online device.
 3. In its offline mode, the IFC shall be able to save (buffer) 100,000 badge transactions.
 4. When the IFC returns to online mode from its stand-alone (offline) mode of operation, the transactions it stored shall be transmitted to the host during the subsequent polling sequences. Such transmission shall not impede current transaction processing. Historical activity must be differentiated from current activity.
 5. Any portal controlled by the IFC shall be capable of being opened or closed by the issuance of a command from the host.
 6. Each IFC shall be capable of supporting 16 Multiplexers controlling up to 255 card readers for badge access, and/or at least 1024 digital input points (DIP) for monitoring devices.
 7. The IFC shall support readers, which utilize the current Barium Ferrite BaFe) badge technology that is in use at Bush IAH. The contractor's response shall be responsible to maintain and extend the BaFe reader technology, so as to accommodate expansion at the Airport.
 8. Time shall be generated locally at each IFC, and the local time shall be capable of being updated for accuracy from a host master clock at anytime.
 9. The IFC shall be in current factory production.
 10. The IFC shall include power backup in the form of re-chargeable batteries. In the event of an AC power failure, the battery backup shall protect any data or software stored in the memory of the IFC for not less than 8 hours.
 11. The IFC shall be installed with capacity to connect one additional card reader for each 3 card readers installed.
 12. Operation from -1 to +40 degrees Celsius, at up to 85% non-condensing relative humidity.

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13. Enclosures shall be NEMA 1 type equivalent, IFCs may be rack mounted if it is determined that this configuration would result in a more reliable, simple to service, and less costly system. Surface mounting of these devices is also approved.
 14. The IFC shall be capable of maintaining a database of badge holders,
 15. badge holder PINs (user definable) and their privileges. During degrade mode, the IFC will continue to grant appropriate accesses for individuals based on this database and shall not degrade the access selection rules. IFCs are to be capable of maintaining at least 25,000 badge holders.
 16. The IFC shall communicate via an RS232 Electrical interface.
 17. The communication shall be asynchronous ASCII where the host shall poll.
- I. FIBER TRANSMISSION MODULE (FTM): The FTM shall be a regularly, manufactured, off the shelf product which shall support bi-directional data transmission. Operation shall be on one or two fibers. The signal shall be transmitted via light using FM modulation for reliability and adjustment free installation and operation.

The following minimum specifications shall be met:

Data Rate: DC to 50 Kb/s
Error Rate: 1×10^{-12}
Optical Wavelength: 1300 nM
Optical Loss Budget: 13dB with 62.5u Fiber
Connectors - Optical: Type ST metallic
Signal: 6 PIN Screw Terminal or DB-25
Maximum size Module: 2.6 W x 4.5 D x 1.2 H inches)
Temperature Range: 0 to +50 C
Power Requirement: 12 VDC or 24 VAC

Mounting for the equipment shall be either in a modular form for field mounting or in a card cage. Card cage mounting shall be accomplished by installing up to 17 units in a single 5 1/2 X 19 X 12 inch card cage. All units will plug in from the front and have all interface wiring accessible from the rear. A four contact connector shall provide power to the card cage on the rear panel of the card cage.

- J. PANIC HARDWARE WITH CONTACT: Panic hardware is to be suitable for emergency/fire exit. They are to be Push/Crash type.
- K. DOOR CLOSER/HOLD OPEN DEVICE: This device shall be an Electro-mechanical closer-holder. Hold-Open shall be achieved by electric solenoid locking of closer arm slide in its track. Track, arm, slide and solenoid are to be contained in a single aluminum extrusion 1 1/2 inch (38 mm) high, 1 1/2 inch (38mm) deep. Closer shall be door mounted. Track and hold-open mechanism shall be surface mounted to the frame face for

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application on the pull side of the door and frame soffit mounted for application on the push side of the door.

Single point Hold-Open shall be selective through a range of 85 degrees to 110 degrees. The Hold-Open point shall be achieved by adjustment of a telescoping closer arm. Closer shall be hydraulic with full rack and pinion enclosed in a cast aluminum alloy shell. Hydraulic fluid shall be non-gumming and non-freezing. Closer shall have two non-critical valves to independently regulate sweep speed and latch speed. It shall have an adjustable back check cushioning valve (and an adjustable back check positioning valve). All valves shall be adjustable with a hex-key. Closer shall have spring power adjustment to permit a 50% increase in closing power. Closer shall be enclosed in a molded cover.

Units shall be fail safe and close the door during any interruption of the electrical power. The hold-open solenoid coil shall have maximum amperage draw of (.090 Amps at 24 volts) (.035 Amps at 120 volts). The unit shall have a switch, which permits testing of the releasing device function without alarming the system.

- L. REMOTE VIDEO CONTROLLERS: The Video Subsystem Controller shall be a full function switcher/controller system with an integral keyboard. The Switcher/Controller will provide a control keyboard, CPU and switching matrix in a single, compact unit. The system shall provide protection for loss of memory due to power failure. It shall be configured to support the number of cameras, monitors and keyboards etc installed specified plus an allowance of 25%. Alarm call up software and the ability to control and activate presets shall be included in the video system software. The video subsystem shall be slaved to the central control system for the purpose of pre-set activate via the RS-232 control port on the video controller. The controller will include two (2) 12" color monitors and a dedicated VCR for each operator workstation. Video image sequencing loops are to be displayed under video subsystem control on the 12" monitors. One 12" monitor is the alarm event monitor. The other 12" monitor is the operator's work monitor under control of the operator through his/her video keyboard. Each camera image, as viewed on the monitor, will show the camera or view name, date and time.

The switcher and control system shall provide digital control of remote camera stations and shall provide control of crosspoint matrix switching.

The system shall have the following features:

1. Basic Configurations: Video subsystem controller shall be software compatible of up to 512 cameras x 256 monitors x 64 keyboards (512 alarm inputs via an alarm interface).
2. Basic Features:

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- a) System Editor:
 - 1) Menu-driven program for setting system operational parameters (e.g. partition tables, alarm operations, camera sequence patterns, titles, etc.).
 - 2) IBM-PC keyboard used for edit commands and tied entry.
 - 3) No external PC required for system setup.
 - 4) System configuration stored in nonvolatile memory (EEPROM).
 - 5) Print Screen feature allows hardcopy print of all menus and screens.
 - 6) Edit system is password protected.
 - 7) System configuration may be uploaded to PC and saved for later use or recall.
 - 8) Screen Saver feature turns off the edit CRT after 5 minutes of no activity from keyboard.

- b) Host RS-232 Serial Communications Channel:
 - 1) User configurable via editor for variable b/s rate (300 B to 19.2 KB), number of data bits; number of stop bits, parity type, and parity enable.
 - 2) Provides increased supervisor] command set.
 - 3) Capable of uploading/downloading system configuration files (support XMODEM protocol for upload/download).
 - 4) Capable of uploading/downloading system title data.
 - 5) Capture screens from editor.
 - 6) Enter or recall system real-time clock data (master clock).
 - 7) Capture results from diagnostic tests.
 - 8) Broadcast messages to individual system monitors. Message capacity to consist of 5 lines of 20 characters per line, or greater.

- c) Built in Diagnostics:
 - 1) Each CPU in the system will perform a ROM integrity self-test on power-up.
 - 2) System CPUs capable of being tested for proper hardware operation via the system editor.
 - 3) Global memory integrity capable of verification.
 - 4) Global communications between CPUs capable of verification.
 - 5) Results can be printed via host RS-232 serial port.

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- d) Support for 64 remote keypads:
 - 1) Supports type keypads.
 - 2) Keypads may be divided between two serial trunks with a maximum of 32 keypads per trunk provides for fast keypad response).
 - 3) Keypads may be assigned to serial trunks via system editor.
 - 4) Alarm acknowledgment function may be limited to certain user-selected keypads via system editor.
 - 5) Eight levels of seize priority for camera PTZ control.
 - 6) Monitor access can be restricted via system editor.
 - 7) Individual keypads can be placed off-line via the system editor.

- e) Receiver Support:
 - 1) Supports receivers.
 - 2) Supports 512 remote receivers via 2 or 4 serial trunks (depending upon system configuration).
 - 3) Receivers may be divided between available serial trunks with a maximum of 256 receivers per trunk.
 - 4) Receivers may be assigned to serial trunks via system editor.
 - 5) Receiver alarm input may be enable or disabled via system editor.
 - 6) Receiver communications rate (Baud rate) may be user-selected between 600 or 4800 BPS via system editor.
 - 7) 600 BPS and 4800 BPS receivers may be mixed on same serial trunk.
 - 8) Receiver on-line status may be verified via system editor profile summary report.

- f) Master real-time clock functions:
 - 1) Used for time-activated events.
 - 2) May be set or read from Host RS-232 serial channel.

- g) Video switching support functions:
 - 1) Provide full matrix switching of up to 1024 cameras on 256 monitors (262144 crosspoints).
 - 2) Support user-programmable camera-to-monitor partitioning.
 - 3) Provide two time-selectable sequence patterns, with automatic sequence start feature, for each ascending order sequencing monitor.
 - 4) Provide two time-selectable sequence patterns, with automatic sequence start feature, for each random order sequencing monitor.

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- 5) Provide sequence pattern lock capability for each sequencing monitor.
 - 6) Support both monitor dwell and individual camera dwell sequencing.
 - 7) Support synchronous sequential switching (salvo) on up to 256 monitors.
 - 8) Provide crosspoint reset function for on-line matrix servicing.
 - 9) Support vertical interval switching.
- h) Alarm support functions:
- 1) Support up to 2048 alarm inputs; up to 1024 alarms from interfaces plus up to 1024 alarms from receivers.
 - 2) Alarms may be individually enabled or disabled.
 - 3) Alarms may be individually set for momentary or latching operation.
 - 4) Preset camera positions may be recalled for each alarm activated and/or cleared.
 - 5) Any alarm input may be assigned to any camera in the system.
 - 6) Support up to 32 alarm monitoring stations.
 - 7) Support independent and/or duplicate alarm monitoring stations.
 - 8) Alarms may be viewed and acknowledged in incoming or operator-selected order.
 - 9) Support timed acknowledge at user specified intervals.
 - 10) Provide five alarm processing modes as follows:
 - STANDARD: displays alarm cameras at up to 32 monitoring stations.
 - SEQUENCE: sequences alarm cameras at up to 32 monitoring stations.
 - SALVO: displays multiple cameras per alarm at up to 16 monitoring stations.
 - SEQUENCING SALVOS: sequences multiple cameras per alarm at up to 16 monitoring stations.
 - FIRST AVAILABLE: displays multiple alarms concurrently at up to 16 monitoring stations.
 - 11) Provide one RS-232 output port for alarm event logging to printers and or computers.
 - 12) Provide high-speed tape output, which sequences through all cameras from active alarm inputs.
 - 13) Provide AM/FM alarm enable/disable.
 - 14) Provide AM/FM assignment of momentary or latching alarm functions.
- i) Time, date, and title generation:
- 1) Provide user-definable time and date formats, character sizes, positions, and backgrounds.

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- 2) Provide 3 lines of 20 characters for each normal camera title.
 - 3) Provide 3 lines of 20 characters for each alarm camera title.
 - 4) Provide 5 lines of 20 characters for host computer messages on each monitor.
 - 5) Each monitor may be programmed to clear its title after a user specified time interval has elapsed.
 - 6) Time and date display may be enabled/disabled for each camera.
 - 7) Displays may be enabled/disabled for each monitor.
- N. ZOOM LENS: The lens shall be a 1/2 inch or 2/3 inch format motorized zoom lens with preset operation for CCTV cameras. The magnification range shall be 6x or 10x as specified. The lens shall have motorized zoom, iris, and focus functions operated by remote control, and it shall have a neutral density spot filter. The lens elements shall be coated to reduce flare. The lens shall have a standard C or CS mount.
- O. FIXED LENS; FORMAT AUTO-IRIS LENS: The lens shall be a 1 1/2 inch or 2/3 inch format, fixed-focal length lens with automatic iris operation where required and a built-in neutral density spot filter for CCTV cameras. The focal length shall be 3.4 to 12.5 mm as required by application with a maximum aperture of f/1.4. The lens shall be designed for use with cameras containing internal auto-iris circuitry. It shall have a C or CS-type mount.
- P. INTERIOR HOUSING: The housing shall be a tamper-proof indoor unit for medium-to-small CCTV cameras and lenses. It shall be designed to mount on wall mounts, adjustable heads, pan-and-tilt drives, and scanners. The overall length, including cable fittings, shall not exceed 16.5 inches (46 cm). Internal dimensions shall be: length: 14.0 inches (35.6 cm); width: 5.8 inches (14.8 cm); height: 3.8 inches (9.8 cm). The housing shall include factory-installed tamper-proof locks.
- Q. EXTERIOR HOUSING: The housing shall be a tamper-proof environmental camera enclosure offering weather protection to 1/2 inch, 2/3 inch and 1 inch format camera/lens combinations. The maximum camera/lens dimensions shall be: length: 22.5 inch (57cm); width: 6.0 inches (15cm); height: 6.6 inch (16 cm). Servicing of the camera/lens package shall be facilitated latches on each side of the housing. Top will remain securely hinged when open. Tamper-proof locks shall be provided to prevent unauthorized opening of the unit. The following options shall be available: thermostatically controlled heater; thermostatically controlled blower; defogger; sunshield; wiper; wiper/washer. All outdoor housing will have all of the above options with the only exception of sun shield when camera is located under ceiling as overhang.
- R. PAN-AND-TILT DRIVE: The pan-and-tilt drive shall be a weatherproof type with a load rating of up to actual weight load plus 25% for wind load. Load rating shall be based on

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the moment-arm distance defined as the distance from the center of gravity of the load to the center of tilt rotation. The unit shall have auto-pan. Preset position operation shall also be provided.

Maximum travel shall be 350 degrees horizontally and +1-90 degrees tilt. Pan speed shall be 7 deg/sec and tilt speed shall be 5 deg/sec. The pan motor shall be thermally protected. The tilt motor shall be impedance protected.

Brading shall be minimum coast, solenoid-actuated in tilt mode. Pan limit stops shall be externally adjustable. Housing construction shall be of steel or glass-filled polycarbonate structural foam thermoplastic for weatherproofing. Steel or thermoplastic shall be used for all gears, and bearings shall be self-lubricating sleeve types. All seals shall be environmentally protected.

The unit shall operate from 24 V (+/- 10%), 50/60 Hz. Maximum input power shall not exceed 9 VA in the pan mode, nor 26 VA in the tilt mode. The pan-and-tilt limit switches shall have 11 A, 10 million cycle rating and provide protection in both directions.

- S. CAMERA MOUNT: All mounts shall be constructed of steel or plastic designed to hold the required camera, housing and PTZ load and are corrosion protected in outdoor applications.
- T. CAMERAS: CCTV Color Cameras shall have a solid-state, charge coupled device (CCD). The minimum scene illumination shall be adequate to produce a useable picture under artificial lighting. The camera shall have auto white balance. The camera shall operate in temperatures from + 14 degrees F. to +122 degrees F without any decrease in performance. The camera shall be UL listed and enclosed in a protective case. The camera shall accept a motorized zoom and other lens.

The camera shall be a 1/2 inch high-sensitivity solid-state color video camera using an interline transfer charge-coupled device (CCD) image sensor. The pickup device shall have a 251,900 pixel array (512 horizontal, 492 vertical). The camera shall produce a standard EIA NTSC color video signal. Composite video output shall be a 1.0 V p-p with 75-ohms impedance and output shall be through a BNC type connector.

The camera weight shall not exceed 2.0 lb. (10 kg). It shall accept C or CS-mount lenses; an adapter for C-mount lenses shall be provided. Camera mounting provisions shall include a 1/4-20 threaded hole in the mounting base. Top and bottom mounting shall be provided. The camera shall have an aluminum case to minimize radio frequency (RF) interference. Dimensions shall not exceed 6.7 x 2.6 x 2.5 inches or 17.1 x 6.6 x 6.4cm (L x H x W).

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Horizontal resolution shall be 320 TV lines. Signal-to-noise ratio shall be typically 48 dB (AGC off, weighted). A gray scale of 10 steps shall be provided. The camera shall incorporate a color balance sensor which reads the color temperature of the light through the lens. Automatic through the lens which balance for color temperatures shall have a range from 2850 K to 7000 K. Manual color balance adjustment shall also be available. The automatic gain control (AGC) capability shall be 20 dB. Two high-speed shutter modes (1/100 and 1/1000 sec) shall be provided for detailed observation of fast-moving objects.

At an output level of 50 IRE, the camera shall have a sensitivity of 0.23 fc (2.5 lux). Sensitivity shall be measured at f/1.2.

External synchronization shall include genlock and line locking with more than 180 deg V-phase adjustment. Internal synchronization is provided by crystal.

The camera shall conform to safety standards of UL 1409 and the radiation standards of FCC Class B. Input power for the camera shall be 24 VAC, 60 Hz, or 12 VDC, with entry through a screw terminal block. Current requirement shall not exceed 170 MA from an AC power source not more than 320 MA from a DC power source.

- U. PTZ RECEIVER/DRIVER: The receiver/driver (hereafter referred to as "receiver") shall be a weatherproof unit designed to communicate to the video switches CPU over a bi-directional (command and response) RS-422 data link. The response channel shall provide receiver status information to the CPU; the command line shall be capable of controlling the receiver whether or not the response circuit is operational.

In standard format the receiver shall provide pan and tilt drive output (24 VAC); output for continuous unattended panning (auto-pan); zoom, focus, iris, and auto-iris operation for motorized zoom lenses; two-speed lens drive; alarm switch circuitry; two latching relays and two non-latching relays for auxiliary functions.

The following optional components shall be provided:

1. Modem for direct interface with Telco 3002 line to permit system communication over phone lines. (This capability shall not be provided only supported.)
2. Preset-position drive for pan, tilt, zoom, and focus functions for up to ten (10) presets.
3. Variable-speed option for control of variable-speed pan and tilt.

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4. Failure switchover circuit to allow system communications to other receivers to function in case of the failure of the receiver in which the switchover circuit is resident.
5. Automatic iris-close circuitry to close lens iris in case of failure of power to the camera or in case of loss of video output from camera.
6. Heater and thermostat for environments with temperatures below 32 degrees F or 0 degrees C.

Input power to the receiver shall be 120 V, 60 Hz. There shall be two model variations, one providing 24 VAC output to the pan and tilt and one providing 120 VAC output to the pan and tilt.

The receiver shall be compatible with the provided video controller systems and Bush IAH compatible.

- V. VIDEO FIBER TRANSMITTER/RECEIVER (T): The devices provided shall operate on one fiber and provide unidirectional transmission of video signals from a CCTV camera to a remote point. Video shall be real time with at least a 15 MHz bandwidth. Optical power AGC shall be used to ensure reliable trouble free operation and no maintenance. All electrical connections shall be with screw type terminals. Bi-color LED's shall be used to indicate received optical power and video status.

The following specifications shall be met:

Video bandwidth: 15 MHz(+0,-3dB)
Video I/O Level: 1 VPP into 75 OHM
SNR - Video: 70dB typical
Differential Phase: .5 deg typical
Differential Gain: .5% typical
TILT: .5% typical
Optical Wavelength: 1300nm
Optical Connectors: Type ST, metallic
Maximum Optical Attenuation: 13dB using 62.5u Fiber
Power Requirement: 24 VAC
Temperature Requirement: -20 to +50 C
Maximum Size Module): 4.5 D X 7.5 W X 2 H (inches)

Mounting for the equipment shall be either in a modular form for field mounting or in a card cage. Card cage mounting shall be accomplished by installing up to 17 units in a single 5 1/2 X 19 X 12 inch card cage. All units will plug in from the front and have all interface wiring accessible from the rear. Power to the card cage shall be made by a four contact connector on the rear panel of the card cage.

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- W. MONITOR: The monitor shall be a color video monitor-with 13 inch (33cm) picture tube. It shall be designed for EIA NTSC standard color composite video signal (1.0 V p-p, 75 ohm), and it shall have a resolution of 270 lines (center). Geometric distortion shall not exceed 3%. Front panel controls shall include power on/off, vertical hold, brightness, contrast, color, and tint. A slide switch for video termination shall be located on the rear panel. Loop-through video output shall be provided, and both input connectors shall be BNC. The monitor shall include a built-in speaker. Input and output connectors for the speaker shall be RCA-type jacks.

Input power shall be 105-128 V, 60 Hz. Power consumption shall be 72 W. The weight shall not exceed 24.7 lb (12.6 kg). The monitor shall be UL listed and comply with the FCC limits for a Class A computing device in accordance with the specifications in Subpart 3 of Part 15 of FCC rules.

- X. VIDEO MULTIPLEXER (T.1): The device provided shall simultaneously transmit unidirectional video and bi-directional audio and data on a single optical fiber. Video shall be real time with at least an 8 Hz bandwidth. The audio input/output circuits shall support 600 OHM balanced or unbalanced operation and + 10 dBm maximum audio input. The data input/output circuits shall support RS-232, RS-422, TTL, Manchester, Bi-phase, or Relay contacts. All electrical connections shall be with screw type terminals. Bi-color LED's shall be used to indicate received optical power, video status, and audio modulation.

The following specifications shall be met:

Video Bandwidth: 8 MHz
Audio bandwidth: 10 KHZ
Video I/O Level: 1 VPP into 75 OHM
Audio I/O: 1 Vrms into 600 OHM
SNR - Video: 60 dB typical
Audio: 40 dB typical
Optical Wavelength: 800 nM
Optical Connectors: Type ST, metallic
Maximum Optical Attenuation: 13 dB using 62.5u Fiber
Power Requirement: 24 VAC
Temperature Requirement: -20 to +50 C

Mounting for the equipment shall be either in a modular form for field mounting or in a card cage., Card cage mounting shall be accomplished by installing up to 8 units in a single 5 1/2 x 19 x 12 inch card cage. All units will plug in from the front and have all

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interface wiring accessible from the rear. A four contact connector shall provide power to the card cage on the rear panel of the card cage.

1.04 SUBMITTALS

- A. Follow Section 01340.
- B. Product Data: Manufacturer's cut sheets and catalog data.
- C. Installation procedures.
- D. Code compliance certifications.
- E. Record Documents: Follow Section 01700.

1.05 QUALITY ASSURANCE

- A. Follow Section 01450.

1.06 WARRANTY

PART 2- PRODUCTS

2.01 MANUFACTURERS

- A. Card Reader: Access Specialties or Department of Aviation approved equivalent
- B. Card Reader (External Only): Access Specialties or Department of Aviation approved equivalent
- C. Card Reader/PIN: Access Specialties or Department of Aviation approved equivalent
- D. Contact: Sentrol or Department of Aviation approved equivalent
- E. Magnetic Lock: ROFU or Department of Aviation approved equivalent
- F. Field Controllers (Multiplexer, Card Reader Interface) and Intelligent Field Controllers: Access Specialties or Department of Aviation approved equivalent
- G. Fiber Transmission Module: Fiber Options, Inc. or Department of Aviation approved equivalent
- H. Panic Hardware with contact: Von Duprin or Department of Aviation approved equivalent

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- I. Door Closer/Hold Open Device: Yale Power Track or Department of Aviation approved equivalent
- J. Remote Video Controller: Vicon or Department of Aviation approved equivalent
- K. Zoom Lens: Vicon or Department of Aviation approved equivalent
- L. Fixed Lens: Vicon or Department of Aviation approved equivalent
- M. Interior and Exterior Camera Housing: Vicon or Department of Aviation approved equivalent
- N. Pan and Tilt Drive: Vicon or Department of Aviation approved equivalent
- O. Camera Mount: Vicon or Department of Aviation approved equivalent
- P. Camera: Vicon or Department of Aviation approved equivalent
- Q. PTZ Receiver/Driver: Vicon or Department of Aviation approved equivalent
- R. Video Fiber Transmitter/Receiver: Fiber Options, Inc. or Department of Aviation approved equivalent
- S. Monitor: Vicon or Department of Aviation approved equivalent
- T. Video Multiplexer: Fiber Options, Inc. or Department of Aviation approved equivalent
- U. Local Area Network Equipment – Chassis, Power Supply, Fiber Optic Control Card, Diagnostic Card, RS-422/485 Channel Card, Ethernet Controller, RS-232 Channel Card and Current Loop Custom Software Card: OPCOM or Department of Aviation approved equivalent
- V. Ethernet Transceiver and Lead Activated Switch: Black Box or Department of Aviation approved equivalent

2.02 MATERIALS

- A. Field Controllers (Multiplexer CE-1600, Card Reader Interface RI-130) and Intelligent Field Controllers IC-1600: Access Specialties or Department of Aviation approved equivalent
- B. Fiber Transmission Module: Fiber Options, Inc. Models XR-1100A, XR-1101 or Department of Aviation approved equivalent
- C. Remote Video Controller: Vicon or Department of Aviation approved equivalent
- D. Camera: Vicon Model Number V24WM or Department of Aviation approved equivalent

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- E. PTZ Receiver/Driver: Vicon Model Number V13OOR or Department of Aviation approved equivalent
- F. Video Fiber Transmitter/Receiver: Fiber Options, Inc. FX/FR-1501 or Department of Aviation approved equivalent
- G. Video Multiplexer: Fiber Options, Inc. Model FX/FR-5800 or FX/FR-5820 or Department of Aviation approved equivalent

2.03 COMPONENTS

- A. Card Reader: Access Specialties or Department of Aviation approved equivalent
- B. Card Reader (External Only): Access Specialties or Department of Aviation approved equivalent
- C. Card Reader/PIN: Access Specialties or Department of Aviation approved equivalent
- D. Zoom Lens: Vicon or Department of Aviation approved equivalent
- E. Fixed Lens: Vicon CS-G Series Lenses or Department of Aviation approved equivalent
- F. Interior and Exterior Camera Housing: Vicon Model Number V8600H-14-HT (Interior) and Model Number V8000H (Exterior) or Department of Aviation approved equivalent
- G. Pan and Tilt Drive: Vicon Model Number V3700APT-PP (Interior) and Model Number V390APT-PP (Exterior) or Department of Aviation approved equivalent
- H. Camera Mount: Vicon Model Number V24WM or Department of Aviation approved equivalent
- I. Monitor: Vicon Model Number VM613 or Department of Aviation approved equivalent

2.04 ACCESSORIES

- A. Card Reader/PIN: Access Specialties or Department of Aviation approved equivalent
- B. Contact: Sentrol Model Number 1078 W or Department of Aviation approved equivalent
- C. Magnetic Lock: ROFU Model 8011 or Department of Aviation approved equivalent
- D. Panic Hardware with contact: Von Duprin 99-F or Department of Aviation approved equivalent
- E. Door Closer/Hold Open Device: Yale Power Track or Department of Aviation approved equivalent

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PART 3- EXECUTION

3.01 EXAMINATION

- A. Follow Section 01450.

3.02 PREPARATION

- A. A Central Computer controls the Access Control Security System located in the Communication Center at Terminal A. The Central Computer communicates with field controllers, which in turn control collections of security devices located at access points. These collections of devices are referred to as configurations where each represents a unique operation and combination of parts. The configuration type assigned to the point defines the access process required by the specifications for each access point.

3.03 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data.
- B. Install each configuration listed below found on the plans with the appropriate functional description and alarm/status signals.

1. Baggage Single Door; Card Reader; Configuration B10

- a. Functional Description

- Operation of the door will be controlled by a Card Reader.
- After presentation of a valid cards the starter control is momentarily manual operation.
- Visual indication is required so the cardholder can determine if the card presented was valid/invalid. An LED indicates if the card was accepted or rejected.
- The configuration transmits specific alarm/status signal to the host.
- During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon return to on-line status.

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- This configuration can be unlocked by the central system.
- b. Alarm/Status Signals
- These signals are interpreted and evaluated by the host and used to direct appropriate response or control processes.
 - Authorized Card - valid card has been presented. Central System logs event and approves an unlock.
 - Undefined Card - a card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Area - card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Time Period - card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Expired Card - card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
 - Inactive Card - card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
 - Reader Tamper - the card reader is being tampered with. Central System logs event and reports an alarm.
 - Invalid Facility Code - the card's facility code is incorrect. Central System logs event and disapproves an unlock and reports an alarm.
 - Door Restore - the door has been closed.
 - Door Open Detect Alarm - a door is held open longer than the preprogrammed entry time.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

2. Bag Claim Belt/Makeup Door (Double); Card Reader, Monitored; Configuration B20
 - a. Functional Description
 - General: The baggage belt configuration is functionally circular with two doors (points). The operation of the two doors is interlocked so that the electrical opening of either one actualizes the opening of the other.
 - After presentation of a valid card the starter control may be manually operated. The controls are interlocked so an operation can be performed at either control.
 - Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. A LED indicates if the card was accepted or rejected.
 - The system configuration transmits specific alarm/status signal to the host.
 - During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or its controller's buffer/memory. Data will be uploaded to the system upon return to on-line status.
 - This configuration can be unlocked by the central system.
 - b. Alarm/Status Signals
 - Authorized Card - valid card has been presented. Central System logs event and approves an unlock.
 - Undefined Card - a card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Area - card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Invalid Time Period - card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Expired Card - card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
 - Inactive Card - card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
 - Door Restore - the door has been closed.
 - Reader Tamper - the card reader is being tampered with. Central System logs event and reports an alarm.
 - Door Open Detect Alarm - a door is held open longer than the programmed entry time.
 - Invalid Facility Code - the card's facility code is incorrect. Central System logs event and disapproves an unlock and reports an alarm.
3. Roll Door/Screening Checkpoint Barrier; Card Reader In, Card Reader Out, Telephone; Configuration B30
- a. Functional Description
- Closing the barrier is controlled by a Card Reader. By presenting a valid card, the gate operator mechanism is unlocked. This also initiates a close/open cycle.
 - Opening is controlled by presenting a valid card. The electric gate operator mechanism is unlocked. This also initiates a close/open cycle.
 - Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. A LED indicates if the card was accepted or rejected.
 - System will report specified alarm conditions to Central Control Computer.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- The configuration transmits specific alarm/status signal to the host.
- During degraded/off-line operations, reader transaction data of reader access will be maintained in the reader's local buffer. Data will be uploaded to system upon restoration of on-line conditions.

b. Alarm/Status Signals

- Authorized Card - valid card has been presented. Central System logs event and approves an unlock.
- Undefined Card - a card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
- Invalid Area - card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
- Invalid Time Period - card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports and alarm.
- Expired Card - card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
- Inactive Card - card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
- Reader Tamper - either of the card readers are being tampered with. Central System logs event and reports an alarm.
- Invalid Facility Code - a card with an incorrect facility code has been presented. Central System logs the event, disapproves the gate operator cycle, and reports an alarm.

4. Bag Makeup Scissor Door; Key Locking, Monitored; Configuration B40

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- a. Functional Description
 - Ingress/Egress is controlled by a manual keyed lock.
 - The doors open or close status is monitored by the Access Control System.
 - b. Alarm/Status Signals
 - This signal is used to direct an appropriate response effort.
 - Door Status Indicator - the door is closed/open
5. Mechanical Roll Door; Card Reader, Electric Operator, Electric Lock; Configuration B50
- a. Functional Description
 - Operation of the roll door is mechanical. When lowered, the roll door magnetic lock activates. When closed and locked the magnetic lock is released by use of a Card Reader. By presenting a valid card the magnetic lock releases and the door can be raised.
 - Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
 - The configuration transmits specific alarm/status signal to the host.
 - During degraded/off-line operation, reader transaction data reader access will be maintained in either the reader's or it's controller's buffer / memory. It is preferred that controller memory be utilized. Data will be uploaded to system upon restoration of online conditions.
 - This configuration can be unlocked by the central system.
 - b. Alarm/Status Signals
 - Authorized Card - valid card has been presented. Central System logs event and approves an unlock.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Undefined Card - a card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Area - card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Time Period - card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports and alarm.
 - Expired Card - card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
 - Inactive Card - card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
 - Door Restore - The door has been closed
 - Door Open Detect Alarm - A door is held open longer than the programmed entry time.
 - Invalid Facility Code - The card's facility code is incorrect. Central System logs even and disapproves an unlock and reports an alarm.
 - Reader Tamper - The card reader is being tampered with. Central System logs event and reports an alarm.
6. Single Emergency Door, Monitored; Configuration C10
- a. Functional Description
- Ingress into a facility from the AOA will be denied by manual lock.
 - Egress to the AOA will be controlled by door panic hardware.
 - Door will lock automatically on closure.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- The Access Control System detects an opening and displays the event.
 - When the door is opened a local audible alarm will sound.
 - This configuration is normally covered by a video camera. See drawings for specific coverage.
- b. Alarm/Status Signals
- Door Status Indicator - the door is closed/open
7. Double Emergency Door, Monitored; Configuration C20
- a. Functional Description
- Ingress into a facility from the AOA will be denied by manual lock.
 - Egress to the AOA will be controlled by each doors panic hardware.
 - Doors will lock automatically on closure.
 - The Access Control System detects an opening, and displays the event.
 - When either door leaf is opened a local audible alarm will sound.
 - This configuration is normally covered by a video camera. See drawings for specific coverage.
- b. Alarm/Status Signals,
- Door Status Indicator - either door leaf is closed/open.
8. Personnel Door (Low Volume), Card Reader/Pin Pad In, Card Reader Out, Electric Lock, Monitored; Configuration D10
- a. Functional Description
- Ingress to the AOA will be controlled by a Card Reader/PIN combination. By presenting a valid card and entering a valid PIN number the doors will unlock permitting entry.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Egress from the AOA will be primarily controlled by a Card Reader. By presenting a valid card, the door will unlock permitting exit.
 - Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
 - System will report specified alarm conditions to the Access Control System.
 - During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
 - This configuration can be unlocked by the central system.
 - This configuration is normally covered by a video camera. See drawings for specific coverage.
- b. Alarm/Status Signals
- Authorized Card - Valid card has been presented. Central System logs event and approves an unlock
 - Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card.
 - Central System togs event and disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
 - Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
 - Duress PIN - A cardholder has entered a specified PIN code for a duress condition. Central System logs the transaction, approves an unlock and initiates an alarm at central station.
 - Invalid PIN - Cardholder has attempted entry using the wrong PIN number. Central system logs event and disapproves the unlock and reports an alarm.
 - Door Open Detect Alarm - A door is held open longer than the programmed entry time.
 - Invalid Facility Code - The card's facility code is incorrect. System logs event and disapproves unlock and reports an alarm.
 - Door Restore - The door has been closed.
 - Reader Tamper - The card reader is being tampered with. Central System logs event and reports an alarm.
9. Flight Station Door; Card Reader/PIN Pad In, Card Reader Out, Electric Lock, Monitored, Crash Hardware; Configuration D20
- a. Functional Description
- Ingress to the AOA will be controlled by a Card Reader/PIN combination. By presenting a valid card and entering a valid PIN number the doors will unlock permitting entry.
 - Egress from the AOA will be primarily controlled by a Card Reader. By presenting a valid card, the door will unlock permitting exit. Egress may also be accomplished by utilizing the crash hardware.
 - Door will automatically lock on closure.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
 - System will report specified alarm conditions to the Access Control System.
 - During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
 - This configuration can be unlocked by the central system.
 - This configuration is normally covered by a video camera. See drawings for specific coverage.
 - Under central system control, a magnetic door holder is energized. Under completion of a system-defined time, the door will be released. Door Open Detect alarm will be by-passed for duration of timer cycle.
- b. Alarm/Status Signals
- These signals are interpreted and evaluated by the host and used to direct an appropriate response or control process.
 - Authorized Card - Valid card has been presented. Central System logs event and approves an unlock.
 - Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
 - Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
 - Door Restore - The door has been closed.
 - Reader Tamper - Either of the card readers are being tampered with. Central System logs event and reports an alarm.
 - Door Open Detect Alarm - A door is held open longer than the programmed entry time.
 - Duress PIN - A cardholder has entered a specified PIN code for a duress condition. Central System logs the transaction, approves an unlock and initiates an alarm at central station.
 - Invalid PIN - Cardholder has attempted entry using the wrong PIN number. Central system logs event and disapproves the unlock and reports an alarm.
 - Invalid Facility Code - The card's facility code is incorrect. Central System logs event and disapproves unlock and reports an alarm.
10. Personal Operational Door (Low/High Volume), Card Reader/PIN In, Card Reader Out, Magnetic Lock, Monitored; Configuration D30
- a. Functional Description
- Ingress to the AOA will be controlled by a Card Reader/PIN combination. By presenting a valid card and entering a valid PIN number, the doors will unlock permitting entry.
 - Egress from the AOA will be primarily controlled by a Card Reader. By presenting a valid card, the door will unlock permitting exit.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
- This configuration can be unlocked by the central system.
- This configuration is normally covered by a video camera. See drawings for specific coverage.
- Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
- System will report specified alarm conditions to the Access Control System.
- NOTE: Certain doors may have telephones or intercoms.

b. Alarm/Status Signals

- Authorized Card - Valid card has been presented. Central System logs event and approves an unlock.
- Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
- Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
- Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
- Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
 - Door Restore - The door has been closed.
 - Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves and unlock and reports an alarm.
 - Reader Tamper - Either of the card readers are being tampered with. Central System logs event and reports an alarm.
 - Door Open Detect Alarm - A door is held open longer than the preset time, which is adjustable.
 - Duress PIN - A cardholder has entered a specified PIN code for a duress condition. Central System logs the transaction, approves an unlock and initiates an alarm at central station.
 - Invalid PIN - Cardholder has attempted entry using the wrong PIN number. Central System logs event and disapproves the unlock and reports an alarm.
 - Invalid Facility Code - The card's facility code is incorrect. Central System logs event and disapproves an unlock and reports an alarm.
11. Personnel Door, Key Locking; Configuration D40
- a. Functional Description
 - Not Controlled
 - b. Alarm/Status Signals
 - N/A
12. Operational/Emergency Hybrid Door; Card Reader/Pin Pad In, Card Reader Out, Magnetic Lock, Monitored; Configuration D50

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

a. Functional Description

- Primary AOA Ingress is controlled by a Card Reader/PIN combination. By presenting a valid card and entering a valid PIN number the doors will unlock permitting entry. Secondary (emergency only) ingress to the AOA will be controlled by door panic hardware. Actuation of the panic hardware will unlock the door. The door will also unlock automatically in a power outage.
- Egress from the AOA is controlled by a Card Reader. By presenting a valid card, the door will unlock, permitting exit. Door will lock automatically on closure.
- Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid, an LED indicates if the card was accepted or rejected.
- During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
- This configuration can be unlocked by the central system.
- This configuration is normally covered by a video camera. See drawings for specific coverage.
- NOTE: Certain doors may have telephones or intercoms.
- Door position contact enables close/open status to be monitored.
- Due to the hybrid nature of this configuration, (part fire door and part operational door) it is monitored so as to differentiate between a normal and emergency opening. When the door is opened without utilizing the card reader, an emergency open is defined.
- System will report specified alarm conditions to Access Control System.

b. Alarm/Status Signal

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Authorized Card - Valid card has been presented. Central System logs event and approves an unlock.
- Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
- Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
- Invalid Time Period - Card has been presented at time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and an alarm.
- Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.
- Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
- Door Restore - The door has been closed.
- Header Tamper - Either of the card readers are being tampered with. Central system logs event and reports an alarm.
- Door Open Detect Alarm - A door is held open longer than the programmed entry time.
- Duress PIN - A cardholder has entered a specified PIN code for a duress condition. Central System logs the transaction, approves an unlock and initiates an alarm at central station.
- Invalid PIN - Cardholder has attempted entry using the wrong. PIN number. Central System logs event and disapproves the unlock and reports an alarm.
- Invalid Facility Code - The card's facility code is incorrect. Central System logs event and disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

13. Operational Gate (High Volume); Card Reader/PIN Pad In, Card Reader Out, Electric Gate Operator, Monitored; Configuration G10

a. Functional Description

- Ingress to the AOA will be controlled by a Card Reader/PIN combination. By presenting a valid card and entering a valid PIN number the gate operator will cycle permitting entry.
- Egress from AOA will be controlled by a Card Reader. By presenting a valid card, the gate operator will cycle permitting exit.
- During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
- This gate operator, of this configuration, can be a cycled by the central system.
- This configuration is normally covered by a video camera. See drawings for specific coverage.
- NOTE: Certain gate may have telephones or intercoms.
- Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicated if the card was accepted or rejected.
- System will report specified alarm conditions to Access Control System.

b. Alarm/Status Signals

- Authorized Card - Valid card has been presented. Central System logs event and approves a gate operator cycle.
- Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves a gate operator cycle and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves a gate operator cycle and reports an alarm.
 - Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves a gate operator cycle and reports an alarm.
 - Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves a gate operator cycle and reports an alarm.
 - Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves a gate operator cycle and reports an alarm.
 - Gate Restore - The gate has been closed
 - Reader Tamper - Either of the card readers are being tampered with. Central System logs event and reports an alarm.
 - Gate Open Detect Alarm - The gate is held open longer than the programmed entry time.
 - Duress PIN - A cardholder has entered a specified PIN code for a duress condition Central System logs the transaction, approves a gate operator cycle, and initiates an alarm at the central station.
 - Invalid PIN - Cardholder has attempted entry using the wrong PIN number. Central System logs event and disapproves the gate operator cycle and reports an alarm.
 - Invalid Facility Code - A card with an incorrect facility code has been presented. Central System logs the event and disapproves the gate operator cycle and reports an alarm.
14. Taxiway Slide Gate; with Card Reader, Controlled Opener, Electronic Alarm, (Gate Openers); Configuration G20

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

a. Functional Description

- The primary means of Opening/Closing will be controlled by a Card Reader. By presenting a valid card, the gate operator is actualized. The gate will Open and remain open until another valid Card Read.
- An alternate opening process may be used in the event that personnel are unavailable locally to open the gate for an aircraft approaching during off-hours. After the approaching aircraft has communicated via UNICOM radio, authorized Airport Operations Control Center personnel will utilize this configuration for aircraft passage.
- Visual indication is required so the cardholder can determine if the card presented Valid/Invalid. An LED indicates if the card was accepted or rejected.
- System will report specified alarm conditions to the Access Control System.
- During degraded/off-line operations, reader transaction data access will be maintained in the reader's local buffer. Data will be uploaded to the system upon restoration of on-line conditions.
- Note: For reduced visibility, strobe, obstruction light and etc.
- A UNICOM radio (with spare backup) will be located in Airport Operations. Appropriate signage will notify pilot of frequencies and procedures.

b. Alarm/Status Signals

- Authorized Card - Valid card has been presented. Central System logs event and approves a gate operator cycle.
- Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event, disapproves a gate operator cycle, and reports an alarm.
- Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event, disapproves a gate operator cycle, and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event, disapproves a gate operator cycle, and reports an alarm.
 - Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event, disapproves a gate operator cycle, and reports an alarm.
 - Inactive Card - Card that is programmed in the system as inactive is presented Central System logs event, and disapproves a gate operator cycle, and reports an alarm.
 - Door Restore - The door has been closed.
 - Reader Tamper - The Card reader is being tampered with. Central System logs event and reports an alarm.
 - Door Open Detect Alarm - A gate is held open longer than the programmed entry time.
 - Invalid Facility Code - The card's facility code is incorrect. Central System logs event, disapproves an unlock, and reports an alarm.
15. Operational Gate (Low Volume); Card Reader/Pin Pad Controlled, Monitored, Electric Gate Operator; Configuration G30
- a. Functional Description
- Gate operation will be controlled by a Card Reader/PIN pad combination. By presenting a valid card and entering a valid PIN number the gate operator will cycle, permitting entry. NOTE: In the case of certain one-way gates, the card reader/pin pad may be installed on either side of gate.
 - Operation of the gate from the non-secure side (see Note in I.A., above) will be controlled via a ground loop. NOTE: In the case of certain one way gates, the ground loop may not be installed. See drawings for detail.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
 - System will report specified alarm conditions to the Access Control System.
 - During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or its controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
 - This gate operator of this configuration can be cycled by the central system.
 - This configuration is normally covered by a video camera. See drawings for specific coverage.
 - NOTE: Certain gates may have telephones or intercoms.
 - System will report specified alarm conditions to Access Control System.
- b. Alarm/Status Signals
- Authorized Card - Valid card has been presented. Central System logs event and approves a gate operator cycle.
 - Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves a gate operator cycle and reports an alarm.
 - Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves a gate operator cycle and reports an alarm.
 - Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event, disapproves a gate operator cycle and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event, disapproves a gate operator cycle, and reports an alarm.
 - Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event, disapproves a gate operator cycle and reports an alarm.
 - Door Restore - The door has been closed
 - Reader Tamper - The card reader is being tampered with. Central System logs event and activates local audible alarm and reports an alarm.
 - Door Open Detect Alarm - The gate is held open longer than the programmed entry time.
 - Duress PIN - A cardholder has entered a specified PIN code for a duress condition. Central System logs the transaction, approves a gate operator cycle and initiates an alarm at central station.
 - Invalid PIN - Cardholder has attempted entry using the wrong PIN number. Central System logs event, disapproves the gate operator cycle, and reports an alarm.
 - Invalid Facility Code - A card with an incorrect facility code has been presented. Central System logs the event, disapproves the gate operator cycle, and reports an alarm.
16. Video, Interior, Pan, Tilt, Zoom; Configuration V10
- a. Functional Description
- Unit will be used to provide CCTV surveillance of a specified area or activity, from a fixed location. It will assist in the assessment of security conditions, enabling security personnel to respond appropriately.
 - The CCTV system will operate under microprocessor control, and be capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Unit will be a Pan/Tilt/Zoom type; mounted indoors. It will be capable of 360-degree pan, 90-degree tilt, and of zoom focusing.
 - Options: the following are optional methods of mounting the Pan/Tilt/Zoom camera units:
 - 1 Mounted in a Ceiling Dome enclosure
 - 2 Wall mounted in a regular enclosure
 - b. Alarm/Status Signals
 - NONE
17. Video, Interior, Wide Angle; Configuration V20
- a. Functional Description
 - Unit will be used to provide CCTV surveillance of a specified area or activity, from a fixed location. It will assist in the assessment of security conditions, enabling security personnel to respond appropriately.
 - The CCTV system will operate under microprocessor control, and be capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching.
 - In addition to the camera being housed in a fixed location, a wide-angle lens will be used to increase the camera's field of view.
 - Options: the following are optional methods of mounting the camera:
 - 1 Mounted in a Ceiling Enclosure
 - 2 Wall mounted in a regular enclosure
 - b. Alarm/Status Signals
 - NONE
18. Video, Exterior, Pan, Tilt, Zoom; Configuration V30

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

a. Functional Description

- Unit will be used to provide CCTV surveillance of a specified activity, from a fixed location. It will assist in the assessment of conditions, enabling security personnel to respond appropriately.
- Is the camera under microprocessor/video controller control, and capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching?
- Unit will be a Pan/Tilt/Zoom type, mounted outdoors. It will be capable of 360-degree pan, 90-degree tilt, and of zoom focusing.
- Exterior mounted cameras will be housed in an environmental structure.

b. Alarm/Status Signals

- NONE

19. Video, Exterior, Wide Angle; Configuration V40

a. Functional Description

- Unit will be used to provide CCTV surveillance of a specified area or activity, from a fixed location. It will assist in the assessment of security conditions, enabling security personnel to respond appropriately.
- The CCTV system will operate under microprocessor control, and be capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching.
- In addition to the camera being housed in a fixed location, a wide-angle lens will be used to increase the camera's field of view.
- Exterior mounted camera's will be placed in an environmental enclosure.

b. Alarm/Status Signals

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- NONE

20. Elevator Door; Card Reader; Configuration E10

a. Functional Description

- Operation of the elevator door controller will be controlled by a Card Reader. By presenting a valid card the elevator door controller's operation will be permitted.
- Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
- System will report specified alarm conditions to Access Control System.
- During degraded/off-line operations, reader transaction data access will be maintained in either the reader's or it's controller's buffer/memory. It is preferred that controller memory be utilized. Data will be uploaded to the system upon restoration of on-line conditions.
- The elevator door controller of this configuration can be a cycled by the central system.

b. Alarm/Status Signals

- These signals are interpreted and evaluated by the host and used to direct an appropriate response or control process.
- Authorized Card - Valid card has been presented. Central System logs event and approves an unlock.
- Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event, disapproves an unlock and reports an alarm.
- Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event, disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event, disapproves an unlock and reports an alarm.
- Expired Card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event, disapproves an unlock and reports an alarm.
- Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
- Alarm Restore - The controller has been used, another read will be necessary
- Reader Tamper - Either of the card readers are being tampered with. Central System logs event and reports an alarm.
- Invalid Facility Code - The card's facility code is incorrect. Central System logs event, disapproves an unlock, and reports an alarm.

21. Door Opener Package, Remote: Card Reader, CCTV Camera, and Intercom;
Configuration X10

a. Functional Description

- General: This package is designed to be installed on any controlled door and permit it to be opened from a remote location and admit an individual air crewmember.
- A card reader is installed in a specified area remote from the door (typically a tenant operations area). Operation of this card reader will cause to remote door to unlock.
- A CCTV camera is installed at the remote door to provide visual identification of an individual requesting entry.
- An intercom station is at each location for facilitating of conversation. This configuration package may be replicated at a specified location to permit opening from several remote sites.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- The door is controlled by a Card Reader. By presenting a valid card at the local reader, the remote door's magnetic lock is released/opened.
 - Visual indication is required so the cardholder can determine if the card presented was Valid/Invalid. An LED indicates if the card was accepted or rejected.
 - System will report specified alarm conditions to Access Control System.
 - During degraded/off-line operations, reader transaction data access will be maintained in the reader's local buffer. Data will be uploaded to the system upon restoration of on-line conditions.
 - A CCTV camera permits observation and recognition of an individual at the remote location.
- b. Alarm/Status Signals
- Authorized Card - Valid card has been presented. Central System logs event and approves an unlock.
 - Undefined Card - A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Area - Card has been presented at a reader that is not part of the readers assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Invalid Time Period - Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves an unlock and reports an alarm.
 - Expired card - Card that is presented has been programmed to be inactive after a specific time period. Central System logs event and disapproves an unlock and reports an alarm.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- Inactive Card - Card that is programmed in the system as inactive is presented. Central System logs event and disapproves an unlock and reports an alarm.
- Alarm Restore - The controller has been used, another read will be necessary.
- Reader Tamper - Either of the card readers are being tampered with. Central System logs event and reports an alarm.
- Door Open Detect Alarm - A door is held open longer than the programmed entry time.
- Invalid Facility Code - The card's facility code is incorrect. System logs event and disapproves an unlock and reports an alarm.

3.04 CONTRACTOR'S FIELD QUALITY CONTROL

- A. The contractor shall submit a complete test plan and procedures that shall, at a minimum, include specific testing of these criteria for each configuration described in 3.03 of this section.
- B. Baggage Single Door; Card Reader; Configuration B10
 1. After presentation of a valid card, will the belt starter control manually operate?
 2. Does an LED indicate if the card was accepted or rejected?
 3. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy.
 4. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented.
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- d. Invalid Time Period - If a card is presented at a time that is not as a valid time assigned to that card.
 - e. Expired Card - an expired card is presented.
 - f. Inactive Card - a card that is programmed in the system as inactive is presented.
 - g. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - h. Reader Tamper - the card reader is being tampered with.
 - i. Invalid Facility Code - When a card with an incorrect facility code is presented.
 - j. Door Restore - Recognize that the door is closed and permit another card read?
- C. Bag Claim Belt/Makeup Door (Double); Card Reader, Monitored; Configuration B20
- 1. After presentation of a valid card, will the belt starter control manually operate?
 - 2. Does an LED indicate if the card was accepted or rejected?
 - 3. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy.
 - 4. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented.
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.
 - d. Invalid Time Period - If a card is presented at a time that is not as a valid time assigned to that card.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- e. Expired Card - When an expired card is presented.
 - f. Inactive Card - when a card that is programmed in the system as inactive is presented.
 - g. Reader Tamper - The card reader is being tampered with.
 - h. Door/Contact Status - The door is open or closed.
 - i. Invalid Facility Code - When a card with an incorrect facility code is presented.
- E. Bag Makeup Scissor Door; Key Locking, Monitored; Configuration B40
- 1. Does the Access Control System detect the door is open and display that condition?
 - 2. Does the keyed lock secure door?
- F. Mechanical Roll Door; Card Reader, Electric Operator, Electric Lock; Configuration B50
- 1. When the door contacts the floor, does the electric lock operate and secure the door?
 - 2. After presentation of a valid card, will the door electric lock unlock / release?
 - 3. Does an LED indicate if the card was accepted or rejected?
 - 4. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy.
 - 5. Can this door be remotely unlocked by the central system?
 - 6. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented.
 - b. Undefined Card - when a card that is not in the system is presented.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- c. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.
- d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
- e. Expired Card - when an expired card is presented.
- f. Inactive Card - when a card that is programmed in the system as inactive is presented.
- g. Door Open Detect Alarm - If the doors are held open longer than the programmed entry time.
- h. Reader Tamper - When the card reader is being tampered with.
- i. Invalid Facility Code - When a card with an incorrect facility code is presented.
- j. Door Restore - Recognize that the door is closed and permit another card read.

G. Single Emergency Door, Monitored; Configuration C10

- 1. Does utilization of the door panic hardware unlock the door when actuated?
- 2. Does the door lock automatically on closure?
- 3. Does the Access Control System detect the door is open and display that condition?
- 4. Is video coverage of the door adequate?
- 5. Does a local audible alarm sound when the door is opened?

H. Double Emergency Door, Monitored; Configuration C20

- 1. Does utilization of the door panic hardware unlock the door when actuated?
- 2. Do the doors lock automatically on closure?

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

3. Does the Access Control System detect that door(s) are open and display that condition?
 4. Is video coverage of the doors adequate?
 5. Does a local audible alarm sound when either door leaf is opened?
- I. Personnel Door (Low Volume), Card Reader/Pin Pad In, Card Reader Out, Electric Lock, Monitored; Configuration D10
1. Is the door unlocked when a valid card is presented and a valid pin number entered?
 2. By presenting a valid card at the egress side, does the door unlock permitting exit?
 3. Does an LED indicate if the card was accepted or rejected?
 4. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory / buffer uploaded to the system upon return to normalcy?
 5. Can this door be remotely unlocked by the central system?
 6. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented.
 - b. Undefined Card - when a card that is not in the system is presented.
 - c. Invalid Area - when a card is presented at a reader that is not part of the readers assigned to that card.
 - d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - When an expired card is presented.
 - f. Inactive Card - when a card that is programmed in the system as inactive is presented.
 - g. Door Contact Status - The door is open or closed.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- h. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - i. Reader Tamper - The reader is being tampered with.
 - j. Invalid Facility Code - When a card with an incorrect facility code is presented.
 - k. Door Restore - Recognize that the door is closed and permit another card read.
 - l. Duress PIN - If a cardholder has entered a duress condition PIN code:
 - Log the transaction;
 - Approves an unlock and;
 - Initiate an alarm at central station.
 - m. Invalid PIN - If a Cardholder has attempted entry by using the wrong PIN number.
- J. Flight Station Door; Card Reader/PIN Pad In, Card Reader Out, Electric Lock, Monitored, Crash Hardware; Configuration D20
- 1. Upon an attempt to ingress, does the door unlock by presenting a valid card?
 - 2. Upon an attempt to egress from the AOA, by presenting a valid card, does the door unlock permitting exit?
 - 3. Does the secondary egress measure door panic hardware and unlock the door when actuated?
 - 4. Does the door unlock automatically drives a power outage?
 - 5. Does the door automatically lock on closure?
 - 6. Is there a visual indication/LED that indicates if the card was accepted or rejected?

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

7. Does the central system control activate a magnetic door holder when the Ingress card reader is utilized? Is the door released upon completion of the system-defined time? Is the Door Open Detect alarm by-passed for duration of timer cycle?
8. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy?
9. Can this door be remotely unlocked by the central system?
10. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented and a valid PIN number is entered.
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.
 - d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - when an expired card is presented.
 - f. Inactive Card - When a card that is programmed in the system as inactive is presented.
 - g. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - h. Door/Contact Status - The door is open or closed.
 - i. Reader Tamper - When the card reader is being tampered with.
 - j. Invalid Facility Code - When a card with an incorrect facility code is presented.
 - k. Door Restore - Recognize that the door is closed and permit another card read.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- l. Duress PIN - If a cardholder has entered a duress condition PIN code:
 - Log the transaction;
 - Approve an unlock;
 - Initiate an alarm at central station.
 - m. Invalid PIN - If a cardholder has attempted entry by using the wrong PIN number.
- K. Personal Operational Door (Low/High Volume), Card Reader/PIN In, Card Reader Out, Magnetic Lock, Monitored; Configuration D30
1. Upon an attempt to ingress, does the door unlock by presenting a valid card and entering a valid PIN number?
 2. Upon an attempt to egress from the AOA, by presenting a valid card, does the door unlock permitting exit?
 3. Does the door unlock automatically in a power outage?
 4. Does the door automatically lock on closure?
 5. Is there a visual indication/LED that indicates if the card was accepted or rejected?
 6. After return to an on-line status are the stored reader access transactions maintained in either the reader or the controller's memory/buffer uploaded to the system upon return to normalcy?
 7. Can this door be remotely unlocked by the central system?
 8. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented (and a valid PIN entered).
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - when an expired card is presented.
 - f. Inactive Card - When a card that is programmed in the system as inactive is presented.
 - g. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - h. Door/Contact Status - The door is open or closed.
 - i. Reader Tamper - When the card reader is being tampered with.
 - j. Invalid Facility Code - When a card with an incorrect facility code is presented.
 - k. Door Restore - Recognize that the door is closed and permit another card read.
 - l. Duress PIN - If a cardholder has entered a duress condition PIN code:
 - Log the transaction;
 - Approve an unlock;
 - Initiate an alarm at central station.
 - m. Invalid PIN - If a cardholder has attempted entry by using the wrong PIN number.
- L. Personnel Door, Key Locking; Configuration D40
- 1. Does a lock secure the door?
- M. Operational/Emergency Hybrid Door; Card Reader/Pin Pad In, Card Reader Out, Magnetic Lock, Monitored; Configuration D50
- 1. Upon an attempt to ingress, does the door unlock by presenting a valid card and entering a valid PIN number?

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

2. Upon an attempt to egress from the AOA, by presenting a valid card, does the door unlock permitting exit?
3. Does the door unlock automatically during in a power outage?
4. Does the door automatically lock on closure?
5. Is there a visual indication/LED that indicates if the card was accepted or rejected?
6. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy?
7. Can this door be remotely unlocked by the central system?
8. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented (and a valid PIN entered).
 - b. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - c. Reader Tamper - When the card reader is being tampered with.
 - d. Invalid Facility Code - When a card with an incorrect facility code is presented.
 - e. Door Restore - Recognize that the door is closed and permit another card read.
 - f. Duress PIN - If a cardholder has entered a duress condition PIN code:
 - Log the transaction;
 - Approves an unlock;
 - Initiate an alarm at the central station.
 - g. Invalid PIN - If a cardholder has attempted entry by using the wrong PIN number.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- h. Undefined Card - When a card that is not in the system is presented.
 - i. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.
 - j. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - k. Expired Card - when an expired card is presented.
 - l. Inactive Card - When a card that is programmed in the system as inactive is presented.
 - m. Reader Tamper - The reader is being tampered with.
 - n. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - o. Door/Contact Status - The door is open or closed.
 - p. Does actuation of the door panic hardware unlock the door when actuated?
 - q. Does the system detect emergency door open and display that condition?
- N. Operational Gate (High Volume); Card Reader/PIN Pad In, Card Reader Out, Electric Gate Operator, Monitored; Configuration G10
- 1. Does utilizing a valid Card Reader and entering a valid Pin Number control ingress? Does the sequential presentation and entry actualize the gate operator, permitting entry?
 - 2. Does utilizing a valid Card Reader control egress? Does presenting a valid card actualize the gate operator, permitting exit?
 - 3. Does contact with the gate safety edge prevent closing?
 - 4. After return to an on-line status are the reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy?
 - 5. Can the gate operator be cycled by the central system?

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

6. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - When a valid card is presented.
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - when a card is presented at a reader that is not part of the readers assigned to that card.
 - d. Invalid Time Period - When a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - when an expired card is presented.
 - f. Inactive Card - when a card that is programmed in the system as inactive is presented.
 - g. Reader Tamper - The card reader is being tampered with.
 - h. Gate/Contact Status - The gate is open or closed.
 - i. Gate Open Detect Alarm - When the gate is held open longer than the programmed entry time.
 - j. Invalid Facility Code - when a card with an incorrect facility code is presented.
 - k. Door Restore - Recognize that the door is closed and permit another card read.
 - l. Duress PIN - If a cardholder has entered a duress condition PIN code:
 - Log the transaction;
 - Approve the gate operator cycle;
 - Initiate an alarm at central station.
 - m. Invalid PIN - A cardholder has attempted entry by using the wrong PIN number.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- O. Taxiway Slide Gate; with Card Reader, Controlled Opener, Electronic Alarm, (Gate Openers); Configuration G20
 - 1. Does a Card Reader control Opening/Closing cycle at a remote location from the gate?
 - 2. Does the gate remain open until another valid Card Read?
 - 3. Can an approaching aircraft in the general vicinity of the gate, communicate with the operations center via UNICOM radio?
 - 4. Does appropriate signage notify pilot of frequencies and procedures?
 - 5. Can Operations Center authorized personnel open/close this configuration for aircraft passage?
 - 6. Are plan specified obstruction lights, etc. visible? Do they operate/ activate appropriately?
 - 7. After return to an on-line status, are the stored reader accesses transactions maintained in the reader's local buffer uploaded to the system upon return to normalcy?
 - 8. Does the central computer system receive the following specific alarm / status messages?
 - a. Authorized Card - when a valid card is presented.
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.
 - d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - When an expired card is presented.
 - f. Inactive Card - when a card that is programmed in the system as inactive is presented.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- g. Reader Tamper - The card reader is being tampered with.
 - h. Door/Contact Status - The door is open or closed.
 - i. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - j. Invalid Facility Code - when a card with an incorrect facility code is presented.
- P. Operational Gate (Low Volume); Card Reader/Pin Pad Controlled, Monitored, Electric Gate Operator; Configuration G30
- 1. Is ingress controlled by utilizing a valid Card Reader and entering a valid PIN number?
 - 2. Does the sequential presentation and entry actualize the gate operator, permitting entry?
 - 3. Is the egress controlled by utilizing a valid Card Reader?
 - 4. Does presenting a valid card actualize the gate operator, permitting exit?
 - 5. Does contact with the gate safety edge prevent closing?
 - 6. After return to an on-line status are the stored reader access transactions maintained in either the reader or its controller's memory/buffer uploaded to the system upon return to normalcy?
 - 7. Can the gate operator be cycled by the central system?
 - 8. Does the central computer system receive the following specific alarm/status messages?
 - a. Authorized Card - When a valid card is presented (and a valid PIN entered).
 - b. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - c. Reader Tamper - When the card reader is being tampered with.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- d. Invalid Facility Code - When a card with an incorrect facility code is presented.
 - e. Door Restore - Recognize that the door is closed and permit another card read.
 - f. Duress PIN - If a cardholder has entered a duress condition PIN code:
 - Log the transaction;
 - Approves an unlock;
 - Initiate an alarm at the central station.
 - g. Invalid PIN - If a cardholder has attempted entry by using the wrong PIN number.
 - h. Undefined Card - When a card that is not in the system is presented.
 - i. Invalid Area - When a card is presented at a reader that is not part of the readers assigned to that card.
 - j. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - k. Expired Card - when an expired card is presented.
 - l. Inactive Card - When a card that is programmed in the system as inactive is presented.
 - m. Reader Tamper - The reader is being tampered with.
 - n. Door Open Detect Alarm - If a door is held open longer than the programmed entry time.
 - o. Door/Contact Status - The door is open or closed.
- Q. Video, Interior, Pan, Tilt, Zoom; Configuration V10
- 1. Unit is used to provide CCTV surveillance of a specified area or activity; does this camera provide surveillance of its assigned area? Can the actions of a human sized figure be seen through out defined area?

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

2. Is the camera under microprocessor/video controller control, capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching?
 3. Is the camera capable of 360-degree pan, 90-degree tilt, and of zoom focusing?
- R. Video, Interior, Wide Angle; Configuration V20
1. Unit is used to provide CCTV surveillance of a specified area or activity; does this camera provide surveillance of its assigned area? Can the actions of a human sized figure be seen through out defined area?
 2. Is the camera under microprocessor/video controller control, capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching?
 3. Is a wide-angle lens used?
- S. Video, Exterior, Pan, Tilt, Zoom; Configuration V30
1. Unit is used to provide CCTV surveillance of a specified area or activity; does this camera provide surveillance of its assigned area? Can the actions of a human sized figure be seen through out defined area?
 2. Is the camera under microprocessor/video controller control, and capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching?
 3. Is the camera capable of 360-degree pan, 90-degree tilt, and of zoom focusing?
 4. Is the housing rated for exterior use?
- T. Video, Exterior, Wide Angle; Configuration V40
1. Unit is used to provide CCTV surveillance of a specified area or activity; does this camera provide surveillance of its assigned area? Can the actions of a human sized figure be seen through out defined area?
 2. Is the camera under microprocessor/video controller control, and be capable of display to multiple monitors, video recorders, and also capable of both automatic and manual switching?

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

3. Is a wide-angle lens used?
 4. Is the housing rated for exterior use?
- U. Elevator Door; Card Reader; Configuration E10
1. Does a valid card read unlock the elevator controller to allow operation?
 2. After return to an on-line status are the stored reader accesses transactions, maintained in either the reader or its controller's memory / buffer uploaded to the system upon return to normalcy?
 3. Can the elevator controller be made operative by the central system?
 4. Are these signals interpreted and evaluated and used to direct an appropriate response effort?
 5. Does the central computer system receive the following messages?
 - a. Authorized Card - when a valid card is presented.
 - b. Undefined Card - When a card that is not in the system is presented.
 - c. Invalid Area - when a card is presented at a reader and that card is not part of the readers assigned cards.
 - d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - A card is presented that has been programmed to be inactive after a specific time period.
 - f. Inactive Card - When a card that is programmed in the system as inactive is presented.
 - g. Alarm Restore - After the reader/elevator controller has been used, is another read necessary to use the elevator controller?
 - h. Reader Tamper - If the card reader is being tampered with.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- i. Invalid Facility Code - when a card with an incorrect facility code is presented.

- V. Door Opener Package, Remote: Card Reader, CCTV Camera, and Intercom; Configuration X10
 1. Is a CCTV camera installed at the remote door? Does it provide visual identification of an individual requesting entry?
 2. Is an intercom station at both the local and remote locations? Do they provide facilities for conversation?
 3. Upon presentation of a valid card at the local reader, is remote door's magnetic lock is released/opened?
 4. Can a cardholder visually ascertain, upon presentation at a card reader, if the card was accepted or rejected?
 5. During degraded/off-line operational modes is transactional data of reader accesses maintained in the readers local buffer? Is data uploaded to system upon restoration of on-line conditions?
 6. Does the Central computer system receive the following messages?
 - a. Valid Card - when a valid card is presented.
 - b. Undefined Card - when a card that is not in the system is presented.
 - c. Invalid Area - When a card is presented at a reader and that card is not part of the readers assigned cards.
 - d. Invalid Time Period - If a card is presented at a time that is not defined in the system as a valid time assigned to that card.
 - e. Expired Card - When a card is presented that has been programmed to be inactive after a specific time period.
 - f. Alarm Restore - After the card reader is used, is another read necessary to open tat door again?
 - g. Reader Tamper - The card reader is being tampered with.

(NOTE TO DESIGNER/SPECIFIER: These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)

- h. Door Open Detect Alarm - A door is held open longer than the programmed entry time.
- i. Invalid Facility Code - When a card with an incorrect facility code is presented.

3.05 CLEANING

- A. Follow Section 01505 for disposal of debris and excess products, and interim cleaning.
- B. Follow Section 01770 for final cleaning.

END OF SECTION