HILLSBOROUGH COUNTY AVIATION AUTHORITY

SUPPLEMENTAL CONTRACT FOR TELECOMMUNICATIONS INFRASTRUCTURE PROJECT SERVICES

Parties And Addresses:

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HILLSBOROUGH COUNTY AVIATION AUTHORITY
SUPPLEMENTAL CONTRACT FOR TELECOMMUNICATIONS INFRASTRUCTURE PROJECT SERVICES

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Exhibits:
A – State of Florida Department of Management Services Contract No. DMS-24/25-264D
B – Authority Design Criteria Manual
C – Scrutinized Company Certification
D – Affidavit of Compliance with Anti-Human Trafficking Law

1. INTRODUCTION

This Supplemental Contract for Telecommunications Infrastructure Project Services utilizing State of Florida Department of Management Services Contract No. DMS-24/25-264D ("Supplemental Contract") is made and entered into this 5th day of February, 2026 between the Hillsborough County Aviation Authority, an independent special district under the laws of the State of Florida whose post office address is Post Office Box 22287, Tampa, Florida 33622 ("Authority"), and COMCO Communication Installation and Service Company, Inc., a Florida corporation, authorized to do business in the State of Florida ("Company"), (collectively hereinafter referred to as the Party or Parties).

The following terms and conditions contained in this Supplemental Contract are hereby incorporated in and made a part of State of Florida Department of Management Services Contract No. DMS-24/25-264D (hereinafter referred to as State of Florida Contract), which is attached hereto as Exhibit A. In the event of any conflict(s) among the terms and conditions contained in this Supplemental Contract and the State of Florida Contract, this Supplemental Contract shall control.

For and in consideration of the mutual covenants hereof, the Parties do hereby agree as follows:

2. DEFINITIONS

The following terms will have the meanings as set forth below:

2.1 Acceptance

The act of the Authority or an Authority Authorized Agent of the Authority by which the Authority assumes for itself, or an agent of another, ownership of existing or new components, or approves specific Services as partial or complete performance of this Supplemental Contract.

2.2 Acceptance Testing Process

The systematic evaluation of a delivered system (hardware or Services) against predefined functional requirements and acceptance criteria stipulated in this Supplemental Contract. Designed to verify that the system operates as intended and satisfies the Authority's needs before final acceptance and full deployment.

2.3 Accounts Payable

The unit within Authority Finance Department that deals with accounts payable.

2.4 After Action Review (AAR)

A systematic process for identifying the root causes of problems or events and an approach for responding to them. Based on the idea that effective management requires more than merely "putting out fires" but instead requires finding a way to prevent such problems or events from occurring again.

2.5 **Airport**
Tampa International Airport.

2.6 **Authority Data**
All data, including any drawings, specifications, reports, Authority Confidential Information, and any other information provided by Authority to Company, otherwise received by Company, or generated by Authority or Company for purposes relating to this Supplemental Contract, including related metadata.

2.7 **Authority Authorized Agent(s)**
A firm or individual selected by the Authority to act on the Authority's behalf, including but not limited to, third-party suppliers directly or indirectly required by Authority to carry out activities on the Authority's behalf under this Supplemental Contract.

2.8 **Board**
The Hillsborough County Aviation Authority Board of Directors.

2.9 **CEO**
The Hillsborough County Aviation Authority Chief Executive Officer.

2.10 **Confidential Information**
Includes all scientific, technical, financial, business and other information, all manufacturing, marketing, sales and distribution data, all scientific and test data, documents, methods, techniques, formulations, operations, know-how, experience, skills, intellectual property, trade secrets, computer programs and systems, processes, practices, ideas, inventions, designs, samples, plans, and drawings.

2.11 **Company Authorized Agent(s)**
Company's representative responsible for coordinating and overseeing Company to include, but not be limited to, monitoring, interpreting and overseeing the Services with regard to the quality performed, the manner of performance, and Authority and customer satisfaction with performance levels.

2.12 **Data Breach**
Includes (a) the loss or misuse (by any means) of any Authority Confidential Information; (b) the unauthorized or unlawful access, use, or disclosure of any Authority Confidential Information; or (c) any other act or omission that compromises the security, confidentiality, integrity or availability of any Authority Confidential Information.

2.13 **Days**
Unless otherwise stated, means calendar days.

2.14 **Deliverables**
The whole of the Services, including, without limitation, training, warranty, and maintenance services, materials, equipment, and things required to be done, furnished or performed by Company in accordance with the terms of this Supplemental Contract.

2.15 **Documentation**
The information provided by Company, including but not limited to, the description of the required functions and applications of the system, operating manuals, training aids, user guides, support troubleshooting scripts, knowledge articles, and system administration documentation as applicable, as well as technical reference materials describing the operation of all such components in sufficient detail to enable Authority's employees to operate, use, maintain, repair, support and test the same without assistance from Company.

2.16 **Exhibits**
Exhibits are attached to this Supplemental Contract and are hereby incorporated and made a part of this Supplemental Contract. Based on the needs of Authority, the Exhibits may be modified from time to time by letter to Company without formal amendment to this Supplemental Contract.

2.17 **FAA**
The U.S. Department of Transportation Federal Aviation Administration or any successor thereto.

2.18 **Implementation Schedule**
The schedule for installation, development, implementation and testing of the Services.

2.19 **Information Technology (IT) Infrastructure**
Hardware, software, networks, data centers, and facilities that support the delivery of IT services and enable the operation of an organization's information systems.

2.20 **Modifications**
Changes or additions to systems from the standard version thereof prepared under this Supplemental Contract.

2.21 **Personnel**
Individuals who are directly employed or contracted by Company to perform the Services at the Airport.

2.22 **Root Cause**
A fundamental reason or factor that causes an error.

2.23 **Sensitive Security Information**
Information that, if publicly released, would be detrimental to the security of the Airport or business operations of the Authority and its suppliers, including, but not limited to, documents, maps, or drawings of the Airport which includes secure Airport locations, trade secret information, system security information, transportation infrastructure, and security measures.

2.24 **Services**
Means the work, duties and obligations to be carried out and performed safely by Company under this Supplemental Contract, as further described in Article 3, Scope of Services. As used in this Supplemental Contract, Services shall include any component task, subtask, service, or function inherent and/or necessary to perform the Services except as otherwise specifically provided in this Supplemental Contract.

2.25 **TSA**
The U.S. Department of Homeland Security Transportation Security Administration or any successor thereto.

2.26 **Vice President of Information Technology**
Authority contract person responsible for the Authority Information Technology Services Department.

2.27 **Vice President of Procurement**
Authority contact person responsible for the Authority Procurement Department.

3. SCOPE OF SERVICES

Company shall provide design, engineering, and installation of structured cabling infrastructure systems for low-voltage applications, including telephones, computers, audio, and visual technologies. Services will also include diagnosing, repairing, and maintaining existing cabling systems and telecommunication infrastructure equipment to ensure optimal functionality. Additionally, Company will manage the relocation of information technology and telecommunication systems as needed, performing safe disconnection, movement, and reconnection during facility changes or expansions. All installed and repaired cabling will be tested and certified to meet applicable industry standards and comprehensive Documentation, including as-built drawings, labeling, and records of Modifications, which will all be provided upon completion of the Services.

Deliverables will consist of installation and testing reports, updated cabling diagrams, service logs, and a final project summary with formal Acceptance. The period of performance will align

with timelines established in individual task orders issued under this Supplemental Contract. All Services and work shall comply with relevant codes and standards, including BICSI, EIA/TIA, NEC, and other regulatory telecommunications requirements, as well as the most recent version of Exhibit B, Authority Design Criteria Manual. The specific scope and cost of each project performed under this Supplemental Contract shall be defined in and based on an Authority-approved task order prior to commencement of Services and/or work. Completion of Services will be verified through inspection, testing, and approval by Authority Authorized Agent.

4. TERM

4.1 Effective Date

This Supplemental Contract will become binding and effective upon approval and execution by Authority and Company ("Effective Date"). This Supplemental Contract may be executed in one or more counterparts, each of which will be deemed an original and all of which will be taken together and deemed to be one instrument.

4.2 Term

This Supplemental Contract will begin on February 5, 2026 and continue through November 25, 2028 (“Initial Term”), unless terminated earlier as provided herein or extended as provided in the Subsection entitled Renewal Options (such Initial Term, plus the Renewal Terms, referred to as “Term”).

4.3 Extension

Upon the expiration of the Term of this Supplemental Contract, at the Authority’s sole discretion, this Supplemental Contract may be extended for a maximum of six (6) months. Such extensions will be effective by the issuance of a written letter to the Company by the Vice President of Procurement. Any such extension will be pursuant to the same terms and conditions in effect at the time of such extension.

4.4 Renewal Options

If Company is not in default of any terms of this Supplemental Contract and if Company has performed all the terms, covenants and conditions herein contained, this Supplemental Contract may be renewed at the terms and conditions stated hereunder for three (3), one (1) year periods subsequent to the end of the Initial Term (each additional term hereinafter referred to as “Renewal Term”) upon written approval by the CEO. Such renewal will be effective by letter without formal amendment to this Supplemental Contract. If all such Renewal Terms are approved by the Authority, this Contract will have a final termination date of November 25, 2031.

5. FEES AND PAYMENTS

5.1 **Not-to-Exceed**

The total amount payable under this Supplemental Contract will be subject to the amount approved by the Board. Authority will provide written notice to Company of the amount approved and any revised amount thereafter.

5.2 **Payment**

Authority will pay Company as agreed upon in a task order approved by Company and Authority. Approved hourly service rates are part of the project costs and are as outlined in the State of Florida Contract.

5.3 **Invoices**

Invoices required by this Supplemental Contract will be created and submitted by Company to Authority Finance Department via email to Payables@TampaAirport.com in a form acceptable to Authority and will include at a minimum the invoice date, invoice amount, dates of Services, and purchase order number.

5.4 **Payment Method**

Company will receive electronic payments via Automated Clearing House (ACH), ePayables, or Purchasing Card (PCard). Authority reserves the right to modify the electronic payment methods and processes at any time. Company may change its selected electronic payment method during the Term of this Supplemental Contract in coordination with Accounts Payable.

In accordance with Florida Statute Section 501.0117, companies that accept credit cards as a valid form of payment are prohibited from imposing a surcharge.

5.5 **Payment When Services Are Terminated at the Convenience of Authority**

In the event of termination of this Supplemental Contract for the convenience of Authority, Authority will compensate Company as listed below; however, in no event shall Company be entitled to any damages or remedies for wrongful termination.

A. All Services performed prior to the effective date of termination; and
B. Expenses incurred by Company in effecting the termination of this Supplemental Contract as approved in advance in writing by Authority.

5.6 **Prompt Payment**

Company must pay any of its subcontractor(s) who have submitted verified invoices for work already performed within ten (10) Days of being paid by Authority. Any exception to this prompt payment provision will only be for good cause with prior written approval of Authority. Failure of Company to pay any of its subcontractor(s) accordingly will be a material breach of this Supplemental Contract.

6. TAXES

All taxes of any kind and character payable on account of the Services furnished and work done under this Supplemental Contract will be paid by Company. The laws of the State of Florida provide that sales tax and use taxes are payable by Company upon the tangible personal property incorporated in the work and such taxes will be paid by Company. Authority is exempt from all State and Federal sales, use and transportation taxes.

Company will pay the taxes, fees, or assessments reflected in a notice Company receives from the Authority within thirty (30) Days after Company's receipt of that notice or within the time period prescribed in the tax bill. Authority will attempt to cause the taxing authority to send the applicable tax bills directly to Company and Company will remit payment directly to the taxing authority, in such instance. Company may reserve the right to contest such taxes, fees, or assessments and withhold payment upon written notice to Authority of its intent to do so, so long as the nonpayment does not result in a lien against the real property or any improvements thereon or a direct liability on the part of Authority.

7. OWNERSHIP OF DOCUMENTS

Authority agrees that all intellectual property developed or created in conjunction with this Supplemental Contract shall be owned by the Company. Company grants Authority a non-exclusive, non-transferable license to use the Deliverables for the Term of this Supplemental Contract. Notwithstanding the forgoing, all documents, papers, letters, maps, books, tapes, photographs, films, sound recordings, data, or other material, regardless of the physical form or characteristics made by Company or its employees' incident to, or in the course of, Services to Authority, with the exception of Company intellectual property, will be and remain the property of Authority.

8. QUALITY ASSURANCE

Company will be solely responsible for the quality of all Services furnished by Company, its employees and/or its subcontractors under this Supplemental Contract. All Services furnished by Company, its employees and/or its subcontractors must be performed in accordance with industry standard, in a timely manner, and must be fit and suitable for the purposes intended by Authority. Company's Services and Deliverables must conform with all applicable Federal and State laws, regulations and ordinances.

9. NON-EXCLUSIVE RIGHTS

Company acknowledges that Authority has hired, or may hire, others to perform Services similar to or the same as those within Company's Services under this Supplemental Contract. Company further acknowledges that this Supplemental Contract is not a guarantee of the assignment of any work and that the assignment of work to others is solely within Authority's discretion.

This Supplemental Contract will not be construed to grant or authorize the granting of an exclusive right within the meaning of 49 USC 40103(e) or 49 USC 47107(a), as may be amended from time to time, and related regulations.

10. INDEMNIFICATION

10.1 To the maximum extent permitted by Florida law, in addition to Company's obligation to provide pay for and maintain insurance as set forth elsewhere in this Supplemental Contract, Company will indemnify and hold harmless Authority, its members, officers, agents, employees, and volunteers from any and all liabilities, suits, claims, procedures, liens, expenses, losses, costs, royalties, fines and damages (including but not limited to claims for attorney's fees and dispute resolution costs) caused in whole or in part by the:

A. presence on, use or occupancy of Authority property;
B. acts, omissions, negligence (including professional negligence and malpractice), errors, recklessness, intentional wrongful conduct, activities, or operations;
C. any breach of the terms of this Supplemental Contract;
D. performance, non-performance or purported performance of this Supplemental Contract;
E. violation of any law, regulation, rule, order, decree, ordinance, Federal Directive or Federal Circular;
F. infringement of any patent, copyright, trademark, trade dress or trade secret rights; and/or
G. contamination of the soil, groundwater, surface water, storm water, air or the environment by fuel, gas, chemicals or any other substance deemed by the Environmental Protection Agency or other regulatory agency to be an environmental contaminant

by the Company or Company's officers, employees, agents, volunteers, subcontractors, invitees, or any other person directly or indirectly employed or utilized by the Company, whether the liability, suit, suit, claim, procedure, lien, expense, loss, cost, royalty, fine or damages is caused in part by an indemnified party. This indemnity obligation expressly applies and shall be construed to include any and all claim(s) caused in part by the negligence, acts or omissions of the Authority, its members, officers, agents, employees, or volunteers.

10.2 In addition to the duty to indemnify and hold harmless, Company will have the separate and independent duty to defend Authority, its members, officers, agents, employees, and volunteers from all suits, claims or actions of any nature seeking damages, equitable or injunctive relief expenses, liens, expenses, losses, costs, royalties, fines, attorney's fees or any other relief in the event the suit, claim, or action of any nature arises in whole or in part from the:

A. presence on, use or occupancy of Authority property;
B. acts, omissions, negligence (including professional negligence and malpractice), errors, recklessness, intentional wrongful conduct, activities, or operations;
C. any breach of the terms of this Supplemental Contract;
D. performance, non-performance or purported performance of this Supplemental Contract;
E. violation of any law, regulation, rule, order, decree, ordinance, Federal Directive, Federal Circular or ordinance; and/or
F. infringement of any patent, copyright, trademark, trade dress or trade secret rights;
G. contamination of the soil, groundwater, surface water, stormwater, air or the environment by fuel, gas, chemicals or any other substance deemed by the Environmental Protection agency or other regulatory agency to be an environmental contaminant

by Company or Company's officers, employees, agents, volunteers, subcontractors, invitees, or any other person directly or indirectly employed or utilized by Company regardless of whether it is caused in part by Company, its members, officers, agents, employees, or volunteers. This duty to defend exists immediately upon presentation of written notice of a suit, claim or action of any nature to Company by a party entitled to a defense hereunder. This duty to defend obligation expressly applies and shall be construed to include any and all claim(s) caused in part by the negligence, acts or omissions of the Authority, its members, officers, agents, employees, or volunteers.

10.3 If the above indemnity or defense provisions or any part of the above indemnity or defense provisions are limited by Fla. Stat. § 725.06(2)-(3) or Fla. Stat. § 725.08, then with respect to the part so limited, Company agrees to the following: To the maximum extent permitted by Florida law, Company will indemnify and hold harmless Authority, its members, officers, agents, employees, and volunteers from any and all liabilities, damages, losses, and costs, including, but not limited to, reasonable attorneys' fee, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of Company and persons employed or utilized by Company in the performance of this Supplemental Contract.

10.4 If the above indemnity or defense provisions or any part of the above indemnity or defense provisions are limited by Florida Statute § 725.06 (1) or any other applicable law, then with respect to the part so limited the monetary limitation on the extent of the indemnification shall be the greater of the (i) monetary value of this Supplemental Contract, (ii) coverage amount of Commercial General Liability Insurance required under this Supplemental Contract, or (iii) $10,000,000.00. Otherwise, the obligations of this Article will not be limited by the amount of any insurance required to be obtained or maintained under this Supplemental Contract.

10.5 Company's obligations to defend and indemnify as described in this Article will survive the expiration or earlier termination of this Supplemental Contract until it is determined by final judgment that any suit, claim or other action against Company, its members, officers, agents, employees, and volunteers its fully and finally barred by the applicable statute of limitations or repose.

10.6 In addition to the requirements stated above, to the extent required by FDOT Public Transportation Grant Agreement and to the fullest extent permitted by law, Company shall indemnify and hold harmless the State of Florida, FDOT, including the FDOT's officers and employees, from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness or intentional wrongful misconduct of Company and persons employed or utilized by Company in the performance of this Supplemental Contract. This indemnification in this paragraph shall survive the termination of this Supplemental Contract. Nothing contained in this paragraph is intended to nor shall it constitute a waiver of the State of Florida's and FDOT's sovereign immunity.

10.7 Nothing in this Article will be construed as a waiver of any immunity from or limitation of liability Authority, or its members, officers, agents, employees, and volunteers may have under the doctrine of sovereign immunity under common law or statute.

10.8 Authority and its members, officers, agents, employees, and volunteers reserve the right, at their option, to participate in the defense of any suit, without relieving Company of any of its obligations under this Article.

10.9 If the above Paragraphs 10.7 – 10.8 or any part of Paragraphs 10.1 – 10.8 are deemed to conflict in any way with any law, the Paragraph or part of the Paragraph will be considered modified by such law to remedy the conflict.

11. ACCOUNTING RECORDS/AUDIT REQUIREMENTS

11.1 **Books and Records**.

In connection with payments to Company under this Supplemental Contract, it is agreed Company will maintain full and accurate books of account and records customarily used in this type of business operation, in conformity with Generally Accepted Accounting Principles (GAAP). Company will maintain such books and records for five years after the end of the Term of this Supplemental Contract. Records include, but are not limited to, books, documents, papers, records, research, and task orders related to this Supplemental Contract. Company will not destroy any records related to this Supplemental Contract without the express written permission of the Authority.

11.2 **Authority Right to Perform Audits, Inspections, or Attestation Engagements.**

At any time or times during the Term of this Supplemental Contract or within five years after the end of this Supplemental Contract, the Authority, FAA, Federal Highway Administration, FDOT, FEMA, Florida Auditor General, Florida Inspector General, Florida Chief Financial Officer, Transportation Security Administration, and the Comptroller General of the United States, or any duly authorized representative of each (Auditors), have the right to initiate and perform audits, inspections or attestation engagements over Company's records for the purpose of determining payment eligibility under this Supplemental Contract or over selected operations performed by Company under this Supplemental Contract for the purpose of determining compliance with this Supplemental Contract.

Access will be granted to all of Company's records directly pertinent to this Supplemental Contract or any task order, as well as records of parent, affiliate and subsidiary companies and any subconsultants or subcontractors directly pertinent to this Supplemental Contract or any task order. If the records are kept at locations other than the Airport, Company will arrange for said records to be brought to a location convenient to Auditors or will provide records electronically in a computer-readable format acceptable to the Auditors at no additional cost to conduct the engagement as set forth in this Article.

Company agrees to deliver or provide access to all records directly pertinent to this Supplemental Contract requested by Auditors within fourteen (14) Days of the request at the initiation of the engagement and to deliver or provide access to all other records directly pertinent to this Supplemental Contract requested during the engagement within seven (7) Days of each request. Company will be in material breach of this Supplemental Contract if Company fails to provide requested records in accordance with this Article and Company will be responsible for the cost of the audit as determined by the Authority.

Auditors have the right during the engagement to interview Company's Personnel, employees, subconsultants, and subcontractors, and to retain copies of any and all records directly pertinent to this Supplemental Contract as needed to support Auditor workpapers.

If as a result of any engagement it is determined that Company has overcharged Authority, Company will re-pay Authority for such overcharge and Authority may assess interest of up to twelve percent (12%) per year on the overcharge from the date the overcharge occurred.

Approvals granted outside of the internal audit function for any Services included or not included in this Supplemental Contract do not act as a waiver or limitation of the Auditor's right to perform engagements.

The Company will notify the Authority no later than seven (7) Days after receiving knowledge that it is subject to any other audit, inspection or attestation engagement related to this

Supplemental Contract and provide Authority a copy of any audit documents or reports so received.

Company agrees to comply with Section 20.055(5), Florida Statutes, and to incorporate in all subcontracts the obligation to comply with Section 20.055(5), Florida Statutes. Company will include a provision providing Auditors the same access to business records at the subconsultant and subcontractor level in all of its subconsultant and subcontractor agreements executed related to this Supplemental Contract.

12. INSURANCE

Company must maintain the following limits and coverages uninterrupted or amended through the Term of this Supplemental Contract. In the event the Company becomes in default of the following requirements, the Authority reserves the right to take whatever actions deemed necessary to protect its interests. Required liability policies other than Workers' Compensation/Employer's Liability and Professional Liability will provide that the Authority, members of the Authority's governing body, and the Authority's officers, volunteers, agents, and employees are included as additional insureds.

Company agrees the required insurance shall be primary and not contributory to any other valid and collectible insurance the Authority may possess, including any self-insured retention or deductible amount, and that any other insurance shall be considered excess insurance only.

12.1 **Required Coverage - Minimum Limits**.

The minimum limits of insurance (inclusive of any amounts provided by an umbrella or excess policy) covering the Services performed pursuant to this Supplemental Contract will be the amounts specified herein. To the extent it is used to meet the minimum limit requirements, any Umbrella or Excess coverage shall follow form to the Employer's Liability, Commercial General Liability and Business Auto Liability coverages, including all endorsements and additional insured requirements. Any applicable Aggregate Limits in the Umbrella or Excess policy(ies) shall not be shared or diminished by claims unrelated to this Supplemental Contract.

12.2 **Commercial General Liability Insurance**.

The minimum limits of insurance covering the Services performed pursuant to this Supplemental Contract will be the amounts specified herein. Coverage will be provided for liability resulting out of or in connection with ongoing operations performed by, or on behalf of, Company under this Supplemental Contract or the use or occupancy of Authority premises by, or on behalf of, Company in connection with this Supplemental Contract. Coverage shall be provided on a form no more restrictive than ISO Form CG 00 01. Additional insured insurance coverage shall be provided on a form no more restrictive than ISO Form CG 20 10 10 01 and CG 20 37 10 01.

	Supplemental Contract Specific
General Aggregate	$10,000,000
Each Occurrence	$10,000,000
Personal and Advertising Injury Each Occurrence	$10,000,000
Products and Completed Operations Aggregate	$10,000,000

12.3 **Workers' Compensation and Employer's Liability Insurance**.
The minimum limits of insurance are:

Part One:	"Statutory"
Part Two:	
Each Accident	$1,000,000
Disease – Policy Limit	$1,000,000
Disease – Each Employee	$1,000,000

12.4 **Business Automobile Liability Insurance**.
Coverage will be provided for all owned, hired and non-owned vehicles. Coverage shall be provided on a form no more restrictive than ISO Form CA 00 01. The minimum limits of insurance covering the work performed pursuant to this Supplemental Contract are:

Each Occurrence – Bodily Injury and Property Damage Combined	$10,000,000

12.5 **Professional Liability Insurance**.
Such insurance will be provided on a form acceptable to Authority and maintained throughout this Supplemental Contract and for three years following completion of this Supplemental Contract. Coverage will include all work of Company without exclusions unless approved in writing by Authority. The limits of coverage will not be less than:

Each Occurrence	$1,000,000
Annual Aggregate	$1,000,000

12.6 **Professional Liability Insurance**.
Such insurance will be provided on a form acceptable to Authority and maintained throughout this Supplemental Contract and for three years following completion of this Supplemental Contract. Coverage will include all work of Company without exclusions unless approved in writing by Authority. The limits of coverage will not be less than:

Each Occurrence	$1,000,000
Annual Aggregate	$1,000,000

12.7 **Environmental Insurance (Pollution)**.

Such insurance will be maintained by Company on a form acceptable to Authority for liability resulting from pollution or other environmental impairment, which arises out of, or in connection with, work under this Supplemental Contract. Company will provide and maintain environmental coverage from the inception of this Supplemental Contract. If on an occurrence basis, the insurance must be maintained throughout the duration of this Supplemental Contract. If on a claims-made basis, the insurance must cover claims reported within three years of the end of this Supplemental Contract. The coverage shall apply without regard to whether the loss is caused by Company or Company's subcontractors, suppliers, consultants or subconsultants. The coverage shall not contain any asbestos abatement, silica, lead, per- and polyfluoroalkyl substances (PFAS), exterior insulation and finish systems (EIFS), permitted work, law, code or ordinance exclusion.

Limits of Coverage will be:

Each Occurrence	$1,000,000
Annual Aggregate	$2,000,000

12.8 **Waiver of Subrogation**.

Company, for itself and on behalf of its insurers, to the fullest extent permitted by law without voiding the insurance required by this Supplemental Contract, waives all rights against the Authority, members of Authority's governing body and the Authority's officers, volunteers, agents, and employees, for damages or loss to the extent covered and paid for by any insurance maintained by the Company.

12.9 **Incident Notification**.

The Company will promptly notify the Airport Operations Center (AOC) of all incidents involving bodily injury or property damage, and as soon as practicable after discovery of an actual or reasonably suspected data breach, security breach, ransomware (data theft), or an extortion threat occurring on Authority-owned property, tenant-owned property or third-party property.

12.10 **Customer Claims, Issues, or Complaints**.

All customer claims, issues, or complaints regarding property damage, bodily injury, data theft, or an extortion threat related to the Company will be promptly handled, addressed and resolved by the Company.

The Company will track all customer claims, issues, and complaints and their status on a Claims Log available for review, as needed, by Authority Enterprise Risk Management. The Claims Log

should include a detailed report of the incident along with the response and/or resolution. Authority Enterprise Risk Management has the option to monitor all incidents, claims, issues or complaints where the Authority could be held liable for injury or damages.

12.11 **Conditions of Acceptance**.
The insurance maintained by Company must conform at all times with Authority Standard Procedure S250.06, Contractual Insurance Terms and Conditions, which may be amended from time to time and which can be provided upon request.

13. COMPLIANCE WITH NON-DISCRIMINATION REQUIREMENTS

During the performance of this Supplemental Contract, Company, for itself, its assignees and successors in interest, agrees as follows:

13.1 **Compliance with Regulations**. Company (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are incorporated herein by reference and made a part of this Supplemental Contract.

13.2 **Nondiscrimination**. Company, with regard to the work performed by it during this Supplemental Contract, will not discriminate on the grounds of race, color, national origin, creed, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. Company will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the Supplemental Contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21. During the performance of this Supplemental Contract, Company, for itself, its assignees, and successors in interest agrees to comply with the following non-discrimination statutes and authorities, including but not limited to:

A. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
B. 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964) including amendments thereto;
C. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
D. Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27

(Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);

E. The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
F. Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
G. The Civil Rights Restoration Act of 1987, (PL 100-209), (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
H. Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38; and
I. Title IX of the Education Amendments of 1972, as amended, which prohibits Company from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

13.3 **Solicitations for Subcontracts, including Procurements of Materials and Equipment**. In all solicitations either by competitive bidding or negotiation made by the Company for work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential subcontractor or supplier will be notified by Company of Company's obligations under this Supplemental Contract and the Nondiscrimination Acts and Authorities on the ground of race, color or national origin.

13.4 **Information and Reports**. Company will provide all information and reports required by the Acts, the Regulations and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Authority or the FAA to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of Company is in the exclusive possession of another who fails or refuses to furnish this information, Company will so certify to the Authority or the FAA, as appropriate, and will set forth what efforts it has made to obtain the information.

13.5 **Sanctions for Noncompliance**. In the event of Company's non-compliance with the non-discrimination provisions of this Supplemental Contract, the Authority will impose such

contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to

A. withholding of payments to Company under this Supplemental Contract until Company complies, and/or cancellation;
B. canceling, terminations or suspending this Supplemental Contract, in whole or in part.

13.6 **Incorporation of Provisions**. Company will include the provisions of Paragraphs 13.1 through 13.5 in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. Company will take action with respect to any subcontract or procurement as Authority or the FAA may direct as a means of enforcing such provisions, including sanctions for non-compliance. Provided, that if the Company becomes involved in or is threatened with, litigation with a subcontractor or supplier because of such direction, Company may request Authority to enter into litigation to protect the interests of Authority. In addition, Company may request the United States to enter into litigation to protect the interests of the United States.

14. AUTHORITY APPROVALS

Except as otherwise indicated elsewhere in this Supplemental Contract, wherever in this Supplemental Contract approvals are required to be given or received by the Authority, it is understood that the CEO or a designee of the CEO is hereby empowered to act on behalf of the Authority.

15. USE OF ARTIFICIAL INTELLIGENCE

Any use of Artificial Intelligence (AI) including, but not limited to generative AI, via platforms, tools, and software must be consistent with Authority Policies, Standard Procedures, Rules and Regulations and applicable laws.

16. REPRESENTATIONS

As a condition of this Supplemental Contract, Company represents and warrants that:

16.1 Company is competent to perform its obligations hereunder, and has sufficient manpower, resources, skills, experience, tools and all such other materials as may be required to meet its obligations in accordance with the Implementation Schedule or otherwise on or before the required date(s);

16.2 Company has the necessary qualifications (including knowledge, experience and skill) to provide the Deliverables, and will provide the Deliverables (including warranty and maintenance service) in a diligent, professional and timely manner; and

16.3 Any subcontractors engaged by Company to carry out any part of the Company's obligations contemplated hereunder shall:

A. be competent to perform their obligations;
B. be accepted by Authority in writing prior to performing any Services hereunder;
C. have sufficient manpower, resources, skills, experience, tools or all such other materials as may be required in order to meet their obligations in accordance with the Implementation Schedule or otherwise on or before the required date(s); and
D. have the necessary qualifications, including knowledge, experience and skill, to perform the work expected of them, with the ability to use such knowledge, experience and skill effectively in carrying out their obligations.

17. CONDUCT

17.1 Company shall supply all the resources, facilities, labor and supervision, management, Services, equipment, materials, drawings, technical data, technical assistance, engineering services, inspection and quality assurance procedures and planning necessary to provide the Deliverables in accordance with the Implementation Schedule or as otherwise required. Without limiting the generality of the foregoing, the Company will specifically be responsible for providing, at its sole expense:

A. access to an appropriate computer platform for the purposes of providing the Deliverables, if required; and
B. all resources, components or things otherwise required or desirable for the Company to complete the Deliverables.

17.2 If required, Company may have certain limited access to Authority IT Infrastructure but only if Company obtains the prior written permission of Authority and complies with any restrictions or prohibitions or any other terms and conditions which are set out by Authority.

17.3 The Company shall:

A. perform all of its obligations hereunder in a diligent, professional, and efficient manner;
B. apply, as a minimum, such quality assurance tests, inspections, and controls as are normally applied by reputable contractors in providing similar Deliverables; and
C. ensure that the Deliverables:

1. are of proper quality, material, and workmanship;
2. are in full conformity with and meet or exceed the functional specifications;
3. meet or exceed manufacturers' performance or other specifications for components or computer programs incorporated in the Deliverables;

4. meet or exceed all other requirements of this Supplemental Contract; and
5. are provided in accordance with the Implementation Schedule and meet any other application deadlines.

D. Company shall provide, at its sole expense, reports on the status or progress in providing the Deliverables, and such other reports as may reasonably be required by Authority.

E. Company specifically warrants, and it is a condition of this Supplemental Contract, that in providing the Deliverables (including any Deliverables provided by any subcontractors), Company shall, and shall ensure that any subcontractor:

1. abide by all of the security practices and directions provided by Authority; and
2. provide an adequate level of protection and security for the data, databases, computer programs, and resources of Authority and others as provided or made available to Company, in order to ensure no disclosure of, unauthorized use of or unauthorized access to any such data, databases, computer programs or other resources.

F. No unauthorized computer program, functionality, routine, data, resources or capabilities shall be introduced to any computer program or Authority IT Infrastructure or of any others except as expressly authorized in writing by Authority, and, without limiting the generality of the foregoing, Company shall specifically not permit and shall protect to prevent the entry of any computer virus program, trojan horse program, worm program or other unauthorized computer program into the system or any part thereof or into the data, databases, computer programs, computer resources or computer systems or any of them or provided by Authority or others.

18. INSPECTION OF DELIVERABLES

18.1 Upon the Deliverables being installed by the Company, Authority and Company shall subject the Deliverables to diagnostic testing to verify that they meet the functional specifications.

18.2 If the testing confirms that the Deliverables meet the functional specifications, Authority shall notify Company in writing that the Deliverables have been successfully installed. If the Deliverables do not meet the functional specifications, Authority shall notify Company of such failure, specifying the problems encountered. Upon Authority's notice, Company shall immediately conduct a retest. If upon retesting the Deliverables do not meet the functional specifications Company shall, within ten (10) business days, correct all problems and shall notify Authority of completion of the corrections, following which the test procedure set out in this Section shall be performed again.

18.3 If the Deliverables do not meet the functional specifications, Authority shall have the option of:

A. notifying Company of the failure and requiring Company to correct the problem, in which case the provisions of this Section shall apply again; or
B. terminating this Supplemental Contract and requiring Company to promptly refund all amounts paid by Authority under this Supplemental Contract.

18.4 Company's Services in correcting problems, if any, specific to the installation test criteria shall be provided free of charge to Authority.

19. DATA SECURITY

19.1 **Authority Data**

A. Company will not attempt to access, and will not allow its Personnel access to, Authority Data or third-party data that is not required for the performance of the Services under this Supplemental Contract by such Personnel.
B. Company must notify the Authority in advance of engaging any subcontractors that will have access to Authority Data and provide details about subcontractor's data security practices.
C. Company represents and warrants that Company has not and will not prevent, or reasonably fail to allow, for any reason including without limitation late payment or otherwise, the Authority's access to and retrieval of Authority Data.
D. Company is obligated to maintain the confidentiality, availability, and integrity of all Authority Data in connection with the performance of the Services. Company must implement strict access controls to ensure that only authorized Personnel have access to Authority Data, including requirements for user authentication, role-based access control, and regular access reviews.
E. Without limiting Company's other obligations under this Supplemental Contract, Company must implement or use network management and maintenance applications and tools, appropriate fraud prevention and detection and encryption technologies to protect all Authority Data; provided that Company must, at a minimum, encrypt all Sensitive Security Information in-transit, in use, and at-rest.
F. Company must perform all Services using security technologies and techniques in accordance with industry-leading practices and the Authority's security policies, procedures, and other requirements made available to Company in writing.
G. Company must encrypt all Authority Confidential Information. Company must encrypt the aforementioned in motion, at rest, and in use in a manner that, at a minimum, adheres to Authority's security policies, procedures, and other requirements.

Company must not deviate from this encryption requirement without advance written Authority approval.

H. Company understands and acknowledges that, to the extent that performance of its obligations under this Supplemental Contract involves or necessitates the processing of Sensitive Security Information, Company will act only on instructions and directions from Authority.

I. If Authority is required to provide or rectify information regarding Sensitive Security Information, Company will reasonably cooperate with Authority to the full extent necessary to comply with data protection laws. If a request by a data subject is made directly to Company, Company will notify Authority of such request as soon as reasonably practicable.

J. Company must implement procedures to minimize the collection of Sensitive Security Information.

19.2 **Data Protection Laws**. Company will comply with all applicable data protection laws, including those that would apply if Company, rather than the Authority, were the owner or data controller of any Authority Data in its possession or under its control in connection with the Services. Company will notify the Authority in writing within twenty-four (24) hours of any actual or suspected non-compliance with applicable data protection laws or any security incidents involving Authority Data.

19.3 **Notice to Authority**. Company will adhere to and comply with all security measures and procedures established by the Authority and any applicable regulatory entities including, but not limited to, the TSA, and any terms of service agreed to by the Authority regarding data security. In the event Company or Company's subcontractor (if any) discovers or is notified of a Data Breach or potential Data Breach of security relating to Authority Data or third-party data, Company will promptly, (a) Notify Authority of such breach or potential Data Breach no later than twenty-four (24) hours following discovery; and (b) If the applicable Authority Data or third-party data was in the possession of Company at the time of such Data Breach or potential breach, Company will investigate and cure the Data Breach or potential breach. Such notice must summarize in reasonable detail the nature of Authority Data that may have been exposed, and, if applicable, any persons whose Personal Identifiable Information may have been affected or exposed by such Data Breach. Company must not make any public announcements relating to such Data Breach without Authority's Vice President of Communications, Marketing, and Strategy prior written approval.

19.4 **Data Breach Responsibilities**.

A. Upon discovery of an actual or reasonably suspected loss, or unauthorized use, access, or disclosure of Authority Data, Company agrees to cooperate fully with the Authority

in any investigation or response efforts related to the Data Breach, including providing access to relevant documentation, records, and resources as needed, to include:

1. investigating and resolving any data privacy or security issues;
2. upon request, providing Authority with an AAR including Root Cause Analysis of the Data Breach;
3. notifying any affected persons (solely at Authority's direction) and governmental regulators, as applicable;
4. recovering affected data or information, to the extent possible;
5. upon request, providing Authority with a corrective action plan acceptable to Authority; and
6. providing notice to impacted parties.

B. Authority has the sole right to determine (a) whether notice of the Data Breach is to be provided to any individuals, regulators, law enforcement agencies, consumer reporting agencies or others as required by law or regulation, or otherwise in Authority's discretion; and (b) the contents of such notice, whether any type of remediation may be offered to affected persons, and the nature and extent of any such remediation.

19.5 **Incident Response Costs.** In the event of a Data Breach attributable to an act or omission of Company, as part of such remediation, Company must pay all costs and expenses of Authority's compliance with any Authority notification obligations, as well as the costs of credit monitoring services for affected individuals.

20. EXIT ASSISTANCE

20.1 **Removal of Company Materials**. Company is responsible, at its own expense, for de-installation and removal from Authority facilities any equipment owned or leased by Company that is not being transferred to Authority under this Supplemental Contract, subject to the Authority's reasonable procedures and in a manner that minimizes adverse impacts to Authority.

20.2 **Transition Assistance**. In the event of any expiration or termination of this Supplemental Contract or award and transition to a new contract, Company will cooperate fully with Authority to ensure an effective and efficient transition of Services. Company acknowledges its responsibility to continuously perform the Services and maintain the same level of Services during the transition period. The terms of this Supplemental Contract shall govern Company's and Authority's rights and obligations during such transition period. Company and Authority will negotiate in good faith to establish the relative roles and responsibilities of Company and Authority in effecting such transition,

as well as the appropriate date for completion of the transition. Company shall be entitled to receive compensation for any continued or additional consultation, Services, or support required for transition. Transition services will be mutually agreed upon via an executed task order.

Authority is committed to ensuring the security, privacy, confidentiality, processing integrity, and availability of systems and data supporting the Authority. Company must annually provide a System and Organization Control 2 Type 2 (SOC 2 Type 2) report, or equivalent as determined by the Authority, prepared by a qualified, licensed, and independent CPA firm or agency accredited by the American Institute of Certified Public Accountants (AICPA). If the Company SOC 2 Type 2 report covers less than twelve (12) months, Company will provide a bridge letter to the Authority stating whether processes or controls have changed since the end of the SOC 2 Type 2 coverage period. There may be no limitation on the scope of the engagement that would preclude the auditor from expressing an unqualified opinion on compliance with the applicable Trust Services Criteria.

All third-parties (including but not limited to affiliates, subcontractors, suppliers, and sub-consultants) meeting any aspect of the criteria below must provide a SOC 2 Type 2 report, or equivalent as determined by Authority, before storing, processing, or handling Authority systems and/or Authority Data.

In-scope third parties include:

- Third-parties offering Authority a hosted solution of any kind, whether contained within a private or public cloud infrastructure.
- Third-parties who will receive Authority Data via manual or automated data feeds.
- Third-parties processing any transactions on behalf of Authority including, but not limited to, credit card transactions, billing transactions, or payroll transactions.
- Third-parties who store Authority Data. This does not include email communication exchanged in the course of standard business. Data storage applies to any of the items above, and any time the third-party maintains the Authority Data for any extended period.

21. ACCEPTANCE AND TEST PLAN

Company will coordinate with Authority to outline acceptance criteria and to develop an Acceptance Testing Process to verify the systems are functioning to the acceptance criteria. The mutually agreed upon acceptance criteria will be effective by the issuance of a written letter to Company by the Vice President of Information Technology Services or designee and will not require a formal amendment to this Supplemental Contract. The acceptance criteria must be specific, measurable, achievable, relevant, and time-bound and should cover all functional and

non-functional requirements, including performance, security, usability, and compliance standards. In the event that any defects or issues are identified during testing, the Company shall promptly remedy such defects at no additional cost to the Authority and re-test the affected functionality to ensure compliance with the acceptance criteria.

22. DISPUTE RESOLUTION

22.1 **Claims and Disputes**.

A. A claim is a written demand or assertion by one of the Parties seeking, as a matter of right, an adjustment or interpretation of this Supplemental Contract, payment of money, extension of time, or other relief with respect to the terms of this Supplemental Contract. The term claim also includes other matters in question between Authority and Company arising out of or relating to this Supplemental Contract. The responsibility to substantiate claims will rest with the party making the claim.

B. If for any reason Company deems that additional cost or Supplemental Contract time is due to Company for work not clearly provided for in this Supplemental Contract, or previously authorized changes in the work, Company will notify Authority in writing of its intention to claim such additional cost or Supplemental Contract time. Company will give Authority the opportunity to keep strict account of actual cost and/or time associated with the claim. The failure to give proper notice as required herein will constitute a waiver of said claim.

C. Written notice of intention to claim must be made within ten (10) Days after Company first recognizes the condition giving rise to the claim or before the work begins on which Company bases the claim, whichever is earlier.

D. When the work on which the claim is based has been completed, Company will, within ten (10) Days, submit Company's written claim to Authority. Such claim by Company, and the fact that Authority has kept strict account of the actual cost and/or time associated with the claim, will not in any way be construed as proving or substantiating the validity of the claim.

E. Pending final resolution of a claim, unless otherwise agreed in writing, Company will proceed diligently with performance of this Supplemental Contract and maintain effective progress to complete the work within the time(s) set forth in this Supplemental Contract.

F. The making of final payment for this Supplemental Contract may constitute a waiver of all claims by Authority except those arising from:

    1. Claims, security interests or encumbrances arising out of this Supplemental Contract and unsettled;

2. Failure of the work to comply with the requirements of this Supplemental Contract;
3. Terms of special warranties required by this Supplemental Contract; and
4. Latent defects.

22.2 **Resolution of Claims and Disputes**.

A. The following shall occur as a condition precedent to Authority review of a claim unless waived in writing by Authority.

First Meeting: Within five (5) Days after a claim is submitted in writing, Company's representatives who have authority to resolve the dispute shall meet with Authority representatives who have authority to resolve the dispute in a good faith attempt to resolve the dispute. If a party intends to be accompanied at a meeting by legal counsel, the other party shall be given at least three (3) Days' notice of such and also may be accompanied by legal counsel. All negotiations pursuant to this clause are confidential and shall be treated as compromise and settlement negotiations for purposes of rules of evidence.

Second Meeting: If the First Meeting fails to resolve the dispute, a senior executive for Company and for Authority, neither of which have day to day responsibilities, shall meet, within ten (10) Days after a dispute occurs, in an attempt to resolve the dispute and any other identified disputes or any unresolved issues that may lead to dispute. Authority may invite other Parties as necessary to this meeting. If a party intends to be accompanied at a meeting by legal counsel, the other party shall be given at least three (3) Days' notice of such and also may be accompanied by legal counsel. All negotiations pursuant to this clause are confidential and shall be treated as compromise and settlement negotiations for purposes of rules of evidence.

Following the First Meeting and the Second Meeting, Authority will review Company's claims and may (1) request additional information from Company which will be immediately provided to Authority, or (2) render a decision on all or part of the claim in writing within twenty-one (21) Days following the receipt of such claim or receipt of additional information requested.

If Authority decides that the work related to such claim should proceed regardless of Authority disposition of such claim, Authority will issue to Company a written directive to proceed. Company will proceed as instructed.

B. Prior to the initiation of any litigation to resolve disputes between the Parties, the Parties will make a good faith effort to resolve any such disputes by negotiation

between representatives with decision-making power. Following negotiations, as a condition precedent to litigation, the Parties will mediate any dispute with a mediator selected by Authority. Such mediation shall occur in Hillsborough County, Florida.

C. Any action initiated by either party associated with a claim or dispute will be brought in accordance with the Applicable Law and Venue Article below.

23. LAWS, REGULATIONS, ORDINANCES, AND RULES

Company, its officers, employees, agents, subcontractors, or those under its control, will at all times comply with applicable Federal, State, and local laws and regulations, Authority Rules and Regulations, Policies, Standard Procedures, and Operating Directives as are now or may hereinafter be prescribed by Authority, all applicable health rules and regulations and other mandates whether existing or as promulgated from time to time by the Federal, State, or local government, or Authority including, but not limited to, permitted and restricted activities, security matters, parking, ingress and egress, environmental and storm water regulations and any other operational matters related to the operation of Airport. Company, its officers, employees, agents, subcontractors, and those under its control, will comply with safety, operational, or security measures required of Company or Authority by the Federal Government including but not limited to, FAA or TSA. If Company, its officers, employees, agents, subcontractors or those under its control will fail or refuse to comply with said measures and such non-compliance results in a monetary penalty being assessed against Authority, then, in addition to any other remedies available to Authority, Company will be responsible and will reimburse Authority the full amount of any such monetary penalty or other damages. This amount must be paid by Company within fifteen (15) Days from the date of written notice from Authority.

24. COMPLIANCE WITH CHAPTER 119, FLORIDA STATUTES PUBLIC RECORDS LAW

IF COMPANY HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO COMPANY'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS SUPPLEMENTAL CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (813) 870-8721, ADMCENTRALRECORDS@TAMPAAIRPORT.COM, HILLSBOROUGH COUNTY AVIATION AUTHORITY, P.O. BOX 22287, TAMPA FL 33622.

The Company agrees in accordance with Florida Statute Section 119.0701 to comply with public records laws including the following:

24.1 Keep and maintain public records required by the Authority in order to perform the Services contemplated by this Supplemental Contract.

24.2 Upon request from the Authority custodian of public records, provide the Authority with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Fla. Stat. or as otherwise provided by applicable law.

24.3 Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by applicable law for the duration of the Term of this Supplemental Contract and following completion of the Term of this Supplemental Contract.

24.4 Upon completion of the Term of this Supplemental Contract, keep and maintain public records required by the Authority to perform the Services. The Company shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the Authority, upon request from the Authority custodian of public records, in a format that is compatible with the information technology systems of the Authority.

The Authority maintains its records in electronic form in accordance with the State of Florida records retention schedules. As a result, the paper original version of this document (to the extent it exists) will be scanned and stored electronically as the authoritative record copy as part of the Authority's record management process. Once that occurs, the paper original version of this document will be destroyed.

25. CONTRACT MADE IN FLORIDA

This Supplemental Contract has been made in and shall be construed in accordance with the laws of the State of Florida. All duties, obligations and liabilities of Authority and Company related to this Supplemental Contract are expressly set forth herein and this Supplemental Contract can only be amended in writing and agreed to by both Parties.

26. NOTICES AND COMMUNICATIONS

All notices or communications whether to Authority or to Company pursuant hereto will be deemed validly given, served, or delivered, upon receipt by the party by hand delivery, or three (3) Days after depositing such notice or communication in a postal receptacle, or one (1) Day after depositing such notice or communication with a reputable overnight courier service, and addressed as follows:

TO AUTHORITY: (MAIL DELIVERY HILLSBOROUGH COUNTY AVIATION AUTHORITY TAMPA INTERNATIONAL AIRPORT P.O. BOX 22287	OR	(HAND DELIVERY) HILLSBOROUGH COUNTY AVIATION AUTHORITY 5411 SKYCENTER DRIVE SUITE 500

TAMPA, FLORIDA 33622-2287
ATTN: CHIEF EXECUTIVE OFFICER

TAMPA, FLORIDA 33607-1470
ATTN: CHIEF EXECUTIVE OFFICER

TO Company:

(MAIL DELIVERY)
COMCO Communication Installation & Service Company, Inc.
4581 62nd Avenue North
Pinellas Park, FL 33781

OR

(HAND DELIVERY)
COMCO Communication Installation & Service Company, Inc.
4581 62nd Avenue North
Pinellas Park, FL 33781

or to such other address as either Party may designate in writing by notice to the other Party delivered in accordance with the provisions of this Article.

If notice is sent through a mail system, a verifiable tracking documentation such as a certified return receipt or overnight mail tracking receipt is required. Company will notify Authority in writing within ten (10) Days following any change in Company's name, Company's address and/or Company's representative, indicated above.

27. SUBORDINATION OF CONTRACT

It is mutually understood and agreed that this Supplemental Contract will be subordinate to the provisions of any existing or future agreement between Authority and the United States of America, its Boards, Agencies, Commissions, and others, relative to the operation or maintenance of the Airport, the execution of which has been or may be required as a condition precedent to the expenditure of federal funds for the development of the Airport, and this Supplemental Contract will be subordinate to the license or permit of entry which may be granted by the Secretary of Defense.

28. SUBORDINATION TO TRUST AGREEMENT

This Supplemental Contract and all rights of Company hereunder are expressly subject and subordinate to the terms, covenants, conditions and provisions of any Trust Agreements or other debt instruments executed by Authority to secure bonds issued by, or other obligations of, Authority. The obligations of Company hereunder may be pledged, transferred, hypothecated, or assigned at any time by Authority to secure such obligations. Conflicts between the terms of this Supplemental Contract and the provisions, covenants and requirements of the debt instruments mentioned above will be resolved in favor of the provisions, covenants and requirements of such debt instruments.

29. ASSIGNMENT AND SUBCONTRACTING

Company will not assign, subcontract, sublease, or license this Supplemental Contract without the prior written consent of Authority. Such consent may be withheld at the sole discretion of Authority. If assignment, subcontract, sublease, or license is approved, Company will be solely

responsible for ensuring that its assignee, subcontractor, sublessee, or licensee perform pursuant to and in compliance with the terms of this Supplemental Contract.

In no event will any approved assignment, subcontract, sublease, or license diminish Authority rights to enforce any and all provisions of this Supplemental Contract.

Before any assignment, subcontract, sublease, or license becomes effective, the assignee, subcontractor, sublessee, or licensee will assume and agree by written instruments to be bound by the terms and conditions of this Supplemental Contract during the remainder of the Term. When seeking consent to an assignment hereunder, Company will submit a fully executed original of the document or instrument of assignment to Authority.

30. BADGING AND SECURITY REQUIREMENTS

All of Company's Personnel who work at the Airport must apply for and be issued a proper security identification badge prior to beginning work at the Airport. Company shall be responsible for ensuring Personnel, vendor and contractor compliance with all security rules, regulations and procedures including, but not limited to, those issued by the FAA, TSA, and Authority. The rules, regulations and procedures of the FAA, TSA and Authority regarding security matters may be modified during the Term and Company shall be required to comply with all modifications. Company shall pay all costs associated with obtaining the required security identification badge and security clearances for its Personnel, including, but not limited to, the costs of training and badging as established by Authority.

Authority will fine Company for each security identification badge that is lost, stolen, unaccounted for or not returned to Authority at the time of security identification badge expiration, employee termination, termination of this Supplemental Contract, or upon written request by Authority. This fine will be due within fifteen (15) Days from the date of invoice. The fine is subject to change without notice, and Company will be responsible for paying any increase in the fine.

If any of Company's Personnel is terminated or leaves Company's employment, Authority must be notified immediately, and the security identification badge must be returned to Authority promptly.

Company's Personnel who are issued security identification badges shall only utilize such badges and access rights in connection with the operation of Company's business as outlined herein. Company's Personnel shall be informed by Company in writing of this requirement and a violation of such shall be a basis for the termination of a person's employment if that person violates such restrictions.

31. EMPLOYEE PARKING

Company will be provided parking at the Authority for the performance of all Services under this Supplemental Contract.

32. APPLICABLE LAW AND VENUE

This Supplemental Contract will be construed in accordance with the laws of the State of Florida. Venue for any action brought pursuant to this Supplemental Contract will be in Hillsborough County, Florida, or in the Tampa Division of the U.S. District Court for the Middle District of Florida.

The Company hereby waives any claim against the Authority and the indemnified parties for loss of anticipated profits caused by any suit or proceedings directly or indirectly attacking the validity of this Supplemental Contract or any part hereof, or by any judgment or award in any suit or proceeding declaring this Supplemental Contract null, void, or voidable, or delaying the same, or any part hereof, from being carried out.

33. SCRUTINIZED COMPANIES

Company is required to complete Exhibit C, Scrutinized Company Certification, at the time this Supplemental Contract is executed and to complete a new Exhibit C for each renewal option period, if any.

This Supplemental Contract will be terminated in accordance with Florida Statute Section 287.135 if it is found that Company submitted a false Scrutinized Company Certification as provided in Florida Statute Section 287.135(5), has been placed on the Scrutinized Companies with Activities in Sudan List, has been engaged in in business operations in Cuba or Syria, or has been placed on a list created pursuant to Florida Statutes 215.743 related to scrutinized activity business operations in Iran.

34. ANTI-HUMAN TRAFFICKING LAWS

Company is required to complete Exhibit D, Affidavit of Compliance with Anti-Human Trafficking Laws, at the time this Supplemental Contract is executed and to complete a new Exhibit D for each renewal option period, if any.

This Supplemental Contract will be terminated in accordance with Florida Statute Section 787.06 (14) if it is found that Company submitted a false Affidavit of Compliance with Anti-Human Trafficking Laws as provided in Florida Statute Section 787.06 (14).

35. RELATIONSHIP OF PARTIES

The Company is and will be deemed to be an independent contractor and operator responsible for its acts or omissions, and the Authority will in no way be responsible therefore.

36. RIGHT TO AMEND

In the event that the United States Government including but not limited to the FAA and TSA, or its successors, Florida Department of Transportation, or its successors, or any other governmental agency requires modifications or changes to this Supplemental Contract as a condition precedent to the granting of funds for the improvement of the Airport, Company agrees to consent to such amendments, modifications, revisions, supplements, or deletions of any of the terms, conditions, or requirements of this Supplemental Contract as may be reasonably required to obtain such funds; provided, however, that in no event will Company be required, pursuant to this paragraph, to agree to an increase in the charges provided for hereunder.

37. TIME IS OF THE ESSENCE

Time is of the essence of this Supplemental Contract.

38. NON-DISCLOSURE

All written and oral information and materials (Information) disclosed or provided by Authority to Company under this Supplemental Contract will not be disclosed by Company, whether or not provided before or after the date of this Supplemental Contract.

The Information will remain the exclusive property of Authority and will only be used by Company for purposes permitted under this Supplemental Contract. Company will not use the Information for any purpose which might be directly or indirectly detrimental to Authority or any of its affiliates or subsidiaries.

Company will prevent the unauthorized use, access, acquisition, disclosure, dissemination or publication of the Information. Company agrees that it will cause its employees and representatives who have access to the Information to comply with these provisions and Company will be responsible for the acts and omissions of its employees and representatives with respect to the Information.

Company agrees that any disclosure of the Information by Company's employees and/or representatives will be deemed a breach of this Supplemental Contract. Company agrees that in the event of any breach or threatened breach by Company of its non-disclosure obligation, Authority may obtain such legal remedies as are available, and, in addition thereto, such equitable relief as may be necessary to protect Authority.

The non-disclosure obligation imposed on Company under this Supplemental Contract will survive the expiration or termination, as the case may be, of this Supplemental Contract and the obligation will last indefinitely.

39. WAIVERS

No waiver by Authority at any time of any of the terms, conditions, covenants, or agreements of this Supplemental Contract, or noncompliance therewith, will be deemed or taken as a waiver at any time thereafter of the same or any other term, condition, or covenant herein contained, nor of the strict and prompt performance thereof by Company. No delay, failure or omission of Authority to exercise any right, power, privilege or option arising from any default nor subsequent payment of charges then or thereafter accrued, will impair any such right, power, privilege or option, or be construed to be a waiver of any such default or relinquishment thereof or acquiescence therein. No notice by Authority will be required to restore or revive time as being of the essence hereof after waiver by Authority or default in one or more instances. No option, right, power, remedy or privilege of Authority will be construed as being exhausted or discharged by the exercise thereof in one or more instances. It is agreed that each and all of the rights, powers, options, or remedies given to Authority by this Supplemental Contract are cumulative and no one of them will be exclusive of the other or exclusive of any remedies provided by law, and that the exercise of one right, power, option or remedy by Authority will not impair its rights to any other right, power, option or remedy.

40. TENANCY

The undersigned representative of Company hereby warrants and certifies to Authority that Company is an organization in good standing in its state of registration, that it is authorized to do business in the State of Florida, and that the undersigned officer is authorized and empowered to bind the organization to the terms of this Supplemental Contract by his or her signature thereto.

41. AMERICANS WITH DISABILITIES ACT

Company will comply with the applicable requirements of the Americans with Disabilities Act; the Florida Americans with Disabilities Accessibility Implementation Act; Florida Building Code, Florida Accessibility Code for Building Construction; and any similar or successor laws, ordinances, rules, standards, codes, guidelines, and regulations and will cooperate with Authority concerning the same subject matter.

42. E-VERIFY REQUIREMENT

In accordance with the State of Florida, Office of the Governor, Executive Order Number 11-116 (Verification of Employment Status) and Fla. Stat. Section 448.095 the Company, and any subcontractor thereof, is obligated to register with and use the Department of Homeland Security's E-Verify system to verify the work authorization status of all new employees of the Company or subcontractor. If the Company enters into a contract with a subcontractor, the Company must require the subcontractor to provide an affidavit stating that the subcontractor uses the E-Verify system and does not employ, contract with, or subcontract with an unauthorized alien.

43. AGENT FOR SERVICE OF PROCESS

It is expressly agreed and understood that if Company is not a resident of the State of Florida, or is an association or partnership without a member or partner resident of said State, or is a foreign corporation, then in any such event Company does designate the Secretary of State, State of Florida, as its agent for the purpose of service of process in any court action between it and Authority arising out of or based upon this Supplemental Contract, and the service will be made as provided by the laws of the State of Florida, for service upon a non-resident. It is further expressly agreed, covenanted, and stipulated that if for any reason service of such process is not possible, and Company does not have a duly noted resident agent for service of process, as an alternative method of service of process, Company may be personally served with such process out of this State, by the certified return receipt mailing of such complaint and process or other documents to Company at the address set out in this Supplemental Contract, or in the event of a foreign address delivery by Federal Express, and that such service will constitute valid service upon Company as of the date of mailing and Company will have thirty (30) Days from date of mailing to respond thereto. It is further expressly understood that Company hereby agrees to the process so served, submits to the jurisdiction of the State or Federal courts located in Hillsborough County, Florida, and waives any and all obligation and protests thereto, any laws to the contrary notwithstanding.

44. INVALIDITY OF CLAUSES

The invalidity of any part, portion, sentence, article, paragraph, provision, or clause of this Supplemental Contract will not have the effect of invalidating any other part, portion, sentence, article, paragraph, provision, or clause of this Supplemental Contract, and the remainder of this Supplemental Contract will be valid and enforced to the fullest extent permitted by law.

45. SEVERABILITY

If any provision in this Supplemental Contract is held by a court of competent jurisdiction to be invalid, the validity of the other provisions of this Supplemental Contract which are severable shall be unaffected.

46. HEADINGS

The headings contained herein, including the Table of Contents, are for convenience in reference and are not intended to define or limit the scope of any provisions of this Supplemental Contract. If for any reason there is a conflict between content and headings, the content will control.

47. PUBLIC ENTITY CRIME

Company attests compliance with Florida Statute Section 287.133, concerning Public Entity Crimes.

48. ORGANIZATION AND AUTHORITY TO ENTER INTO CONTRACT

The undersigned representative of Company hereby warrants and certifies to Authority that Company is an organization in good standing in its state of registration, that it is authorized to do

business in the State of Florida, and that the undersigned officer is authorized and empowered to bind the organization to the terms of this Supplemental Contract by his or her signature thereto and neither Company, its officers or any holders of more than five percent (5%) of the voting stock of Company have been found in violation of Florida Statute Section 287.133, concerning Criminal Activity on Contracts with Public Entities. If Company is a corporation whose shares are not regularly and publicly traded on a recognized stock exchange, Company represents that the ownership and power to vote the majority of its outstanding capital stock belongs to and is vested in the officer or officers executing this Supplemental Contract.

49. CONTRACT CHANGES

A change order or amendment is a written contract modification prepared by Authority and signed by both Parties hereto, stating their agreement upon all of the following, and without invalidating this Supplemental Contract:

A. a change in the Scope of Services, if any;
B. a change of the Supplemental Contract amount, fees, hourly rates or other costs, if any;
C. a change of the basis of payment, if any;
D. a change in Supplemental Contract time, if any; and
E. changes to the terms and conditions of this Supplemental Contract.

49.1 **Claim for Payment**.

Any claim for payment for changes in the Services that is not covered by written change order or amendment or other written instrument signed by the Parties hereto will be rejected by Authority. Company acknowledges and agrees that Company will not be entitled to payment for changes in the Services unless such revised Services are specifically authorized in writing by Authority in advance. The terms of this Article may not be waived by Authority unless such waiver is in writing and makes specific reference to this Article.

Changes in the Services will be performed under applicable provisions of the Supplemental Contract documents, and Company will proceed promptly, unless otherwise provided in the change order, amendment or other written instrument.

49.2 **Right to Carry Out the Services**.

If Company defaults or neglects to carry out the Services in accordance with the Supplemental Contract documents and fails within a seven (7) day period after receipt of written notice from Authority to begin and prosecute correction of such default or neglect with diligence and promptness, Authority may, without prejudice to other remedies Authority may have, correct such deficiencies. In such case an appropriate change order will be issued deducting from payments then or thereafter due Company the cost of correcting such deficiencies, including compensation for another Company's or Authority's additional services and expenses made

necessary by such default, neglect or failure. If payments then or thereafter due Company are not sufficient to cover such amounts, Company will pay the difference to Authority.

50. COMPLETE CONTRACT

This Supplemental Contract represents the complete understanding between the Parties, and any prior contracts, agreements, or representations, whether written or verbal, are hereby superseded. This Supplemental Contract may subsequently be amended only by written instrument signed by the Parties hereto unless provided otherwise within the terms and conditions of this Supplemental Contract.

[Remainder of Page is Intentionally Left Blank]

IN WITNESS WHEREOF, the Parties hereto have set their hands and corporate seals on this 5th day of February 2026.

HILLSBOROUGH COUNTY AVIATION AUTHORITY

ATTEST: _____ BY: _____

Jane Castor, Secretary — Arthur F. Diehl III, Chairman

Address: PO Box 22287
Tampa, FL 33622

Address: PO Box 22287
Tampa, FL 33622

LEGAL FORM APPROVED:

WITNESS: _____ BY: _____

Signature — David Scott Knight, Assistant General Counsel

_____

Printed Name

HILLSBOROUGH COUNTY AVIATION AUTHORITY
STATE OF FLORIDA
COUNTY OF HILLSBOROUGH

The foregoing instrument was acknowledged before me by means of □ physical presence or □ online authorization, this 5th day of February, 2026, by Arthur F. Diehl III, in the capacity of Chairman, and by Jane Castor in the capacity of Secretary, for Hillsborough County Aviation Authority, a public body corporate under the laws of the State of Florida, on its behalf.

Stamp or Seal of Notary

_____

Signature of Notary

_____

Print, Type, or Stamp Commissioned Name of Notary

Personally Known OR Produced Identification
Type of Identification Produced

COMCO COMMUNICATION INSTALLATION & SERVICE COMPANY, INC.

Signed in the Presence of:

BY: _____
Signature

_____
Witness

PRESIDENT
Title

DJ MANCINI
Printed Name

MICHAEL C. BUGNER
Printed Name

_____
Witness

4581 62ND AVE. N.
Printed Address

PHIL GREENE
Printed Name

PINELLAS PARK, FL 33781
City/State/Zip

COMCO COMMUNICATION INSTALLATION & SERVICE COMPANY, INC.

STATE OF FLORIDA

COUNTY OF PINELLAS

The foregoing instrument was acknowledged before me by means of □ physical presence or □ online notarization, this 9th day of JANUARY 2026, by MICHAEL C. BUGNER (Name of person) as PRESIDENT (type of authority), for COMCO (name of party on behalf of whom contract was executed).

Stamp or Seal of Notary

_____
Signature of Notary

_____
Print, Type, or Stamp Commissioned Name of Notary

Personally Known OR Produced Identification
Type of Identification Produced

Jennifer Sloan
Comm.: HH 742010
Expires: Nov. 30, 2029
Notary Public - State of Florida

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4050 Esplanade Way
Tallahassee, FL 32399-0950

Ron DeSantis, Governor
Pedro Allende, Secretary

CONTRACT

FOR

TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3

CONTRACT NO.: DMS-24/25-264D

BETWEEN

THE STATE OF FLORIDA

DEPARTMENT OF MANAGEMENT SERVICES

AND

COMCO COMMUNICATION INSTALLATION AND SERVICE COMPANY, INC.

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Contract

This Contract No. DMS-24/25-264D (Contract) is between the STATE OF FLORIDA, DEPARTMENT OF MANAGEMENT SERVICES (Department or DMS), an agency of the State of Florida with offices at 4050 Esplanade Way, Tallahassee, Florida 32399-0950, and Comco Communication Installation and Service Company, Inc. (Contractor), with offices at 4581 62nd Ave., N., Pinellas Park, FL 33781, each, a "Party" and collectively referred to herein as the "Parties".

WHEREAS, the Contractor responded to the Department's Request for Proposals (RFP) No. DMS-24/25-264, "Telecommunication Infrastructure Project Services 3".

WHEREAS, the Contractor was awarded to provide Division 1 commodities and services in the following Region:

- Region 6

NOW, THEREFORE, in consideration of the premises and mutual covenants set forth herein, the Parties agree as follows:

SECTION 1. TERM

1.1 Initial Term

The initial term of the Contract will be for three (3) years. The initial term shall begin on the last date the Contract is signed by all Parties.

1.2 Renewal Term

Upon written agreement, the Department and the Contractor may renew the Contract in whole or in part, for renewal terms up to three (3) years in accordance with section 287.057(14), Florida Statutes, and Rule 60A-1.048, Florida Administrative Code (F.A.C). Any renewals shall be contingent upon satisfactory performance evaluations by the agency and subject to the availability of funds. The Contractor shall not charge any costs for renewing the contract.

1.3 Termination

The Department, by thirty (30) days advance written notice to Contractor, may terminate the Contract in whole or in part when the Department determines in its sole discretion that it is in the Department's best interest to do so. Contractor will not furnish any services after termination of the Contract, except as necessary to complete any continued portion of the Contract. If the Contract is terminated before performance is completed, the Contractor will be paid only for that work satisfactorily performed for which costs can be substantiated. Contractor will not be entitled to recover any lost profits, consequential damages, special, punitive, consequential, or indirect damages or any other damages other than the payment amounts due for performance until the effective date of termination.

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SECTION 2. PAYMENTS

2.1 Price Adjustments

During the term of the Contract (including optional renewal years), the Department encourages the awarded Respondent to offer price decreases that are in line with increased efficiencies and added infrastructure enhancements. The Department reserves the right to further negotiate reduction in pricing for the renewal years.

2.2 Service Level Agreement

Service Level Agreement (SLA) dictate the levels of service delivery for individual services. One, multiple, or recurring violations of SLAs, as described in Exhibit A – Statement of Work, may be considered a breach of the Contract and may result in a suspension or termination of the Contract. The Department reserves the sole right to determine when violation(s) of SLAs constitute a breach of the Contract or will result in a suspension or termination of the Contract. The Department's determination of a breach of the Contract will depend on the number and severity of the SLA violation(s), disruption to service, Contractor's response, and other factors.

The resulting damages to the Department or Customer(s) from such a breach are by their nature impossible to ascertain presently and will be difficult to ascertain in the future. The issues involved in determining such damages will be numerous, complex, and unreasonably burdensome to prove. The Contractor therefore agrees to credit the Department consistently with Exhibit A – Statement of Work.

In addition to the processes set forth in the Contract (e.g., SLAs), if the Department determines that there is a performance deficiency that requires correction by the Contractor, then the Department will notify the Contractor. The correction must be made within a timeframe specified by the Department. The Contractor must provide the Department with a corrective action plan describing how the Contractor will address all performance deficiencies identified by the Department.

If the corrective action plan is unacceptable to the Department, or implementation of the plan fails to remedy the performance deficiencies, the Department will retain ten percent (10%) of the total invoice amount and may suspend or terminate the Contract. The retainage will be withheld until the Contractor resolves the performance deficiencies. If the performance deficiencies are resolved, the Contractor may invoice the Department for the retained amount. If the Contractor fails to resolve the performance deficiencies, the retained amount will be forfeited as a financial consequence and the Department may terminate the Contract.

2.3 Liquidated Damages

The Contractor will promptly notify the Department or Customer upon becoming aware of any circumstances that may reasonably be expected to jeopardize the timely and successful completion (or delivery) of any commodity or contractual service. The Contractor will use commercially reasonable efforts to avoid or minimize any delays in performance and will inform the Department or Customer of the steps the Contractor is

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taking or will take to do so, and the projected actual completion (or delivery) time. If the Contractor believes a delay in performance by the Department or Customer has caused or will cause the Contractor to be unable to perform its obligations on time, the Contractor will promptly so notify the Department or Customer and use commercially reasonable efforts to perform its obligations on time notwithstanding the Department or Customer's delay.

The Contractor acknowledges that untimely performance or other material noncompliance will damage the Department or Customer, but by their nature such damages may be difficult to ascertain. Accordingly, any liquidated damages provisions stated in the solicitation will apply to the Contract. Liquidated damages are not intended to be a penalty and are solely intended to compensate for damages.

2.4 Detail of Bills

The Contractor shall submit bills for fees or other compensation for services or expenses in detail sufficient enough for a proper pre-audit and post-audit. The Department reserves the right to request additional documentation as needed.

2.5 Bills for Travel

Bills for travel are not permitted and will not be paid. Travel expenses are not reimbursable unless specifically authorized by the Customer in writing, and in such a case may be reimbursed only in accordance with section 112.061, F.S.

2.6 Payments

The Parties agree that payments under this Contract shall be made monthly in arrears. The Contractor will be paid upon submittal of an invoice to the Department after delivery and acceptance of commodities or contractual services is confirmed, and the invoice is accepted by the Customer.

2.7 Appropriations

The State of Florida's performance and obligation to pay under this Contract is contingent upon an annual appropriation by the Legislature.

2.8 Return of Funds

Contractor will return any overpayments due to unearned funds or funds disallowed pursuant to the terms of the Contract that were disbursed to the Contractor by the Department or Customer. The Contractor must return any overpayment within forty (40) calendar days after either discovery by the Contractor, its independent auditor, or notification by the Department or Customer of the overpayment.

2.9 Payment Audit

Records of costs incurred under terms of the Contract will be maintained in accordance with Section 10 of the PUR 1000. Records of costs incurred will include the Contractor's general accounting records, together with supporting documents and records of the Contractor and all subcontractors performing work, and all other records of the Contractor and subcontractors considered necessary by the Department, State of Florida's Chief Financial Officer or the Office of the Auditor General for audit.

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SECTION 3. CONTRACT DOCUMENT

This Contract sets forth the entire understanding of the Parties and consists of the documents listed below. In the event any of these documents conflict, the conflict will be resolved in the following order of priority (highest to lowest):

1. This Contract Document
2. Exhibit A – Statement of Work
3. Exhibit B – Pricing Workbook
4. Exhibit C – Region Map
5. Exhibit D – Project Commencement Submittal Section A
6. Exhibit E – Project Commencement Submittal Section C
7. Exhibit F – Project Final Submittal Section A
8. Exhibit G – Project Final Submittal Section B
9. Exhibit H – Daily Log
10. Exhibit I – Customer and Contractor Sign-Off Form
11. The General Contract Conditions - PUR 1000 form, which are incorporated by reference in accordance with Rule 60A-1.002(7), F.A.C., and are available at: https://www.dms.myflorida.com/content/download/2933/11777/PUR_1000_General_Contract_Conditions.pdf
12. Contractor's Proposal to the RFP, incorporated by reference as if fully stated herein.

SECTION 4. CONTRACT ADMINISTRATION

4.1 Composition and Priority

The Contractor agrees to provide commodities or contractual services within the manner and at the location specified in the Contract and any exhibits to the Contract. Additionally, the terms of the Contract supersede the terms of any and all prior or contemporaneous agreements between the Parties.

4.2 Department Contract Administrator

Pursuant to Fla. Stat. § 287.057(16) the Contract Administrator listed below will be responsible for the Department's maintenance of this Contract:

Christina Guerra
Departmental Purchasing
Department of Management Services
4050 Esplanade Way, Suite 260.4z
Tallahassee, FL 32399
Telephone: (850) 488-0012
Email: dms.purchasing@dms.fl.gov

In the event that the Department changes the Contract Administrator, the Department will notify the Contractor in writing via email. Such changes do not require a formal written amendment to the Contract.

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4.3 Contract Manager

Pursuant to Fla. Stat. § 287.057(15) the Contract Manager who is primarily responsible for overseeing the Contractor's performance of its duties and obligations pursuant to the terms of this Contract shall be as follows:

Luis Lopez
Division of Telecommunications
Florida Department of Management Services
4030 Esplanade Way, Suite 180P
Tallahassee, FL 32399
Telephone: 850-414-2606
Email: luis.lopez@dms.fl.gov

In the event that the Department changes the Contract Manager, the Department will notify the Contractor in writing via email. Such changes do not require a formal written amendment to the Contract.

4.4 Contractor's Point of Contact

The Contractor's Contract Manager, who is primarily responsible for the Contractor's oversight of the Contract performance, will be identified in a separate writing to the Department upon Contract signing in the following format:

Mike Bugner, President
Comco Communication Installation & Service Co., Inc.
4581 62nd Avenue N.
Pinellas Park, FL 33781
Telephone: 727-742-0448
Email: mike@comcoinc.net

VJ Singh, President
Comco Communication Installation & Service Co., Inc.
4581 62nd Avenue N.
Pinellas Park, FL 33781
Telephone: 727-510-2178
Email: vj.singh@comcoinc.net

In the event that the Contractor changes its Contract Manager, the Contractor will notify the Department's Contract Manager in writing via email. Such a change does not require an amendment to the Contract.

4.5 Supplier Development

Office of Supplier Development. The State of Florida supports its business community by creating opportunities for business enterprises to participate in procurements and contracts. The Department encourages supplier development through certain certifications and provides advocacy, outreach, and networking through regional business events. For additional information, please contact the Office of Supplier Development (OSD) at OSDHelp@dms.fl.gov.

Reporting Certified Business Enterprises. Upon request, the Contractor will report to the Department its spend with business enterprises certified by the OSD. These reports must include the time period covered, the name and vendor identification information of

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each business enterprise utilized during the period, commodities and contractual services provided by the business enterprise, and the amount paid to the business enterprise on behalf of each agency purchasing under the Contract.

4.6 Dispute Resolution, Governing Law and Venue

Any dispute concerning performance of the Contract shall be decided by the Department's Contract Manager, who will reduce the decision to writing and serve a copy on the Contractor. The decision of the Department's Contract Manager shall be final and conclusive. Exhaustion of this administrative remedy is an absolute condition precedent to the Contractor's ability to pursue legal action related to the Contract or any other form of dispute resolution. The laws of the State of Florida govern the Contract. The Parties submit to the jurisdiction of the courts of the State of Florida exclusively for any legal action related to the Contract. Further, the Contractor hereby waives any and all privileges and rights relating to venue it may have under Chapter 47, F.S., and any and all such venue privileges and rights it may have under any other statute, rule, or case law, including, but not limited to those based on convenience. The Contractor hereby submits to venue in the county chosen by the Department.

SECTION 5. COMPLIANCE WITH LAWS

5.1 Compliance

The Contractor shall comply with all laws, rules, codes, ordinances, and licensing requirements that are applicable to the conduct of its business, including those of Federal, State and local agencies having jurisdiction and authority Chapter 287, Florida Statutes, Chapters 60A-1 and 60FF, Florida Administrative Code. The Contractor shall comply with section 274A of the Federal Immigration and Nationality Act, the Health Insurance Portability and Accountability Act (HIPAA) (including executing any Business Associate Agreements as requested by Customers, if applicable), the Americans with Disabilities Act and all prohibitions against discrimination on the basis of race, religion, sex, creed, national origin, handicap, marital status or veteran's status. The Contractor shall comply with Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, and the United States Export Administration regulations and Wassenaar Agreement. The Contractor shall comply with all Federal Communications Commission (FCC) regulations. Violation of any laws, rules, codes, ordinances or licensing requirements shall be grounds for Contract termination or non-renewal of the Contract.

5.2 Notice of Legal Actions

The Contractor shall notify the Department of any regulatory or legal actions filed against it for a violation of any laws, rules, codes, ordinances, or licensing requirements within 30 days of the action being filed. The Contractor shall notify the Department of any legal actions filed against it for a breach of a contract of similar size and scope to this Contract within 30 days of the action being filed. Failure to notify the Department of a legal action within 30 days of the action shall be grounds for termination or nonrenewal of the Contract. The Contractor shall immediately notify the Department in writing if its ability to perform is compromised in any manner during the term of the Contract.

SECTION 6. WORKERS' COMPENSATION AND LIABILITY INSURANCE

6.1 Workers' Compensation Insurance

The Contractor shall maintain Workers' Compensation insurance as required under the Florida Workers' Compensation Law or the workers' compensation law of another jurisdiction where applicable. The Contractor must require all subcontractors to similarly

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provide Workers' Compensation Insurance for all of the latter's employees. In the event work is being performed by the Contractor under the resulting contract and any class of employees performing the work is not protected under Worker's Compensation statutes, the Contractor must provide, and cause each subcontractor to provide adequate insurance, satisfactory to the Department, for the protection of employees not otherwise protected.

6.2 General Liability Insurance

The Contractor shall maintain insurance sufficient to adequately protect the Department and Customers from all claims or liability for personal injury or property damage arising out of, resulting from the performance of, or in connection with the operation of, the Contract. All insurance shall be with insurers authorized to transact the applicable line of insurance business in the State of Florida. The Contractor shall provide Certification(s) of Insurance evidencing that all appropriate coverage is in place and showing the Department to be an additional insured.

The Contractor must submit via email, to the Department's Contract Manager, notice of any cancellation or nonrenewal at least ten (10) calendar days prior to cancellation or nonrenewal. In the event of cancellation or nonrenewal, the Contractor will be responsible for securing a replacement insurance policy in accordance with this section.

SECTION 7. INTELLECTUAL PROPERTY

7.1 Intellectual Property

The Parties do not anticipate that any intellectual property will be developed as a result of this Contract. However, unless specifically addressed in the Contract, intellectual property rights to all property created or otherwise developed by the Contractor for the Department or the Customer will be owned by the State of Florida at the completion of the Contract.

Any inventions or discoveries developed in the course of or as a result of services performed under the Contract which are patentable pursuant to 35 U.S.C. § 101 are the sole property of the State of Florida. Contractor must inform the Customer of any inventions or discoveries developed or made in connection with the Contract and will be referred to the Florida Department of State for a determination on whether patent protection will be sought for the invention or discovery. The State of Florida will be the sole owner of any and all patents resulting from any invention or discovery made in connection with the Contract.

Contractor must notify the Department or State of Florida of any publications, artwork, or other copyrightable works developed in connection with the Contract. All copyrights created or developed in connection with the Contract are the sole property of the State of Florida.

7.2 Indemnification

The Contractor agrees to indemnify, defend, and hold the Department, Customer, the State of Florida, its officers, employees and agents harmless from all fines, claims, assessments, suits, judgments, or damages, including consequential, special, indirect, and punitive damages, including court costs and attorney's fees, arising from or relating to violation or infringement of a trademark, copyright, patent, trade secret or intellectual property right or out of any acts, actions, breaches, neglect or omissions of the Contractor, its employees, agents, subcontractors, assignees or delegates related to the Contract, as well as for any determination arising out of or related to the Contract that the Contractor

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or Contractor's employees, agents, subcontractors, assignees or delegates are not independent contractors in relation to the Department. The Contract does not constitute a waiver of sovereign immunity or consent by the Department or the State of Florida or its subdivisions to suit by third parties.

Without limiting this indemnification, the Department or Customer may provide the Contractor (1) written notice of any action or threatened action, (2) the opportunity to take over and settle or defend any such action at Contractor's sole expense, and (3) assistance in defending the action at Contractor's sole expense.

SECTION 8. MONITORING BY THE DEPARTMENT

The Contractor shall permit all persons who are duly authorized by the Department to inspect and copy any records, papers, documents, facilities, goods and services of the Contractor that are relevant to this Contract and to interview clients, employees and Subcontractor employees of the Contractor to assure the Department of satisfactory performance of the terms and conditions of this Contract. Following such review, the Department may deliver to the Contractor a written report of its finding(s) and direct the development, by the Contractor, of a corrective action plan. This provision will not limit the Department's termination rights.

SECTION 9. AUDITS

The Department may conduct or have conducted performance and/or compliance audits of any and all areas of the Contractor and/or subcontractors as determined by the Department. The Department may conduct an audit and review all the Contractor's and Subcontractors' data and records that directly relate to the Contract Services. To the extent necessary to verify the Contractor's fees and claims for payment under the Contract, the Contractor's agreements or contracts with Subcontractors, partners or agents of the Contractor, pertaining to this Contract, may be inspected by the Department upon 15 days' notice, during normal working hours and in accordance with the Contractor's facility access procedures where facility access is required. Release statements from its Subcontractors, partners or agents are not required for the Department or its designee to conduct compliance and performance audits on any of the Contractor's contracts relating to this Contract. The State's Chief Financial Officer and the Office of the Auditor General also have authority to perform audits and inspections.

SECTION 10. BACKGROUND SCREENING, RECORD RET AND WARRANTY OF SECURITY

All Contractor employees, Subcontractors and agents performing work under the Contract must comply with all security and administrative requirements of the Department.

10.1 Background Screening

In addition to any background screening required by the Contractor as a condition of employment and the requirements found in the Statement of Work, the Contractor warrants that it will conduct a Level II criminal background screening of, or ensure that such a screening is conducted for, each of its employees, subcontractor personnel, independent contractors, leased employees, volunteers, licensees or other person, hereinafter referred to as "Person" or "Persons," operating under their direction who directly perform services under the Contract, whether or not the Person has access to State of Florida Data ("Data"), as well as those who have access, including indirect access, to State of Florida Data, whether or not they perform services under the Contract.

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The Contractor warrants that all Persons will have passed the Background Screening described herein before they have Access to Data or begin performing services under the Contract. The look-back period for such background screenings shall be for a minimum of six (6) years where six (6) years of historical information is available.

"Access" means to approach, instruct, communicate with, store data in, retrieve data from, or otherwise make use of any resources of a computer, computer system, or computer network. "Data" means a representation of information, knowledge, facts, concepts, computer software, computer programs or instructions, whether said information is confidential information or personal health information. Data may be in any form, including but not limited to, in storage media, stored in the memory of the computer, in transit or presented on a display device, or a hard copy. The Contractor shall ensure that the background screening is conducted on all Persons directly performing services under the Contract whether or not the Person has access to State of Florida, as well as those persons who are not performing services under the Contract but have access, including indirect access, to State of Florida Data.

The minimum background screening process shall include a check of the following databases through a law enforcement agency or a Professional Background Screener accredited by the National Association of Professional Background Screeners or a comparable standard:

- Social Security Number Trace; and
- Criminal Records (Federal, State and County criminal felony and misdemeanor, national criminal database for all states which make such data available);

The Contractor agrees that each Person will be screened as a prior condition for performing services or having access to State of Florida Data. The Contractor is responsible for any and all costs and expenses in obtaining and maintaining the criminal background screening information for each Person described above. The Contractor shall maintain documentation of the screening in the Person's employment file. The Contractor shall abide by all applicable laws, rules and regulations including, but not limited to the Fair Credit Reporting Act and/or any equal opportunity laws, rules, regulations or ordinances.

10.1.1 Disqualifying Offenses

If at any time it is determined that a Person has a criminal misdemeanor or felony record regardless of adjudication (adjudication withheld, a plea of guilty or nolo contendere, or a guilty verdict) within the last ten (10) years from the date of the court's determination for the crimes listed below, or their equivalent in any jurisdiction, the Contractor is required to immediately remove that Person from any position with access to State of Florida Data or directly performing services under the Contract. The disqualifying offenses are crimes where the nature of the criminal activity is such that a reasonable person would agree that their employment would create a risk of injury, loss, or damage to people and/or property of any State of Florida premises. Examples of these types of crimes include, but may not be limited to, the following:

- Computer-related or information technology crimes
- Fraudulent practices, false pretenses and frauds, and credit card crimes
- Forgery and counterfeiting • Violations involving checks and drafts
- Misuse of medical or personnel records
- Felony theft
- Murder/Manslaughter
- Petit Theft
- Burglary/Robbery
- Aggravated Assault
- Sexual Battery
- Kidnapping/False Imprisonment

If the Contractor finds a Disqualifying Offense for a Person within the last ten (10) years from the date of the court's disposition, it may obtain information regarding the incident and determine whether that Person should continue providing services under the Contract or have access to State of Florida premises. The Contractor shall consider the following factors only in making the determination:

1) nature and gravity of the offense,
2) the amount of time that lapsed since the offense,
3) the rehabilitation efforts of the person, and
4) relevancy of the offense to the job duties of the Person.

During the process of collecting the information and making a decision, the Contractor shall not allow the Person to perform services or have access to State of Florida premises.

10.1.2 Refresh Screening

The Contractor will ensure that all background screening will be refreshed at least twice every year from the time initially performed for each Person during the Term of the Contract.

10.1.3 Warrant of Security

"Warrant of Security" means a written document signed by the Contractor and submitted to the Department's Contract Manager in which the Contractor includes:

1) The name of each individual or Person subject to a criminal background screening under the Contract, and the date of his or her most recent criminal background screening; and
2) A statement confirming that the criminal background screening did not identify a disqualifying offense;

No Warrant of Security shall include the substance of criminal background screening results or any subsequent analysis.

10.1.3.1 Initial Warrant of Security

The Contractor will submit an Initial Warrant of Security before services are delivered under this Contract.

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10.1.3.2 Annual Warrant of Security

The Contractor will submit a Warrant of Security to the Contract Manager by December 31st of each Contract year.

10.1.3.3 Supplemental Warrant of Security

The Contractor will submit a supplemental Warrant of Security to the Contract Manager before any individual subsequently hired by the Contractor, and becomes a Person, delivers services under this Contract.

10.1.4 Self-Disclosure

The Contractor shall ensure that all Persons have a responsibility to self-report within three (3) calendar days to the Contractor any updated court disposition regarding any disqualifying offense, regardless of adjudication (adjudication withheld, a plea of guilty or nolo contendere, or a guilty verdict). The Contractor shall immediately reassess whether to disallow that Person access to any State of Florida premises or from directly performing services under the Contract. Additionally, the Contractor shall require that the Person complete an annual certification that they have not received any additional criminal misdemeanor or felony record regardless of adjudication (adjudication withheld, a plea of guilty or nolo contendere, or a guilty verdict) for the Disqualifying Offenses and shall maintain that certification in the employment file.

In addition, the Contractor shall ensure that all Persons have a responsibility to self-report to the Contractor within three (3) calendar days, any arrest for any Disqualifying Offense. The Contractor shall notify the Department's Contract Manager within twenty-four (24) hours of all details concerning any reported arrest.

10.2 Department's Ability to Audit Screening Compliance and Inspect Locations

The Department reserves the right to audit the Contractor's background screening process upon two (2) Business Days prior written notice to the Contractor during the Term of the Contract. Department will have the right to inspect the Contractor's working area, computer systems, and/or location upon two (2) Business Days prior written notice to the Contractor to ensure that access to the State of Florida Data is secure and in compliance with the Contract and all applicable state and federal rules and regulations.

10.3 Data Access

The Contractor shall retain a list of all persons with Access to State of Florida Data, including a statement confirming that each person has passed the Background Screening required herein. Such a statement shall not include the substance of the screening results, only that the Person has passed the screening.

The Contractor shall create a written policy for the protection of State of Florida Data, including a policy and procedure for Access to State of Florida Data.

The Contractor shall retain the written policy and information required in this subsection for the duration of this Contract and a period of no less than five years from the date of termination of this Contract and any Contract extensions. The written policy and information required in this

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subsection shall be included in the Department's audit and screening abilities. The written policy and information required in this subsection shall also be subject to immediate disclosure upon written or oral demand at any time by the Department or its designated agents or auditors.

Access as referenced in this Section shall mean review, inspect, approach, instruct, communicate with, store data in, retrieve data from, or otherwise make use of any data, regardless of type, form, or nature of storage. Access to a computer system or network includes local and remote access.

Notwithstanding any provision of the Contract to the contrary, the Contractor shall notify the Department as soon as possible and in all events within one (1) business day in the event it discovers any unauthorized Access of State of Florida Data occurs, any unauthorized transmission of State of Florida Data, or any credible allegation or suspicion of a material violation of the above. This notification is required whether the event affects one employee/retiree or the entire population. The notification shall be clear and conspicuous and include a description of the following:

1) The incident in general terms.
2) The type of personal information that was subject to the unauthorized Access and acquisition.
3) The number of individuals who were, or potentially have been affected by the breach.
4) The actions taken by the Contractor to protect the State of Florida Data information from further unauthorized Access. However, the description of those actions in the written notice may be general so as not to further increase the risk or severity of the breach.

Upon becoming aware of an unauthorized access to State of Florida Data, the Contractor's Account Manager shall set up a conference call with the Department's Contract Manager. The conference call invitation shall contain a brief description of the nature of the event. When possible, a thirty (30) minute notice shall be given to allow Department personnel to be available for the call. If the designated time is not practical for the Department, an alternate time for the call shall be scheduled. All available information shall be shared on the call. The Contractor shall answer all questions based on the information known at that time and shall answer additional questions as additional information becomes known. The Contractor shall provide the Department with final documentation of the incident including all actions that took place. If the Contractor becomes aware of an unauthorized access to State of Florida Data outside of normal business hours, the Contractor shall notify the Department's Contract Manager and in all events, within one (1) business day.

Failure to compile, retain, and disclose the written policy and information as required in this subsection shall be considered a breach of the Contract. The resulting damages to the Department from a breach of this subsection are by their nature impossible to ascertain presently and will be difficult to ascertain in the future. The issues involved in determining such damages will be numerous, complex, and unreasonably burdensome to prove. The parties acknowledge that these financial consequences are liquidated damages, exclusive of any other right to damages, not intended to be a penalty and solely intended to compensate for unknown and unascertainable damages. The Contractor therefore agrees to credit the Department the sum of $500 for each breach of this subsection.

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SECTION 11. PERFORMANCE BOND

The Contractor shall furnish DMS with a Performance Bond for all Projects over two hundred thousand dollars ($200,000.00). The Performance Bond shall be for the amount of the total cost of the order. The form of the guarantee shall be a Performance Bond made payable to DMS. The guarantee shall be furnished to the Product Manager prior to commencement of the Project.

The Performance Bond provided for any Project shall guarantee to DMS that the Contractor shall complete the Project associated with the Performance Bond in accordance with the terms of the Project including services provided, price, time, and provisioning for securing E-Rate funding where Customers have been qualified by USAC. If the Contractor defaults or is terminated by the Customer, DMS may call upon the surety to complete the Project.

The Contractor and insurer or bonding company shall provide the Department prior written notice or immediate notice upon knowledge of any attempt to cancel or to make any other material change in the status, coverage, or scope of the Performance Bond, or of the Contractor's failure to pay bond premiums.

The Department shall not be responsible for any premiums or assessments on or in relation to the Performance Bond.

The Performance Bond is to protect the Department and the State against any loss sustained through failure of the Contractor's performance in accordance with the Contract. No payments shall be made to the Contractor until the Performance Bond is in place and approved by the Department in writing.

The Performance Bond provided under this Section shall be used solely to the extent necessary to satisfy the damage claims made by the State pursuant to the terms of the Contract. In no event shall the Performance Bond be construed as a penalty bond.

SECTION 12. NO OFFSHORING

Unless otherwise agreed in writing, the Contractor and its Subcontractors will not perform any of the Services from outside of the United States, and the Contractor will not allow any State of Florida Data to be sent by any medium, transmitted or accessed outside of the United States. The Contractor agrees that a violation of items listed above will result in immediate and irreparable harm to the Department and will entitle the Department to a credit of $50,000 per violation, with a total cap of $500,000 per event. This credit is intended only to cover the Department's internal staffing and administrative costs as well as the diminished value of Services provided under the Contract and will not preclude the Department from recovering other damages it may suffer as a result of such violation. For purposes of determining the damages due hereunder, a group of violations relating to a common set of operative facts (e.g., same location, same time period, same off-shore entity) will be treated as a single event. A violation of this provision will also entitle the Department to recover damages, if any, arising from a breach of this section and constitutes an event of default.

Notwithstanding any provision of this Contract to the contrary, the Contractor shall notify the Department as soon as possible and in all events within one business day in the event it discovers any Data is breached, any unauthorized access of State of Florida Data occurs (even by persons

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or companies with authorized access for other purposes), any unauthorized transmission of Data or any credible allegation or suspicion of a material violation of the above. This notification is required whether the event affects one employee/retiree or the entire population. The notification shall be clear and conspicuous and include a description of the following:

(a) The incident in general terms.
(b) The type of personal information that was subject to the unauthorized access and acquisition.
(c) The number of individuals who were or potentially have been affected by the breach.
(d) The actions taken by the Contractor to protect the Data information from further unauthorized access. However, the description of those actions in the written notice may be general so as not to further increase the risk or severity of the breach.

Upon becoming aware of an alleged security breach or security incident, the Contractor Security Officer shall set up a conference call with the Department's Contract Manager. The conference call invitation shall contain a brief description of the nature of the event. When possible, a 30-minute notice shall be given to allow Department personnel to be available for the call. If the designated time is not practical for the Department, an alternate time for the call shall be scheduled. All available information shall be shared on the call. The Contractor shall answer all questions based on the information known at that time and shall answer additional questions as additional information becomes known. The Contractor shall provide the Department with final documentation of the incident including all actions that took place. If the Contractor becomes aware of a security breach or security incident outside of normal business hours, the Contractor shall notify the Department's Contract Manager and in all events, within one business day.

SECTION 13. CREDENTIALING DOCUMENTS

Contractor shall on an annual basis, prior to the anniversary of the Contract, submit the following credentialing documents:

1. The Contractor must provide documentation of a valid and current State of Florida license for at least one (1) of the following professions, held by either Contractor or Contractor's Subcontractor listed in Form 11 – Subcontracting: Registered Electrical Specialty Contractor, Low Voltage System Specialist, or a Registered Electrical Contractor.
2. The Contractor must provide documentation of a valid and current Building Industry Consulting Service International (BICSI) Registered Communications Distribution Designer (RCDD) certification held by an individual currently employed by the Contractor. The Department may, in its sole discretion, independently verify any information provided by the Contractor, including information related to the responsiveness requirements and certifications thereto.

SECTION 14. SPECIFIC APPROPRIATION

The following are the specific state funds from which the state will make payment under the contract:

General Appropriations Act (Florida Law)
2680 SPECIAL CATEGORIES

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CENTREX AND SUNCOM PAYMENTS
FROM COMMUNICATIONS WORKING
CAPITAL TRUST FUND.....123,586,638

The Department of Management Services is authorized to submit budget amendments in accordance with Chapter 216, Florida Statutes, to increase Specific Appropriation 2680, in the event that payments for telecommunications services exceed the amount appropriated.

SECTION 15. BUSINESS REVIEW MEETINGS

The Parties agree to participate with and in the Contract Oversight Team as applicable throughout the term of this Contract, in accordance with Section 287.057(26), Florida Statutes. Notwithstanding the statutory threshold of $5 million, all Contractors—regardless of contract value—shall be required to participate in Quarterly Business Review (QBR) meetings for the duration of the Contract. These meetings shall occur once every calendar quarter and may be conducted in person or via video conference, as mutually agreed upon by the Parties.

The purpose of each QBR shall include, but not be limited to:

- Reviewing overall performance and service levels;
- Discussing key performance indicators (KPIs) and contract compliance;
- Identifying opportunities for improvement or innovation;
- Addressing any outstanding issues or risks; and
- Aligning goals and priorities for the next quarter.

The Contract Manager and Contractor's Point of Contact as declared in this Contract shall attend each QBR. In the event the Contractor's Point of Contact is unable to attend, they shall designate a representative(s) to attend the QBRs who is authorized to discuss the subject matter and make decisions or recommendations as appropriate. A summary of discussion points and any agreed-upon action items shall be documented and shared with both Parties within ten (10) business days following each meeting.

SIGNATURE PAGE IMMEDIATELY FOLLOWS

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SO AGREED by the Parties' authorized representatives on the dates noted below:

DEPARTMENT OF MANAGEMENT SERVICES

Signature: DocuSigned by: Tom Berger 4819BB6123514E1...

Print Name: Tom Berger

Title: Deputy Secretary of Business Operations

Date: 11/25/2025 | 11:38 AM EST

COMCO COMMUNICATION INSTALLATION AND SERVICE COMPANY, INC.

Signature: DocuSigned by: Michael C. Bugner 50C1EEC39C3A43E...

Print Name: Michael c bugner

Title: President

Date: 11/17/2025 | 3:43 PM EST

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EXHIBIT A
STATEMENT OF WORK

1. PURPOSE

To provide Customers with Telecommunication Infrastructure Project Services on a regional basis, pursuant to the terms set forth in this Statement of Work.

2. DEFINITIONS

Definitions contained in section 287.012, Florida Statutes (F.S.); Rule 60A-1.001 and Chapter 60FF-1 Florida Administrative Code (F.A.C.); and Form PUR 1000 (07/24), General Contract Conditions; are incorporated by reference. In the event of a conflict, the definitions listed in this section supersede the incorporated definitions for the purposes of this Statement of Work. All definitions apply in both their singular and plural sense.

Business Day – Monday through Friday, inclusive, except for those holidays specified in section 110.117, F.S., from 8:00 a.m. to 5:00 p.m. at the Customer's location.

Communication Service Authorization and Billing System (CSAB) – The State of Florida's accounting system for ordering SUNCOM Services, billing Customers for SUNCOM Services, and the associated electronic repository data that is available to Customers through the website http://SUNCOM.myflorida.com.

Contract Manager – The representative designated by the Department who will oversee all aspects of the Contract, ensure that performance expectations are met, and serve as the primary point of contact for the Contractor.

Contractor Project Manager – The employee of the Contractor who is assigned to manage Projects and MACs within a specific Region.

Corrective Action Plan (CAP) – is a contractor created, Department approved plan outlining the Contractor's plan to address any identified deficiencies.

Customer – An entity that is a qualified eligible user of SUNCOM service and has accepted access to the CSAB System. Eligible users include state agencies, political subdivisions of the state, municipalities, public schools and districts, private, nonprofit elementary and secondary schools (provided they do not have an endowment in excess of $50 million), state universities, community colleges, libraries, water management districts, state commissions and councils, and nonprofit corporations.

Division – A collection of Telecommunication Infrastructure Project Services described in this Statement of Work and Exhibit B, Pricing Workbook.

Division of Telecommunications (DivTel) – The DMS Division responsible for technology, contract and project management.

End-of-Life – The date identified by the original equipment Manufacturer that a product or service will no longer be supported.

E-Rate Category Two – Internal connections needed to bring broadband into, and provide it throughout, schools and libraries. These are broadband connections used for educational purposes within, between, or among instructional buildings that comprise a school campus or

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library branch.

E-Rate Customer – Customers who are eligible for the E-Rate Program, utilizing E-Rate funding for eligible purchases from the awarded Division One and Division Two services Contract resulting from this RFP.

E-Rate Program – Common name for the universal service support program for schools and libraries that provides funding to schools and libraries for eligible products and services as established by the Telecommunications Act of 1996. This program is administered by the Schools and Libraries Division (SLD) of the Universal Services Administrative Company (USAC) under the jurisdiction of the Federal Communications Commission (FCC).

General Contractor – The employee of the Contractor who is responsible for the day-to-day oversight of a construction site, management of vendors and trades, and the communication of information to all involved parties throughout the course of a building project.

Identifier – A unique number that is assigned to a Project.

Manufacturer – The producer or provider of Telecommunication Infrastructure Project Services which possess the minimum quality, reliability, service, and value required by the Department and Customers' Statement of Work. May be used interchangeably with Brand Name.

Manufacturer's Suggested Retail Price (MSRP) – The MSRP represents the Manufacturer's recommended retail selling price, list price, catalog price, distributor price, published price, or other usual or customary price that would be paid by the purchaser for specific equipment. It shall be formally published by the Manufacturer, publicly listed and available, and verifiable by the Department.

Manufacturer's Suggested Retail Price (MSRP) List – The Manufacturer's Suggested Retail Price List, a collection of MSRPs and related information broken down by specific equipment.

Mini-Bid – The process where E-Rate Customers determine the cost effectiveness of qualified bidders by conducting evaluations.

Moves, Adds and Changes (MAC) – Any work initiated by the Customer which that is less than $60,000 in cost, initiated by the Customer, that uses the Contract to procure services at the time of the quote or Mini-Bid.

Product Manager – The DMS, DivTel, or Bureau of Engineering employee who oversees and coordinates all services ordered by Customers.

Project – Any work that exceeds $60,000 in cost, initiated by the Customer, that uses the Contract to procure services at the time of the quote or Mini-Bid.

Project Contact – The employee of the Customer who is the point of contact for a Project or a MAC with the authority to make decisions regarding the Project or MAC.

Proposal – The Contractor's formal response to Request for Proposals (RFP) No. DMS-24/25-264.

Region – Service area comprised of specific Florida counties, as defined in Exhibit C, Region Map.

Secure Facility(ies) – Any location specifically designed to restrict the movement and activities of

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individuals in custody. These facilities are typically characterized by physical security measures such as fences, surveillance systems, locked rooms, and other barriers that limit access and movement.

State – The State of Florida

Subcontract – An agreement entered into by the Contractor with any other entity, organization, or person who agrees to perform any obligation for the Contractor specifically related to securing or fulfilling the Contractor's obligations to DMS under the terms of the Contract.

Subcontractor – An organization or entity that has a Subcontract with a Contractor.

SUNCOM – The State of Florida's system developed to provide communication services to state agencies, political subdivisions of the state, municipalities, and nonprofit corporations in accordance with sections 282.701-282.711, Florida Statutes. Services include voice, data, video, images, and radio communications.

3. SCOPE OF WORK

3.1 Applicability

All provisions of the Statement of Work (SOW) apply to both Division One and Division Two services and, unless otherwise stated, apply to both Projects and Moves, Adds and Changes (MACs). Scope of Work section 3 is only applicable to Contractors providing E-Rate eligible services and equipment.

	Division One	Division Two
Service	Cabling Distribution System	E-Rate Category Two Eligible Services and Equipment
Service is E-Rate eligible	No	Yes
Customers	All Customers (E-Rate eligible and Non E-Rate eligible)	E-Rate eligible customers
Contractors	All Contractors	Contractors registered and compliant with the USAC E-Rate program (E-Rate Contractors)

3.2 Description of Scope

The Contractor shall provide Telecommunication Infrastructure Project Services and other commodities regionally as set forth in this Contract. The Contractor shall ensure it can perform and provide infrastructure cabling, equipment components, and design of telecommunications infrastructure systems, along with total Project and MAC management services.

The Contractor shall comply with any and all requirements set forth in Florida Statutes, the current National Electrical Codes, current Telecommunications Industry Association (TIA) standards, and Building Industry Consulting Service International (BICSI) standards. The Contractor shall provide:

- Design and installation of structured cabling infrastructure systems;
- Installation of low voltage cabling for telephones, computers, audio, and visual

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technologies, including all equipment and services necessary for installation of cabling;
- Installation of low voltage cabling equipment, including all equipment necessary for the installation. Low voltage cabling equipment includes, but is not limited to: racks, cabinets, conduits, and wire management;
- Installation of 20amp /120V dedicated electrical outlet.
- Repairs to cabling systems and telecommunication infrastructure equipment; and
- Moving information technology systems.
- Other Commodities or Services as requested by the Department within the scope of this Contract.

The Contractor will be responsible for all aspects of the services provided. The Contractor shall complete all projects no later than the expiration date of the Contract or, where applicable, the expiration dates of any purchase orders issued off the Contract.

3.3 Contract Divisions of Work

The Cabling Distribution System and E-Rate Category Two Equipment; and other commodities and services available through this Contract shall be classified under two Divisions of work:

Division One – Cabling Distribution System. Contracts that include this Division will provide labor, materials, tools, services, and equipment for cable distribution systems for analog, digital, and VoIP telephony, audio, video, and networking data. Cabling distribution systems include E-Rate Category Two eligible cabling services. The Division One Contractors will provide cabling distribution systems for new building construction, building renovations, inter-building, intra-building, outside plant, and MACs to existing systems. All Customers, E-Rate and non-E-Rate eligible may purchase from this Division. Both E-Rate Contractors and non-E-Rate Contractors are authorized to supply Division One services and equipment. Contracts for these services will have all-inclusive prices including all installation and material costs as determined by Exhibit B, Pricing Workbook.

Division Two – E-Rate Category Two. Contracts that include this Division will be limited to providing labor, tools, materials, and equipment, and services described in the E-Rate Category Two Equipment and Services section of this SOW subsection 5.5. These equipment and services are designated by the FCC as eligible under the E-Rate program Category Two, Internal Connections, and include the provision of cabling necessary to fulfill Customer orders for E-Rate Category Two eligible equipment contemplated herein.

Only E-Rate Contractors will be eligible for Division Two Contracts under this procurement. Only E-Rate customers may purchase from this Division. Contracts for these services will have separate labor and equipment costs as determined by Exhibit B, Pricing Workbook.

3.4 State of Florida Regions

For purposes of this Contract, the State will be divided into the following Regions:

Region 1	Escambia, Okaloosa, Santa Rosa
Region 2	Bay, Franklin, Gulf, Holmes, Walton, Washington
Region 3	Calhoun, Gadsden, Jackson, Jefferson, Leon, Liberty, Madison, Taylor, Wakulla
Region 4	Alachua, Bradford, Citrus, Columbia, Dixie, Gilchrist, Hamilton, Lafayette, Levy, Marion, Putnam, Suwanee, Union
Region 5	Baker, Clay, Duval, Flagler, Nassau, St. Johns

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Region 6	DeSoto, Hardee, Hernando, Highlands, Hillsborough, Manatee, Pasco, Pinellas, Polk, Sarasota
Region 7	Brevard, Lake, Orange, Osceola, Seminole, Sumter, Volusia
Region 8	Charlotte, Collier, Glades, Hendry, Lee
Region 9	Indian River, Martin, Okeechobee, Palm Beach, St. Lucie
Region 10	Broward, Miami-Dade, Monroe
Region 11	Monroe – The Upper Keys
Region 12	Monroe – The Middle Keys
Region 13	Monroe – The Lower Keys

A map of the service regions is set forth in Exhibit C, Region Map.

4. GENERAL REQUIREMENTS

4.2 Cooperation with Other Contractors

The Contractor must not commit or permit any act which will interfere with the performance of work by any other Contractor or Department employees.

4.1 Cooperation with General Contractors and Project Contacts

The Contractor shall coordinate installation and construction sequences with the General Contractor when a General Contractor is in charge of site construction and with the Project Contact when the Project Contact is in charge of construction improvements.

4.2 Work Coordination

The commencement dates for services shall be determined solely at the discretion of the Customer. Such start dates shall be documented and maintained within the CSAB system by DivTel. Contractor shall not initiate any on-site work, until such approval has been received and documented in the CSAB system.

The Contractor shall seek to prevent disruption of the Customer's day-to-day operations at the site while performing work pursuant to this Contract. When disruptions to the Customer's day-to-day operations are necessary to perform the services requested, the Contractor shall coordinate with the Project Contact in advance and obtain written approval from the Project Contact. The Contractor shall provide an electronic copy of the Project Contact's approval to disrupt the Customer's day-to-day operations to the DMS Product Manager for the Project file.

Upon request, the Project Contact will provide the Contractor with the available information for the facility, such as construction or as-built drawings, equipment installation, and aboveground/underground utilities details. On projects where this information is not available, the Contractor will provide surveys that are included as part of the services of this Contract, at no additional cost. Where hazardous materials are detected during the surveys or during construction, the Contractor shall stop work and notify the DMS Product Manager and the Project Contact of the hazardous conditions immediately for determination and disposition of the issue.

The Contractor shall be responsible for coordinating activities with other vendors as needed for the successful implementation of the system. Contractor will continue such coordination throughout the Project or MAC, including pre-planning, planning, integration, general construction, finishing construction, as well as all other construction timeline items. Neither the Department nor the Customer will be liable for any additional costs that result from the Contractor's failure to meet specified deadlines in a request for quote (or Mini-

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Bid for E-Rate customers) or the Contractor's failure to properly coordinate with other trades and vendors.

4.3 Contractor is Responsible for Contractor Materials

A storage facility will not be provided to the Contractor for the storage of installation materials. The Contractor shall be responsible for all materials brought onto any job site. Theft, misplacement, or loss of any materials shall be the Contractor's responsibility. Claims associated with such losses shall be processed against the Contractor's identified insurance policies or other means.

4.4 Subcontracting

The Contractor shall be fully responsible for all work performed under the Contract. Should the Contractor need to Subcontract out any services, the Contractor shall submit a written request to the Department's Contract Manager identified in the Contract. No Subcontractor may be utilized until the Department provides the Contractor with approval in writing. The Contractor may not use another Contractor on Contract No. DMS-24/25-264 as a subcontractor. The Department reserves the right to revoke or deny the use any subcontractor at any time for any reason as determined by the Department's sole discretion.

The written request shall include, but is not limited to, the following:

a) The name, address and other information identifying the Subcontractor.

b) Component and type of services to be performed by the Subcontractor.

c) Time of performance of the identified service.

d) How the Contractor plans to monitor the Subcontractor's performance of the identified services.

e) Certification that the Subcontractor has all licenses and has satisfied all legal requirements to provide the services to the Department. Also, Contractor shall certify that the Subcontractor is approved by the Florida Department of State to transact business in the State of Florida.

f) A copy of the written subcontract agreement.

g) Acknowledgement from the Subcontractor of the Contractor's contractual obligation to the Department and that Subcontractor agrees to comply with all terms and conditions of the Proposal and resulting Contract.

h) The Contractor acknowledges that it shall be not released of its contractual obligation to the Department as a result of any Subcontract.

i) All requirements shall be adhered to as contained in PUR 1000 and Contract regarding compliance with subcontractors.

j) The Department and the Customer reserve the right to contact the Subcontractor directly at their discretion.

4.5 Staffing Requirements and Responsibilities

The Contractor shall provide sufficient, qualified personnel to oversee and carry out the

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services of the Contract. The term "Contractor staff" includes all staff employed by the Contractor, by its Subcontractors relevant to the Contract, and agents. The staffing requirements and responsibilities include the following:

a) The Contractor staff responsibilities include conducting all components of the Contract in a timely, efficient, productive, consistent, courteous and professional manner as representatives of the State.

b) The Contractor staff shall devote the time and resources necessary to successfully manage the State of Florida account, including being available for telephonic, email, and on-site consultations.

c) The Contractor shall provide orientation and training on all components of the Contract to all Contractor staff listed on Form 4 – Contact Worksheet which is included in Attachment L, Required Documents for Respondents prior to their commencement of work on any component of the Contract. Documentation of this training shall be provided to DMS upon request. If the Contractor is put on a CAP at any time during the life of the contract, the Contractor shall retrain all staff within thirty (30) days and provide documentation of compliance to the Contract Manager for the Department within 5 days of completion.

d) DMS will have the right to require the replacement of any Contractor staff and Contractor will remove such staff within five (5) calendar days or earlier upon DMS's notice to Contractor.

e) As reflected in the customer SOW and the Contractor Quote (Quote) the Contractor must provide a sufficient number of Contractor Staff to perform the projected workload for the start of the Contract and shall be scalable and flexible so it can be adapted as needed. Absent circumstances outside of the Contractor's control as determined by the Department, failure to complete a project within the timeframes specified in the SOW and Quote is prima facia evidence that the number of staff was insufficient.

f) The Contractor shall have a minimum of one (1) employee with the BICSI Registered Communications Distribution Designer (RCDD) certification on staff for the term of the Contract. This requirement will be met if the Subcontractor has an employee with the RCDD certification. The RCDD employee shall be made available as needed for Projects requiring an RCDD. If the employee with the RCDD certification identified in the Contractor's Proposal is no longer affiliated with the Contractor, a copy of the RCDD Certification for another employee shall be provided to DMS within fourteen (14) calendar days of the change.

4.6 Invoices

The Contractor shall submit invoices to DMS in accordance with the timeline stated in SOW section 9, Service Level Agreements. The Contractor shall submit invoices electronically to the Contract Manager in the CSAB, preferably in PDF format or an acceptable Word document. The invoice must be accompanied by sufficient detail to appropriately document the services delivered, in accordance with all Florida Statutes. The Contract Manager, at their discretion, may request documents to support line item charges in any and all invoices. Invoices which do not include required supporting documentation, or which are not submitted in accordance with instructions, may be returned to the vendor and may delay payment. Under no circumstances shall the

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contractor bill more than actual costs for cost reimbursement expenses.

Pursuant to Section 215.422, Florida Statutes, the State shall make payment only upon receipt of a proper invoice. An invoice shall be considered proper only when it includes all documentation and information required by this Contract or requested by the Department, including but not limited to receipts, progress reports, timesheets, or any other materials specified herein. Failure to submit such documentation shall constitute an improper invoice, and the State reserves the right to reject or return the invoice without payment until all required materials are received. The time period for payment under the Florida Prompt Payment Act shall begin only upon receipt of a proper invoice.

The following requirements apply to all invoices submitted for payment.

a) An invoice submitted to DMS for payment must be a legible copy.

b) Invoices for commodities must clearly reflect a description of the item or items, number of units and cost per unit. Numerical code descriptions alone (i.e. part number instead of actual part name) will not be accepted. The itemization of the bill should reflect the CSAB quote.

c) The invoice must include the date the invoice was issued. The period of performance must be listed on the invoice and must range from the start of the project through the customer acceptance form as the end date.

d) Acronyms and non-standard abbreviations for programs or organizational units within an agency should not be used in the supporting documentation unless an explanation is also included.

e) No balances for prior purchases will be paid unless supported by an invoice.

f) The invoice (or invoice backup) must demonstrate that each deliverable's minimum performance levels were met. Payment will only be made for completed projects that are within the scope of the contract and catalog.

g) A statement will not be paid unless it can be clearly shown that the vendor intended it to be used as an invoice that meets all invoice requirements.

h) Exhibit I, Customer and Contractor Sign-Off Form must be submitted with the invoice. This form shall only be signed by the Project Contact.

i) The invoice must include at a minimum Agency name, Customer point of contact, and address of the worksite.

j) Completed Exhibit H, Daily Log for all invoiced hours. This form shall be completed by the Project Contact.

For more information regarding DFS payment requirements, please refer to the Reference Guide for State Expenditures:(reference-guide-for-state-expenditures.pdf) or see the Chief Financial Officer's website at https://myfloridacfo.com/.

4.6.1 Secure Facilities

When providing Telecommunication Infrastructure Project Services at a Secure Facility, the Contractor may invoice for up to four (4) additional hours per day, per

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person to account for delays related to mandatory security check-in and clearance procedures. These hours must be directly associated with documented wait times occurring on the day services are rendered and must be itemized separately on the invoice as "secure facility access delay time." The Department reserves the right to request verification of time delays, such as sign-in logs or facility-issued access records, to support the additional billing. This section shall not apply to delays caused by Contractor-related issues, such as failure to arrive on time or lack of required identification or credentials.

4.7 E-Rate Invoicing

When invoicing for services to an E-Rate customer, the Contractor shall separately itemize the price, for any materials or services that are ineligible for E-Rate funding. The invoice should include both E-Rate eligible and ineligible items on the same invoice, not invoiced separately. The Contractor must include the items in the previous section and the following information on all invoices:

a) Location of site where service was provided;
b) Eligible Price;
c) Ineligible Price;
d) Quantity of Eligible and Ineligible Items;
e) Associated Funding Request Number and Funding Request Line Item number (provided by the Customer); and
f) CSAB Item number that matches delivered and/or installed equipment.

Contractors will use the Service Provider Invoice (SPI) billing to E-Rate customers. SPI invoicing (FCC Form 474) is an FCC form that service providers submit to request reimbursement for discounted eligible services already provided to the schools or libraries on their customer bills (also known as a SPI credit).

4.8 Travel

Travel costs are not allowed under this Contract and will not be paid or reimbursed.

4.9 Permits, Fees, and Inspections

The Contractor shall obtain and pay for all permits, fees, impact fees, fines, and inspections. The Contractor shall submit in CSAB a copy of permits and inspection certificates, as a PDF, issued by authorities having jurisdiction, to the DMS Product Manager.

4.10 Ad-Hoc

Cabling distribution systems contain a variety of related components. The Contract provides pricing for numerous standard products; however, there may be rare circumstances where orders may contain products not listed in the CSAB Catalog, but which are necessary to deliver overall functionality. In these instances, the necessary products will be provided at no more than the Contractor's cost.

4.11 Updates to Equipment

DMS anticipates the equipment may change over the term of the Contract and should be flexible to remain current throughout the life of the Contract. Changes in equipment offered by Contractor in the same or equivalent form and within the scope of the Contract are permissible updates. Updates may be prompted by the Contractor, DMS, or Customers. At DMS' sole discretion, updates may require a Contract amendment, and any updates will not be incorporated into the CSAB system without DMS' approval. For equipment

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updates, Contractor must price the item at the same Unit Price or percentage discount off the Manufacturer's Suggested Retail Price (MSRP) offered in Exhibit B, Pricing Workbook.

If applicable, all Contractors will be given the same opportunity to offer the updated, or new related service.

4.12 Acceptable Substitution

The Contractor may provide a substitution for a product if it is approved in writing by the Department, is of similar quality, and the cost will not exceed the cost in the Exhibit B, Pricing Workbook.

4.13 Catalog Items

Products within the scope of the Contract may be added in accordance with SOW section 4.12 or removed from CSAB at the Department's sole discretion.

4.14 Acceptable Publications

The Department may request, and the Contractor shall provide within three (3) business days, acceptable and supporting information or documentation related to equipment sold. Acceptable and supporting information or documentation includes, but is not limited to:

1. MSRP list. The MSRP and MSRP list may not be custom or solely developed, created, maintained, altered, revised, changed, or utilized for purposes of the Contract
2. The Manufacturer's official retail websites.
3. Technical documentation with specifications of equipment.

4.15 Customer Service

The Contractor will provide a high level of customer service. This will include providing professional, timely, and accurate communication to Customers and DMS at all times. Contractor is to return Customer's phone calls and emails within two business days. Contractor is to seek Customer feedback. Throughout the Project or MAC, the Contractor will document all Customer complaints and submit such complaints to the Department's Contract Manager in writing within five (5) business days.

5. E-RATE REQUIREMENTS

Section 5 is only applicable to E-Rate Contractors who provide E-Rate eligible equipment and services. In this section, "Contractor" refers to E-Rate Contractors registered and compliant with the USAC E-Rate program.

5.1 E-Rate Introduction

If the Contractor is providing E-Rate eligible equipment and services under the Contract to E-Rate Customers, the Contractor shall meet the requirements within this SOW section 5.

The E-Rate Program helps ensure that schools and libraries can obtain high-speed Internet access and telecommunications at affordable rates.

The Contract(s) that result from this procurement have been competitively bid by a state government entity for use by eligible entities in accordance with USAC State Master Contracts.

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The Contractor will neither be deemed a consultant of DMS nor of any E-Rate Customer.

5.2 E-Rate Registration and Compliance

To ensure compliance with all applicable Universal Service Fund (USF) regulations, program mandates, and auditing requirements, Contractors must comply with the following:

a) The Contractor shall maintain eligibility and remain in good standing as a USF service provider for the duration of the Contract and shall comply with all applicable FCC orders and regulations and USAC E-Rate requirements.

b) The Contractor must have an identified employee who is responsible for submitting E-Rate forms and who is qualified to answer questions and to receive correspondence regarding the E-Rate program. The contact details for this named person shall be submitted to the DMS Contract Manager within thirty (30) days of Contract execution. If the Contractor's identified employee changes, the Contractor must notify the DMS Contract Manager within one (1) business day.

c) The Contractor shall assist DMS and its E-Rate Customers in completing any forms related to the USF program.

d) The Contractor must take all actions necessary to provide E-Rate eligible equipment and services in compliance with the terms and conditions of the Contract and E-Rate rules and regulations. E-Rate rules will be the minimum performance standard requirements met under this Contract. Where this Contract has performance requirements greater than those of E-Rate rules, the Contractor must meet those higher Contract standards.

e) The Contractors shall have, at a minimum, a working knowledge of the USF and FCC's Registration Number (FCCRN) and will keep current with all requirements pertaining to the USF program.

f) The Contractor shall timely provide to the DMS Contract Manager all information and documentation needed to timely prepare its E-Rate applications, document transactions eligible for E-Rate support, or timely respond to any USAC inquiries and audits.

g) The Contractor shall label all equipment with an identifying tag to demonstrate the equipment was purchased with E-Rate funding.

h) The Contractor shall complete a DMS inventory log identifying the location of installed equipment at eligible E-Rate locations and provide the completed inventory log via email to the DMS Contract Manager once the Project or MAC is complete.

i) The Contractor must submit a Service Provider Annual Certification (SPAC) (Form 473) to USAC each funding year to certify that it will comply with program rules. A copy of this certification will be sent to the DMS Contract Manager and DMS E-Rate Coordinator annually.

j) The Contractor shall obtain a Service Provider Identification Number (SPIN) from USAC within sixty (60) days of Contract award. Documentation validating that the Contractor has obtained SPIN number shall be sent to the DMS Contract Manager and DMS E-Rate Coordinator.

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k) The Contractor shall maintain compliance with the Lowest Corresponding Price (LCP) as defined in 47 C.F.R. § 54.500.

l) The Contractor agrees to comply with all FCC/USAC E-Rate document retention regulations and requirements.

m) The Contractor agrees to comply with all E-Rate gift rules, in accordance with 47 C.F.R. § 54.503 and FCC/USAC regulations and requirements.

5.3 E-Rate Filings

Both the Contractor and DMS agree that:

a) Per FCC guidelines, DMS is the applicant and files all FCC related forms on behalf of E-Rate Customers.

b) DMS acknowledges that it has posted an E-Rate Description of Services Requested and Certification Form (Form 470) in connection with this procurement, which is a prerequisite to E-Rate eligible entities utilizing Contract(s) awarded as a result of the procurement as the basis for E-Rate funding applications.

c) Awarded contracts will be between DMS and the Contractor. An E-Rate Customer will conduct a Mini-Bid to select the most cost-effective Contract.

d) E-Rate has specific rules and regulations regarding eligibility of services, the manner and timeframes under which USAC Schools and Libraries Division approve funding requests and distributions, the format and submission of customer bills and USAC invoices, and audits in connection with funding under the E-Rate program, which the Contractor is required to adhere to.

5.4 Contractor's Liability for Maintaining Eligibility as a USF Service Provider

The Contractor must maintain eligibility as a USF service provider and must not be placed on "Red Light Status" by the FCC or placed on the Suspension and Debarment List of the USAC. In the event that the FCC or USAC determines that the Contractor or one of its subcontractors has not acted in compliance with the E-Rate Program, the Contractor will be liable for the equivalent to the actual loss of DMS (and any of its E-Rate Customers) where the Contractor's or Subcontractor's USF ineligibility is due to circumstances within Contractor's control. Whether a Contractor's ineligibility is due to circumstances beyond Contractor's control is a determination solely within the discretion of DMS.

If Contractor becomes ineligible as an E-Rate Service Provider due to:

a. Circumstances within the Contractor's control; or
b. Becomes unwilling or unable to provide E-Rate eligible equipment in compliance with E-Rate rules and regulations or the Contract; or
c. Violates E-Rate rules and regulations in a way that causes USAC to deny E-Rate Customer funding in whole or in part,

DMS and E-Rate Customers have the following remediation:

a. May seek to change to another Contractor;
b. May seek substitute equipment; or
c. May seek damages.

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The Contractor agrees to pay liquidated damages in the event it becomes ineligible as a USF provider. In such an event, liquidated damages shall be calculated as the additional cost to DMS and any of its E-Rate Customers above the E-Rate discount. Payment of such liquidated damages shall be the sole responsibility of the awarded Contractor and will be assessed at the time the Customer is billed by the ineligible Contractor. DMS and any of its E-Rate Customers shall only be responsible for the E-Rate discounted price of the services.

In the event DMS or E-Rate Customer are unable to obtain USAC approval to change to a new Contractor, and such USAC denial is a result of the Contractor's actions not being an eligible reason for USAC to approve a change of service providers under E-Rate rules, the Contractor will be liable to DMS for the amount of E-Rate funding forfeited as a result.

If the Contractor's violation of the E-Rate rules and regulations is the reason for the E-Rate Customer's loss of E-Rate funding, in whole or in part, the value of the lost funding associated with the Contractor's violation will be considered a liquidated damage under this subparagraph.

5.5 E-Rate Category Two Equipment and Services

The Eligible Services List (ESL) for each funding year provides guidance on the eligibility of products and services under the E-Rate program. The ESL is updated by the FCC on an annual basis. The E-Rate Category Two equipment and services eligible for E-Rate support includes the internal connections needed for broadband connectivity within, between, or among schools and libraries. Support is limited to the internal connections necessary to bring broadband into, and provide it throughout, schools and libraries. These are broadband connections used for educational purposes within, between, or among instructional buildings that comprise a school campus or library branch.

All Division Two components in Exhibit B, Pricing Workbook, are E-Rate eligible and shall not include ineligible E-Rate components. The eligible components and services in E-Rate Category Two subject to this procurement are listed below:

a) Infrastructure – to provide options for industry standard compliant equipment to develop a telecommunications infrastructure. This includes all components necessary to internal connections needed to bring broadband into, and provide it throughout, buildings, which may connect to a wireless infrastructure or other equipment such as:

   a. Switches – a mechanical or electronic device that completes or breaks an electrical path or that selects the paths for communication
   b. Routers – switching devices that can act as an interface between two networks and connect different segments, such as departments or floors in a building
   c. Cabling – the wires or groups of wires capable of carrying voice, video, or data transmissions

b) Wireless Access – to provide options for industry standard compliant wireless equipment. This includes all components necessary to provide wireless networking capabilities which then connect to a wired infrastructure. Components include:

   a. Wireless access points used in a local area network (LAN) or wireless local area network (WLAN) – Wireless access points provides internet access to devices capable of receiving wireless broadband
   b. Wireless controller systems – Wireless controller systems are used in conjunction with access points to create a wireless local area network

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c) Related Components – to provide options for industry standard compliant components related to infrastructure and wireless access. This includes all components necessary for the functionality of broadband distribution:

   a. Antennas – devices for transmitting and/or receiving radio frequency signals
   b. Connectors – devices that connect wires or fibers
   c. Related components used for internal broadband connections – miscellaneous components to transport broadband internally
   d. Racks – metal supporting framework for mounting cables, equipment, and/or wires.
   e. Uninterruptible Power Supply (UPS)/Battery Backup – devices that provide backup electric energy to a piece of equipment in the event of a power failure
   f. Software – software supporting the components in this section used to distribute high-speed broadband throughout school buildings and libraries.
   g. SNMP Cards – devices that enable remote monitoring and management of equipment (such as UPS systems) over a network using the Simple Network Management Protocol (SNMP).
   h. Firewall Components – devices that function as security appliances to control, monitor, and protect network traffic according to predefined security rules. Also referred to as Security Appliances.

d) Installation, configuration, and activation of all equipment contemplated within this Statement of Work.

e) Eligible Managed Internal Broadband Services – services provided by a third party for the operation, management, and monitoring of eligible broadband internal connections are eligible managed internal broadband services (e.g., managed Wi-Fi). E-Rate support is limited to eligible expenses or portions of expenses that directly support and are necessary for the broadband connectivity within schools and libraries. Eligible expenses include the management and operation of the LAN/WLAN, including installation, activation, and initial configuration of eligible components and on-site training on the use of eligible equipment. In some eligible managed internal broadband services models, the third-party manager owns and installs the equipment and school and library applicants lease the equipment as part of the managed services contract. In other cases, the school or library may own the equipment, but have a third party manage the equipment for it.

   a. Eligibility limitations for managed internal broadband services – The equipment eligible for support as part of a managed internal broadband service may include only equipment listed above as broadband internal connections. Upfront charges that are part of a managed service contract are eligible for E-Rate support except to the extent that the upfront charges are for any ineligible internal connections (e.g., servers other than those that are necessary to provide caching), which, if included in the contract, must be cost allocated out of any funding request.

f) Basic Maintenance of Eligible Broadband Internal Connections – E-Rate support is available for basic maintenance and technical support appropriate to maintain reliable operation when provided for eligible broadband internal connections. The following basic maintenance services are eligible: Repair and upkeep of eligible hardware; Wire and cable maintenance; Configuration changes; Basic technical support including online and telephone-based technical support; and Software upgrades and patches

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including bug fixes and security patches.

a. Eligibility limitations for basic maintenance – Basic maintenance is eligible for support only if it is a component of a maintenance agreement or contract for eligible broadband internal connections. The agreement or contract must specifically identify the eligible internal connections covered, including product name, model number, and location. Support for basic maintenance will be paid for the actual work performed under the agreement or contract. Support for bug fixes, security patches, and technical support is not subject to this limitation. Basic maintenance does not include:
    i. Services that maintain ineligible equipment,
    ii. Upfront estimates that cover the full cost of every piece of eligible equipment,
    iii. Services that enhance the utility of equipment beyond the transport of information, or diagnostic services in excess of those necessary to maintain the equipment's ability to transport information,
    iv. Network management services, including 24-hour network monitoring,
    v. On-site technical support (i.e., contractor duty station at the applicant site), unless applicants present sufficient evidence of cost-effectiveness, and
    vi. Unbundled warranties.

5.6 Mini-Bid Process

E-Rate Customers must determine the cost effectiveness of qualified bidders by conducting the Mini-Bid process and requesting quotes. This multiple step process is consistent with USAC's direction regarding cost effectiveness (see below) Lowest Corresponding Price - Universal Service Administrative Company and in accordance with 47 CFR 54.511.

Customers will use this process to request in CSAB specific work within their facilities based on their own unique technological needs. The format of each Customer's quote request will be left to the discretion of DMS. In all cases, the Contractor's quote must include a well-defined, detailed breakdown of the total cost of the proposed service, with E-Rate eligible and ineligible items separately listed, and prices that do not exceed those set forth in the Contractor's Pricing Workbook.

If the Contractor was awarded to provide both Division One and Division Two services in a Region and a Customer requests equipment in a Region where Contractor has a listed price in Division One and a percentage off MSRP in Division Two, the Contractor's response will include, at a minimum, the price or MSRP discount which provides the Customer with the most cost-effective solution.

When a quote is obtained for Division Two equipment, and the manufacturer proposed was not specifically referenced within the Contractor's price sheet, the percentage off MRSP listed as, "any other manufacturer offered by the Contractor as an equivalent" within the Contractor's price sheet will be utilized.

If the Contractor accepts the quote request, the Contractor shall timely submit a quote to the Customer in CSAB. If the Contractor does not accept the quote request, it will opt-out in CSAB. All contractors in their designated Region shall respond to all bids in their Region with either an opt-out or with a bid. The quote must be accepted by DMS in writing before any implementation. The quote must contain all information including manufacturer's data

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needed for the Customer to review and approve the service. The quotes will contain sufficient detail necessary for audit processes.

E-Rate Customers will seek quotes from qualified E-Rate Contractors for specific E-Rate eligible goods and services. A quote request contemplated in this Mini-Bid process may not expand the scope of a Contract, and the Contractor is limited to providing quotes only for services contemplated in the Contract between the Department and the Contractor.

TIPS 3 E-Rate eligible Customers may request, as part of their quote, specific manufacturers. E-rate rules require that when specific manufacturers are identified in the Mini-Bid, Contractors must be able to submit quotes for equivalent products and services. Contractors proposing equivalent equipment must provide DMS with documentation demonstrating the Contractor proposed equipment has equivalent attributes to the requested manufacturer's product such as performance, weight, size, durability, visual effect, and specific features and requirements indicated. Quotes for equivalent equipment will not be considered unless all of the outlined information has been provided and determined satisfactory by the Customer.

The E-Rate Customer will be responsible for determining the factors to use in evaluation of quotes received in response to the E-Rate Customer's Mini-Bid, and the E-Rate Customer can have as many evaluation criteria as necessary to assist in the selection of the most cost-effective solution, as long as price for E-rate eligible services is the most heavily weighted factor in the evaluation. This process will be governed by USAC's guidelines and criteria as described in the "Mini-Bids" section found at State Master Contracts - Universal Service Administrative Company USAC guidance for conducting a bid evaluation can be found at Step 2: Selecting Service Providers - Universal Service Administrative Company

The bid evaluation must also follow applicable local procurement regulations.

The Customer will accept the quote in CSAB.

The E-Rate Customer, DMS Contract Manager, and the DMS E-Rate staff will maintain all documentation related to this Mini-Bid.

6. NON-E RATE QUOTE REQUESTS

TIPS 3 Non E-Rate Customers will use this process to request in CSAB specific work within their facilities based on their own unique technological needs. The format of each quote request will be left to the discretion of DMS. In all cases, Contractor's quote must be well-defined with a detailed breakdown of the total cost of the proposed service and prices that do not exceed those set forth in the Contractor's Pricing Workbook.

If the Contractor was awarded to provide both Division One and Division Two services in a Region and a Customer requests equipment in a Region where Contractor has a listed price in Division One and a percentage off MSRP in Division Two, the Contractor's response will include, at a minimum, the price or MSRP discount which provides the Customer with the most cost-effective solution.

When a quote is obtained for Division Two equipment, and the manufacturer proposed was not specifically referenced within the Contractor's price sheet, the percentage off MRSP listed as, "any other manufacturer offered by the Contractor as an equivalent" within the Contractor's price sheet will be utilized.

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A quote request may not expand the scope of a Contract, and the Contractor is limited to providing quotes only for services contemplated in the Contract between the Department and the Contractor.

TIPS Non-E-Rate Customers may request, as part of their quote, specific manufacturers. Contractors proposing equivalent equipment must provide DMS with documentation demonstrating the Contractor proposed equipment has equivalent attributes to the requested manufacturer's product such as performance, weight, size, durability, visual effect, and specific features and requirements indicated. Quotes for equivalent equipment will not be considered unless all of the outlined information has been provided and determined satisfactory by the Customer.

If the Contractor accepts the quote request, the Contractor shall timely submit a quote to the Customer in CSAB. If the Contractor does not accept the quote request, it will opt-out in CSAB, or by electronic message to the Product Manager, or by not responding. The quote must be accepted by DMS in writing before any implementation. The quote must contain all information and manufacturer's data needed for the Customer to review and approve the service. The Customer will be responsible for determining the factors to use in evaluating quotes received in response to the Contractor's quote. The quotes will contain sufficient detail necessary for audit processes. The Customer will accept the quote in CSAB.

7. MANAGEMENT REQUIREMENTS

The Contractor shall be required to perform management activities associated with delivery of services contemplated in this SOW and Contract including, but not limited to, managing deliveries, scheduling, quality assurance, and Subcontractors. Unless otherwise specified, the documents required in this section are to be delivered to the DMS Product Manager and the Customer in CSAB.

The Contractor shall document all on-site personnel using Exhibit H, Daily Log. At a minimum, the Customer shall verify and sign off on the Contractor's Exhibit H, Daily Log each week. The Department may request, and the Contractor shall provide, completed Exhibit H, Daily Log prior to invoice approval. Invoice approval is subject to the Customer's verification and sign off of the Contractor's hours worked as submitted on Exhibit H, Daily Log.

7.1 Project Commencement Submittals

Prior to commencement of any Project, the Contractor shall submit in CSAB a document or multiple documents (as needed due to file size) in Portable Document Format (PDF) described within this section. Each section set forth below must be addressed in the Project Commencement Submittals to be considered complete. If a section, such as section D, is not applicable for the Contractor to complete for the specific Project, a statement of such shall be included in the Project Commencement Submittal. Work shall not proceed without the DMS Product Manager's written approval.

The document name(s) shall consist of the unique Identifier with "PCS" after the Identifier. The Identifier shall consist of: The Customer CSAB order date in year-month-day format, agency acronym, abbreviation of the city where the work is to be performed, and street number of the location. For instance, 20250301DMSTL4030 is the Identifier for a Project that was originally ordered in CSAB on March 1, 2025 for DMS for a site in Tallahassee with the address numbers 4030. The Identifier format may be accomplished, implemented, and amended by DMS without a formal amendment to the Contract.

Section A – Documents for Commencement of Project. Submittal identification shall include the following: the Project name; the unique Identifier; the Contractor's name; Contractor Project

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Manager's name, address, and contact information; Subcontractor's full name, address, and contact information; Customer's full name, physical address of the Project including building name (if applicable), date of Project commencement, and the Project Contact's name, phone number, and email address. Please see the sample form in Exhibit D, Project Commencement Submittal Section A for an example of the submittal of Section A and the format required. The information required for Project Commencement Submittal, Section A may be modified during the term of the Contract at the Department's sole discretion.

Section B – Manufacturer's Data Information. The Contractor shall submit Manufacturer's data on all products needed to complete the Project, which includes the bill of materials, Manufacturer's technical data sheets, and Manufacturer's catalog information showing dimensions, colors, and configurations. The Manufacturer's technical data sheet(s) shall include the physical specifications of the products as well as the cable electrical and transmission characteristics, such as mutual capacitance, impedance, direct current (DC) resistance, insertion loss, structural return loss (SRL), attenuation to cross talk ration (ACR), power sum near end crosstalk (PSNEXT), worst pair-to-pair NEXT.

Section C – Project Equipment. The Contractor shall verify the color selection and quantity of the equipment with the Customer prior to ordering the following equipment:

a) Patch cords
b) Horizontal cable
c) Racks and/or cabinets
d) Faceplates
e) Jacks

Please see the sample form in Exhibit E, Project Commencement Submittal Section C for an example of the submittal of Section C and the format required. The information required for Project Commencement Submittal Section C may be modified by DMS during the term of the Contract. If the color requirements for all components are stated in the specification for the Project, the color selection does not have to be verified, and the Contractor should respond to this section as "not applicable colors are determined in the specification."

Section D – Permit Information. The Contractor shall provide all applicable permits required for the Project or MAC, issued by the proper authorities having jurisdiction.

Section E – Engineering Approvals. The Contractor shall provide the approval of a licensed structural engineer in accordance with SOW section 11.5, Cutting and Patching, as applicable.

Section F – Insurance and Bonding Documents. The Contractor shall be responsible for and provide insurance and performance bonding documents as required by the Contract.

Section G – Drawings. The Contractor shall provide AutoCAD installation/layout drawings for the entire system, showing equipment model numbers, complete part quantities and numbers, configurations and the inter-relationship and position of all components. Drawings shall be a minimum of 11" X 17" in size. The drawing submittal requirement may be waived if drawings have been provided by DMS, the Project Contact, or Customer as part of the design.

7.2 Project Final Submittals

Prior to final invoicing of any Project, the Contractor shall submit in CSAB a document or multiple documents (as needed due to file size) as a PDF as described within this section. These documents will be submitted in accordance with the timeline stated in SOW section 9, Service Level Agreements.

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The document name(s) shall consist of the unique Identifier with "PFS" after the Identifier. The Identifier shall consist of: The Customer CSAB order date in year-month-day format, agency acronym, city abbreviation of the work, and street number of the location. For instance, 20250301DMSTL4030 is the Identifier for a Project that was originally ordered in CSAB on March 1, 2025, for DMS, for a site in Tallahassee with the address numbers 4030. The Identifier format may be accomplished, implemented, and amended by DMS without a formal amendment to the Contract.

Each section must be addressed in the Project Final Submittals to be considered complete. If a section is not applicable for the Contractor to complete for the Project, a statement of such shall be included in the Project Final Submittal. Final Submittals must be approved by DMS prior to final invoicing. DMS approval will signify completion of on-site work.

Section A – Documents for Finishing Project. Submittal identification shall include the following: the Project name; the unique Identifier; Project commencement date; the Contractor Project Manager's name, address, and contact information; Subcontractor's full name, address, and contact information; Customer's full name, physical address of the Project including building name (if applicable), date of Project commencement, and the Project Contact's name, phone number, and email address. Please see the sample form in Exhibit F, Project Final Submittal Section A for an example of the submittal of Section A and the format required. The information required for Exhibit F, Project Final Submittal Section A may be modified during the term of the Contract at the Department's sole discretion.

Section B – Testing Documentation. The Contractor will perform test measurements and system calibrations for the entire system and provide the results. This documentation shall include test measurements and system calibrations specified in SOW section 11.38, Testing Requirements. The Contractor shall provide a certification report, listing the item, a description of the test results with both the calculated and measured loss for each fiber, and the model number and serial number for the item. Please see the sample form in Exhibit G, Project Final Submittal Section B for an example of the submittal of Section B and the format required. The information required for Exhibit B, Project Final Submittal Section B may be modified during the term of the Contract at the Department's sole discretion.

Section C – General Requirements. The Contractor shall submit all of the following documentation, prior to final invoicing of any Project:

a) All DMS inspection reports with each item signed off by the Contractor indicating completion of those items. DMS inspection reports will list items to be completed or repaired by the Contractor prior to DMS payment to the Contractor.
b) A letter stating that the system is installed properly and that all system components meet or exceed specifications of this Contract. The Contractor's one (1) year guarantee of installation shall be included in this letter.
c) Manufacturer's Warranty as specified in SOW section 10.1, as applicable.
d) Inspection certificates/permits issued by authorities having jurisdiction.
e) Exhibit I, Customer and Contractor Sign-Off Form, signed by the Project Contact. (will be provided by DMS).
f) A properly executed Consent of Surety Company to Final payment, AIA Document G707, if applicable.
g) Contractor's Affidavit of Release or Waivers of Lien on AIA Document, Form G706.

Section D – Drawings. The Contractor shall provide detailed documentation of the distribution system, including as-built drawings prepared to scale in AutoCAD if specified in the Project's specification or requested by the Project Contact. The drawings shall be submitted in CSAB as a PDF, as well as an electronic AutoCAD file.

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The Contractor shall include in the as-built drawings: cable routes and outlet locations with all cables and terminations identified by their sequential number as defined by the numbering convention; riser and backbone riser diagrams; a bill of materials of all installed equipment and wiring; and racks and equipment layouts showing placement of equipment and model numbers of all installed equipment. Drawings shall be a minimum of 11" X 17" in size. If drawings have been provided to the Contractor as part of the design, these documents will be modified accordingly by the Contractor to denote as-built information if required in the Project's specification or requested by the Project Contact. Contractor shall provide AutoCAD installation/layout drawings for the entire system, showing equipment model numbers, complete part quantities and numbers, configurations and the inter-relationship and position of all components. The drawing submittal requirement may be waived if drawings have been provided by DMS, the Project Contact, or Customer as part of the design.

7.3 MAC Commencement Submittals

A Project Commencement Submittal, as outlined in SOW section 7.1, does not need to be submitted for MACs on existing telecommunication systems when the Contractor installs components from the same Manufacturer or equivalent of existing components. Otherwise the Project Commencement Submittal is required. The Contractor shall verify in writing the materials and equipment to be installed and the quantity of materials needed prior to work commencement, and verification shall be submitted by the Contractor to the DMS Product Manager in CSAB as a PDF.

7.4 MAC Final Submittals

A Project Final Submittal, as outlined in SOW section 7.2, does not need to be provided for MACs on existing telecommunication systems when the Contractor installs components from the same Manufacturer or equivalent of existing components. Otherwise, the Project Final Submittal is required. Prior to final invoicing of any MAC, the Contractor shall do the following:

7.4.1 The Contractor shall perform test measurements and system calibrations for the components installed and provide these test measurements and system calibrations to the DMS Product Manager in CSAB as a PDF. This documentation shall include test measurements and system calibrations specified in SOW section 8.38, Testing Requirements. The Contractor shall provide a certification report, listing the test results with both the calculated and measured loss for each fiber.

7.4.2 The Contractor shall update the existing drawings to include the new components from the Customer MAC order and submit the drawings in CSAB if requested by the Project Contact in the CSAB order. The Contractor shall include in the as-built drawings: cable routes and outlet locations with all cables and terminations identified by their sequential number as defined by the numbering convention; riser and backbone riser diagrams; a bill of materials of all installed equipment and wiring; and racks and equipment layouts showing placement of equipment and model numbers of all installed equipment. Drawings shall be a minimum of 11" X 17" in size. The drawings shall be submitted in CSAB as a PDF and as an electronic AutoCAD file.

7.4.3 The Contractor shall provide detailed documentation of the distribution system, including as-built drawings prepared to scale in AutoCAD if specified in the Project's specification or requested by the Project Contact. The drawings shall be submitted in CSAB as a PDF and as an electronic AutoCAD file.

7.4.4 The Contractor shall submit the Manufacturer's Warranty documentation as specified in SOW section 10.1 as a PDF in CSAB.

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7.5 Project and MAC Inspection and Acceptance

7.5.1 Contractor-Installed products

For Contractor-installed products, the date of acceptance is the date the Customer or Project Contact accepts the product as installed and in good working order. Acceptance shall be signed off by the Customer or Project Contact in CSAB for every Project and MAC. The DMS Product Manager will subsequently sign off in CSAB for every Project and MAC. Inspection and acceptance shall be at destination at Project or MAC completion, unless otherwise provided.

7.5.2 Customer-Installed products

For Customer-installed products where the Contractor just delivers the product(s) to the Customer, acceptance is complete when the Customer or Project Contact signs off on receipt of the product. Mere acknowledgement by Project Contact or Customer personnel of the delivery or receipt of products (e.g., a signed bill of lading) shall not be deemed or construed as acceptance of the products received. Until sign-off acceptance, risk of loss or damage shall remain with the Contractor. The Contractor shall be responsible for filing, processing and collecting all damage claims.

a.) To assist the Contractor with damage claims for Customer-installed products, the Customer or Project Contact will: record any evidence of visible damage on all copies of the delivering carrier's Bill of Lading; report in writing damage to the carrier and the Contractor; and provide the Contractor with a copy of the carrier's Bill of Lading and damage inspection report. A damage inspection report is created by the Contractor and submitted to the Department.

b.) Any delivery of Customer-installed product that is substandard or does not comply with the Contract terms may be rejected or accepted on an adjusted price basis, as determined by the Customer. The Customer will have five (5) calendar days to accept or reject a product. When the Customer rejects a product, Contractor shall remove the uninstalled product from the premises within ten (10) calendar days after notification of rejection. Upon notification of rejection, the risk of loss of rejected or non-conforming product shall remain with the Contractor. If the Customer agrees to accept the non-conforming product on an adjusted price basis, the Contractor will invoice the Customer accordingly.

c.) Rejected uninstalled Customer-installed product not removed by the Contractor within ten (10) calendar days shall be deemed abandoned by the Contractor and DMS shall have the right to dispose of it as its own property. Contractor shall reimburse DMS for costs and expenses incurred in storing or effecting removal or disposition of rejected product.

7.6 Changes

During the Project or MAC, Customers may submit changes to their orders through CSAB. Contractors will work with Customers and the Department to incorporate those changes into the Project or MAC, wherever feasible. Depending on the change, the Department may require revised quotes and revised Project or MAC submittals.

7.7 Work Schedule

The Contractor shall submit to DMS adequate information, in a format acceptable to DMS, which demonstrates the schedule of the work to be done and the Contractor's plan to manage

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to that schedule. The Department reserves the right to request additional documentation as needed.

8. PRICE ADJUSTMENTS

Prices shall remain firm for the first 12 months of the Contract. Contractors may request a price adjustment that would take effect on the anniversary date of the Contract. This may be done up to once per year for the duration of the Contract. The price adjustment requests must be submitted 30 days before the anniversary date of the Contract in writing to the Department's Contract Manager. The Contractor shall not request, and the Department will not approve, more than one request for a price adjustment for each subsequent year.

The Department is under no obligation to approve a price adjustment request. In the event that a request for price adjustment is denied, the Contractor will remain obligated to perform pursuant to the terms of the Contract.

Price adjustment requests must be supported by a change in the Producer Price Index (PPI) for the Series ID "PCU334220334220" Broadcast and Wireless Communications Equipment Manufacturing." The change in PPI shall be calculated using the percent change in PPI for the month which the Contract term began and the latest available PPI at the time of the price adjustment request. This information is published by the U.S. Department of Labor, Bureau of Labor Statistics (BLS) and is available at https://www.bls.gov/data/. Any price adjustment request shall not exceed the percent change in PPI or 5%, whichever is less.

A price adjustment will constitute a change to the Contract requiring an amendment executed by both Parties. After the Department approves a price adjustment in a written communication to the Contractor, it will incorporate the price adjustment into the CSAB system. Price adjustments may not be applied retroactively.

9. SERVICE LEVEL AGREEMENTS

9.1 All products and services provided under the Contract must meet or exceed all conditions and specifications. Contractors are required to submit to the Department and Customer documentation as required in this Statement of Work. This documentation, and any other documentation requested from the Contract and DMS customers, may be used to determine compliance with the Contract and the Contract's Service Level Agreements.

Standards and Deliverables	Service Level	Financial Consequence
General Requirements		
The Contractor shall submit invoices within forty-five (45) calendar days of completion of services and in accordance with SOW section 4.7. The completion of services shall mean the completion of on-site work, work completion sign-off by the Customer or Project Contact and the DMS Product Manager, and the delivery of the Project Final Submittals documentation specified in SOW sections 7.2 and 7.4.	Contractor will submit a complete and timely invoice	1% of the invoice amount per calendar day that the invoice is late. After 100 days the invoice will not be paid services will be deemed gratuitously provided.

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The Contractor shall submit accurate invoices that reflect the work performed. Each invoiced line item must be supported by the required corresponding documentation. Invoices that do not match the approved project completion records will be considered non-compliant and will be rejected.	Contractor will submit an accurate invoice and all required backup documentation of the work that was performed. Example: All invoices from subcontractors for work performed.	After the first instance of an inaccurate or non-compliant invoice for the same billing event, the Contractor shall be assessed a financial consequence of 5% of the total invoice amount. All additional occurrences for the same billing event shall be a 10% financial consequence per occurrence of the total invoice amount.
The Contractor shall not allow for any work to be performed by an employee, subcontractor personnel, independent contractors, leased employees, volunteers, licensees or other person ("Persons") who has not been cleared through a Level II Background Check. Contractor must submit all results from the background check prior to any work being performed by the Persons mentioned in this section.	Contractor will ensure compliance with background check requirement and maintain documentation evidencing their clearance before appearing at a job site.	$250.00 per person per day for each occurrence.
Projects		
All Project Commencement Submittals documentation set forth in SOW section 7.1 shall be submitted by the Contractor in CSAB at least four (4) business days prior to the commencement date of the Project.	Contractor will timely provide complete and accurate Project Commencement Submittals	$250.00 for each calendar day this deliverable is past due, capped at fifty percent (50%) of the invoice.
All Project Final Submittals documentation set forth in SOW section 7.2 shall be submitted in CSAB by the Contractor within twenty-one (21) business days after Customer or Project Contact inspection and acceptance.	Contractor will timely provide complete and accurate Project Commencement Submittals	10% of the total invoiced amount for each calendar day this deliverable is past due, capped at fifty percent (50%) of the invoice.
MACs		
All MAC Final Submittals documents set forth in SOW section 7.4 shall be submitted in CSAB by the Contractor within twenty-one (21) business days after completion of on-site work for the MAC.	Contractor will timely provide complete and accurate MAC Final Submittals	10% of the total invoiced amount for each calendar day this deliverable is past due, capped at fifty percent (50%) of the invoice.

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9.2 Suspension of Services

Suspension from services shall mean the Contractor will be unable to receive new Project or MAC orders during the suspension timeframe. The suspension from services shall not keep the Contractor from completing work ordered prior to the suspension. If a vendor responds to the quote by opting out within the system and provides a valid justification for the opt out these provisions will not be triggered. The Department is the sole determiner of what is deemed a valid justification.

a) If, within three (3) calendar months, a Contractor does not provide a quote on a total of six (6) or more orders for services for Projects, MACS, or a combination thereof, denying services to Customers, the Contractor shall be suspended from services for thirty (30) consecutive days.

b) If, within six (6) calendar months, a Contractor does not provide a quote on twelve (12) or more orders for services for Projects, MACs, or a combination thereof, denying services to Customers, the Contractor shall be suspended from services for ninety (90) consecutive days.

c) If the Contractor fails to submit an accurate and compliant invoice for three (3) separate billing events during a rolling twelve (12) month period, the Contractor may be suspended from services for a period of thirty (30) consecutive days.

d) The DMS Contract Manager will inform the Contractor in writing of the start and ending date of the suspension from services within fourteen (14) calendar days prior of the suspension from services.

e) If the Contractor is suspended from services two times during a six (6) month period, they will be placed on a Corrective Action Plan as described in Section 9.3.

f) The Department maintains its sole discretion on Contractor suspension from services and Corrective Action Plans.

9.3 Corrective Action Plan

In addition to the processes set forth in the Contract, if the Department determines that there is a performance deficiency that requires correction by the Contractor, then the Department will issue a notice to provide a Corrective Action Plan from the Contractor. The Corrective Action Plan must include:

- The specific performance deficiencies identified
- The time frame for correction
- Additional requirements as determined by the Department

The correction must be made within the time frame specified by the Department. The Contractor must provide the Department with a plan describing how the Contractor will address all performance deficiencies identified by the Department. The CAP shall utilize SMART (specific, Measurable, Achievable, Relevant, and Time-bound) goals to ensure success. If the Contractor fails to comply with the Department's notice to provide a Corrective Action Plan, then the Department may elect to terminate the Contract at its sole discretion.

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10. WARRANTIES

10.1 Manufacturer Warranty

At no additional cost, the Contractor shall provide a minimum fifteen (15) year Manufacturer's extended product warranty and system assurance warranty for Projects or MACs which meet Manufacturer's warranty requirements. If a Customer requests a Manufacturer's extended product warranty and system assurance warranty greater than fifteen (15) years for a specific project, the Contractor shall meet this requirement if the Manufacturer provides such warranty.

For E-Rate eligible components, a Manufacturer's multi-year warranty for a period up to three (3) years that is provided as an integral part of an eligible component, without a separately identifiable cost, may be included in the proposed cost of the component. All other Manufacturer warranties are ineligible for E-Rate support and may not be included in the proposed cost for a component.

10.1.1 **Extended Product Warranty**

The extended product warranty shall ensure against product defects. All cabling components shall meet or exceed the specifications of TIA 568-C. The system shall meet or exceed the attenuation and Near End Cross Talk (NEXT) requirements of TIA 67. The installation shall meet or exceed the loss and bandwidth requirements of TIA 67 for fiber links/channels, for a minimum of a 15-year period from the date of final acceptance by Customer. The extended product warranty shall apply to all passive system components.

10.1.2 **System Assurance Warranty**

The system assurance warranty shall cover the failure of the cabling system to support the applications for which it was designed to support for a minimum of a fifteen (15) year period from the date of final acceptance by the Customer.

10.1.3 **Extended Product Warranty**

The extended product warranty and the system assurance warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s). Upon successful completion of the installation, subsequent inspection, and testing, the Customer shall be provided a numbered certificate, from the manufacturing company, registering the installation.

10.2 Contractor Warranty

Contractor warrants that all products furnished under the Contract shall be free of defective material and workmanship and shall otherwise perform in accordance with required performance criteria, for a period of no less than one (1) year from date of final acceptance by the Customer. Warranty repairs shall be completed by the Contractor at no cost to the Customer.

11. TECHNICAL SPECIFICATIONS

The Contractor shall provide equipment and services in accordance with the Contract and Project or MAC specifications and the applicable technical specifications set forth herein.

11.1 Codes and Standards

The Contractor shall provide and install the cabling distribution system in accordance with the codes, standards, regulations, and best practices from the following organizations set forth herein, and any codes and standards individually referenced herein, which shall include the latest edition, amendment and all applicable addenda. DMS will verify that codes and standards have been followed by inspection of the Contractor's work and by reviewing Contractor inspection documentation and testing documentation provided by the Contractor pursuant to the

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requirements set forth in this Contract. Where there is a conflict between the Contract documents and the applicable codes, standards, regulations, and best practices, the most stringent requirements shall govern.

The following codes and standards are incorporated by reference and are applicable to work performed and the equipment offered under this Contract, where applicable. The work performed and equipment offered under this Contract shall be provided in accordance with all of the applicable regulations, standards, codes, and best practices from the following organizations, where applicable, and are all incorporated by reference:

11.1.1 Underwriters' Laboratories (UL). All materials shall be UL listed and labeled. All applicable systems shall have a UL systems label. If there are no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels.

11.1.2 Telecommunications Industry Association (TIA) standards, revision D or the most recent revisions.

11.1.3 National Electrical Code (NEC), latest editions.

11.1.4 Building Industry Consulting Service International (BICSI) International Standards Program (ANSI/BICSI), latest editions.

11.1.5 The most recent editions of the following Building Component Safety Information (BCSI) Manuals:

a) Telecommunications Distribution Methods Manual

b) Outside Plant Design Reference Manual

c) Information Technology Systems Installation Methods Manual

d) AV Design Reference Manual

The work performed and equipment offered under this Contract shall be provided in accordance with all the applicable regulations, standards, codes, and best practices from the following organizations, which are all incorporated by reference:

11.1.6 Institute of Electrical and Electronics Engineers (IEEE) Applications standards, latest editions

11.1.7 Occupational Safety and Health Administration Regulations (OSHA).

11.1.8 National Fire Protection Association (NFPA).

11.1.9 American National Standards Institute (ANSI).

11.1.10 Telecommunications Industry Association (TIA).

11.1.11 National Electrical Contractors Association (NECA).

11.1.12 Society of Cable Television Engineers (SCTE).

11.1.13 National Electrical Manufacturers Association (NEMA).

11.1.14 National Electrical Safety Code (NESC).

11.1.15 The State Uniform Building Code for Public Educational Facilities Construction (UBC), State Requirements for Educational Facilities.

11.1.16 International Standards Organization and International Electrotechnical Commission (ISO/IEC)

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11.2 Manufacturer and Equipment Requirements

11.2.1 The Contractor shall ensure telecommunication equipment provided meets the specifications herein and any additional requirements provided by the specifications for each Project and/or MAC.

11.2.2 On MACs to existing telecommunication systems, the Contractor shall utilize the same Manufacturer or the equivalent of components currently installed in the facility unless otherwise directed by the Project Contact. The Contractor shall notify the DMS Product Manager in writing if directed by the Project Contact to utilize Manufacturer components that are a different Manufacturer than the existing telecommunication system components and where the new components or materials would void an existing telecommunication system warranty. The Contractor shall not commence work without written approval from the DMS Product Manager if the new components materials would void an existing telecommunication system warranty.

11.2.3 On renovation and new construction Projects, the Contractor shall comply with the Project Contact or DMS Product Manager requirements as indicated by each Project specification. These requirements will be provided to the Contractor by the DMS Product Manager or Project Contact for the specific Project. When feasible, the Contractor shall match all system components to the same Manufacturer or the equivalent Project wide and obtain a Project warranty. Contractor will notify Project Contact or DMS Product Manager if not feasible and Contractor must be further authorized in writing to proceed.

11.2.4 On Projects where the Manufacturer is not listed, the Contractor shall select the Manufacturer which meets all the requirements of the Project specifications, Customer's request, and any supplementary requirements.

11.2.5 When feasible, the Contractor shall install equipment from the same Manufacturer or the equivalent of the components currently in place and specifically indicated as acceptable components by the cable Manufacturer.

11.2.6 For all drilling work specified in this Statement of Work, the drilling equipment Manufacturer shall have at least five (5) years of successful manufacturing of products with characteristics and capacities required by the particular section of this Statement of Work.

11.3 Damage to Other Work and Personnel

11.3.1 During construction, the Contractor shall adequately protect the Customer's workspace, equipment, fixtures, and materials. Upon work completion, the Contractor ensure all workspaces, equipment, fixtures, and materials are clean and in good condition.

11.3.2 The Contractor shall carry insurance for protection of Customer's employees, third parties, materials, and equipment on the building site, as prescribed by law for the duration of the Contract and as required in the specific Project or MAC by the Customer.

11.3.3 The Contractor is responsible for repairing all damages caused by their personnel, including their Subcontractors.

11.4 Fire and Smoke Rated Walls, Floors, Roofs, and Ceilings

Where fire and smoke rated walls, floors, roofs, and ceiling assemblies are penetrated or cut by the Contractor as a result of this Contract, the Contractor shall provide and install all materials, including fire and smoke rated assemblies, as required to re-establish the rating of the wall, floor, roof or ceiling assembly to the satisfaction of the authority having jurisdiction.

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11.5 Cutting and Patching

11.5.1 The Contractor shall cut and patch all walls, partitions, floors, pits, and chases as required by the scope of work for the Project or MAC, design and specifications of the Project or MAC.

11.5.2 Prior to cutting any structural member, the Contractor shall obtain the approval of a structural engineer licensed in the State of Florida in accordance with Chapter 471, Florida Statutes, and submit a copy of the approval as a PDF in CSAB to the DMS Product Manager. Such approval shall contain the engineer's instruction for methods to be implemented for cutting and patching.

11.6 Removal of Rubbish

During construction, the Contractor shall keep the job site clean and remove all rubbish at the close of each workday. Upon completion of work, the Contractor shall leave the premises and workspace in a clean and acceptable condition. The Contractor shall remove all tools, scaffolding, unused materials, and rubbish from the building and site upon completion of work.

11.7 Removal of Accessible Abandoned Cable

The Contractor shall remove accessible, abandoned cable pursuant to the National Electric Code. Removal of the abandoned cable by the Contractor shall be coordinated with the DMS Product Manager and the Project Contact to determine the scope of demolition and the cost to the Customer. The Contractor shall submit its demolition proposal as a draft order in CSAB to the DMS Product Manager.

11.8 Cutting, Trenching, Excavation, and Obstructions

The Contractor shall verify with the Project Contact, utility companies, municipalities, and other interested parties that all available information has been provided before any cutting, trenching, or excavation operations begins and shall verify the locations given to ensure accuracy. Should Contractor encounter obstructions during performance of the Project or MAC, whether shown or not, the Contractor shall obtain written approval from the Customer to implement any modification of the Project or MAC, including altering the route of new work, rerouting existing lines, removing the obstruction where permitted, or otherwise performing the work as necessary to satisfy the purpose of the new construction and leave existing services and structures in a satisfactory and serviceable condition.

11.9 Installation Guidelines

The Contractor shall adhere to the following specifications, and in accordance with SOW section 11.1, Codes and Standards, for the installation of any material or component, or for any other services provided for Projects or MACs utilizing this Contract:

11.9.1 General Installation

a) The Contractor shall install systems and materials in accordance with Manufacturer instructions, specifications, drawings, and details.

b) The Contractor shall inspect all installation and safety equipment for defects and

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replace any unsafe or unsatisfactory equipment.

c) Electricians and technicians of the Contractor shall perform the system installation under direct supervision of a person with a State of Florida electrical license.

d) All components shall be installed in an organized, clean, and neat manner, consistent with the best electrical, voice, and data installation practices.

e) The Contractor shall run exposed conduits parallel or at right angles to the building or other construction lines in a neat and orderly manner.

f) The Contractor shall provide all conduit, raceway, sleeves, and cable trays even when not specifically identified in the Project or MAC drawing or specifications.

g) The Contractor shall be responsible for any damage to any surfaces or work disrupted as a result of its work or the work of its Subcontractor. The Contractor shall repair all damaged surfaces to match adjacent finishes.

h) The Contractor shall schedule above ceiling cable and conduit installation work prior to ceiling tile installation. On retrofit work orders, if the Contractor is required to remove ceiling tiles, the Contractor shall avoid damaging tiles or disturbing grid. The Contractor shall replace all damaged surfaces and coordinate tile replacement with the Project Contact or General Contractor.

i) The Contractor shall provide wire management devices on backboards and racks to facilitate organized routing of exposed cables and patch cords.

j) The Contractor shall secure written approval from the Project Contact on the final locations of telecommunication outlets, especially those located in floor slabs.

k) All equipment installed by the Contractor shall be plumb and level.

l) The Contractor shall ensure that all outlets have unique sequential numbers and shall modify outlet numbers if the same number is shown for more than one outlet on the drawings.

m) The finished installation shall be required to meet the approval of the Project Contact and all applicable laws, regulations, and professional standards for overall quality, cleanliness, and organization.

11.10 Layout

The Contractor shall field-verify the exact location of all equipment, devices, and openings. The layout of equipment shall include ample space around equipment for inspection and maintenance. The Contractor shall provide outlets, racks, and patch panels at locations as shown on the drawings.

11.11 Color Coding

Color identification and coding of termination fields installed by the Contractor shall comply with TIA 606A. Acceptable methods of color-coding termination fields include the use of colored

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connections, cable assemblies, covers, or labels.

11.12 Demolition

The Contractor shall remove all existing equipment from areas as indicated in the Project or MAC scope of work and remove accessible abandoned telecommunication cable. Any existing unused conduit which is concealed, or which does not interfere with the work, may remain in place. Telecommunication cable and equipment to be demolished, except items noted to be relocated or delivered to the Customer, become the property of the Contractor for disposal.

11.13 Fire Stopping

a) All penetrations through fire-rated walls, floors, and ceilings assemblies shall be sealed by the Contractor with a UL Listed fire stop system approved by the authority having jurisdiction. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire-rated structure).

b) Creation of penetrations and openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the Contractor. Conduit sleeves shall be provided by the Contractor as a means of routing cables between various distribution frame rooms. Openings in sleeves and conduits used for the system cables and those that remain empty (spare) shall be sealed by the Contractor with a UL listed fireproof, removable sealing material approved by the authority having jurisdiction.

11.14 Cable

a) The telecommunication system wiring shall be installed above ceilings by the Contractor, unless otherwise approved by the Customer. All communications cabling used throughout the projects shall comply with the requirements as outlined in the National Electric Code (NEC) Article 800.

b) The Contractor shall minimize cable pulling tensions using suitable equipment and practices. Installation procedures implemented by the Contractor shall include smooth uniform pulling and continuous management of the cable feed. The Contractor shall not install exposed cable in public access spaces. Cable installation shall comply with the minimum bending radius and maximum pulling tension allowed by the Manufacturer and the specification requirements set forth in SOW section 11.1, Codes and Standards.

c) The bending radius and pulling tension requirements of all cables shall be adhered to by the Contractor during handling and installation to prevent damage to the cable.

d) The Contractor shall coil cables in the wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, the Contractor is permitted to store excess cable in the wall. No more than 12 inches of copper cable and 36 inches of fiber cable slack shall be stored in an in-wall box, modular furniture raceway, or an insulated wall. The Contractor shall loosely coil excess slack and store it in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

e) Cables shall be dressed and terminated in accordance with the recommendations of TIA

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568-C, the manufacturer's recommendations, and best industry practices.

f) Cable installed in cable trays, conduits, and raceways shall comply with the cable fill limits set by BICSI and TIA 569-A, not to exceed forty percent (40%), and shall not exceed the manufacturer's recommendations or impact the cable shape. The Contractor shall avoid over filling cable trays, conduits, and raceways.

g) The Contractor shall inspect conduits for plastic insulating bushings and shall install plastic insulating bushings on the conduit when the bushings are missing prior to pulling cable through the conduit. Cables installed by the Contractor in conduits without plastic insulating bushings shall be removed. Such cables shall be replaced and not reused.

h) The Contractor shall install each run of cable between the termination block/interconnect unit and the information outlet/building control device shall be continuous without any joints or splices. Bridge taps or repairs to cable are not allowed. Damaged or broken cables shall be replaced by the Contractor.

i) When transition or consolidation points are allowed, the Contractor shall locate and house them in accessible locations in an enclosure suitable for its purpose.

j) The Contractor shall ensure that cable installations comply with the Manufacturer's requirements, with SOW section 11.1, Codes and Standards, best industry practices, and Contractor shall ensure the following requirements are met:

1. Folds shall not exceed 90 degrees;

2. Avoid excessive cable bending;

3. Tie wraps must be tightened without tools but must also be tight enough to hold cables together;

4. Avoid, overly tight tie wraps close to cable bends and pulling of a looped cable that could cause a cable to twist tightly;

5. Replace all cables with torn jackets, cut jackets, skinned jackets or wear-through due to abrasion or sharp edges;

6. Avoid excessive scoring of the jacket that cuts into the copper conductors;

7. The bend radius of the horizontal cable shall not be less than four (4) times the outside diameter of the cable; and

8. Cable and pathways shall be installed to provide for a minimum bending radius greater than six (6) times the cable diameter for copper cable and ten (10) times the cable diameter for optical fiber. A greater bending radius shall be used if required by the Manufacturer cable specifications.

11.15 Horizontal Cable Installation

a) The Contractor shall organize and keep all cables clean and organized at the racks, in the wire management devices, and interconnect cabinets. Hook and Loop or

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"Velcro" Cable wraps shall be used by the Contractor to secure and release cables quickly and safely in the racks for station cables and patch cords and in the Customer's telecommunication room where cables are reconfigured.

b) The Contractor shall install cable in accordance with Manufacturer's recommendations, SOW section 11.1, Codes and Standards, and best industry practices.

c) The Contractor shall install 200-pound nylon pull cord with a thickness of 1/8-inch minimum in every conduit.

d) The Contractor shall not fill cable raceways greater than maximum fill limits set by BICSI, the TIA-569-A maximum fill for the particular raceway type, or forty percent (40%), whichever is more stringent.

e) Any cable damaged or cable exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to the Customer's final acceptance at no cost to the Customer.

f) The Contractor shall identify cables with a self-adhesive label in accordance with TIA-606A. The Contractor shall apply the cable label to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

g) Contractor shall ensure copper cable is installed in such a way that there are no bends smaller than four (4) times the cable outside diameter at any point in the run and at the termination field.

h) Contractor shall ensure that pulling tension on four-pair UTP cables does not exceed 25 pounds per foot during installation.

i) The Contractor shall ensure that cables installed on the outer surface of ceilings or sidewalls be supported by the structural components of the building structure in such a manner that the cable is not damaged by normal building use. Cables shall be attached by the Contractor to structural components with approved hangers to avoid cable damage.

j) The Contractor shall install all cables parallel to or at right angles to the building or other construction lines in an organized and orderly manner.

11.16 Backbone Cable Installation

a) The Contractor shall organize and keep all cables clean and organized.

b) The Contractor shall secure vertical cable at the top of the run and at every other floor to bear the weight of the cable. The cable attachment point by the Contractor shall comply with the minimum bend radius of the cable. The Contractor shall utilize split mesh grip or other approved devices to bear the weight of the cable. The Contractor shall provide supporting hardware at each vertical closet location to prevent slippage of vertical cable. The Contractor may only use cable ties to prevent lateral movement.

c) Contractor shall install backbone cables separately from horizontal distribution cables.

d) The Contractor shall install cable in accordance with manufacturer's

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recommendations, SOW section 11.1, Codes and Standards, and best industry practices.

e) Contractor will install a 200-pound nylon pull cord with a thickness of 1/8-inch minimum in every conduit.

f) Where backbone cables and distribution cables are installed in a cable tray or wire way, the Contractor shall install backbone cables first, and bundled separately from the horizontal distribution cables.

g) The Contractor shall securely fasten all backbone cables to the sidewall of the Customer's telecommunication room on each floor.

h) Where backbone cables are installed in an air return plenum, the Contractor shall install riser-rated cable in metallic conduit.

i) The Contractor shall ensure that backbone cables spanning more than three floors are securely attached at the top of the cable run with a wire mesh grip and on alternating floors.

j) The Contractor shall install vertical runs of cable supported by messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

k) Contractor shall ensure that all large bundles of cables and heavy cables are attached using metal clamps or metal banding to support the cables.

l) The Contractor shall install the building backbone cable in a star topology with separate segments of fiber optic cable originating in the Equipment Room and terminating in each Telecommunications Space without splices.

11.17 Optical Fiber Cable

a) The Contractor shall organize and keep all cables clean and organized.

b) The Contractor shall install cable in accordance with Manufacturer's recommendations, SOW section 11.1, Codes and Standards, and best industry practices.

c) The Contractor shall install the building backbone cable in a star topology with separate segments of fiber optic cable originating in the Equipment Room and terminating in each Telecommunications Space without splices.

d) All fiber backbone cables shall be installed by the Contractor in innerduct for physical protection. The Contractor shall provide 1-inch, 1 ½-inch and/or 2-inch nonmetallic corrugated flexible innerduct for use in plenum, outside duct banks, and riser applications. In plenum rated areas, the Contractor shall place plenum rated cable in plenum rated inner duct.

e) Where specifically requested, the Contractor shall provide flexible engineered fabric conduit. Engineered fabric shall include 3 cells, not rip or tear, and shall be chemically resistant to ground chemicals and petroleum products. The Contractor shall install a pull cord in each cell. In plenum rated areas the Contractor shall provide plenum rated fabric.

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11.18 Terminations

The Contractor shall strip a maximum of 1 inch of the jacket at both ends of the Category 5e, 6, and 6a cables, maintaining the twisting of the individual pair as close as possible to the termination point, maintaining the wire twist within a ½-inch of the end of the wire. The Contractor shall cleanly route cable directly to the connection blocks without open loops. The Contractor shall provide pair termination cable with tight and non-distorted twists that are maintained up to the connecting blocks. From each jack location, there will be one sheath of wiring cable to the associated distribution frame.

11.18.1 Copper Termination Hardware

a) The Contractor shall dress and terminate cables in accordance with TIA 568-C standard, Manufacturer's recommendations, SOW section 11.1, Codes and Standards, and best industry practice. The Contractor shall install cables in organized bundles and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

b) The Contractor shall ensure that all data jacks are located in the bottom position(s) of each vertical faceplate and data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

c) Contractor shall ensure that voice jacks are located in the top position(s) on the vertical faceplates and in the left most position(s) in horizontally oriented faceplates.

11.19 Identification

a) The Contractor shall utilize clear permanent typewritten labels matching the scheme indicated on the drawings for identification. All labeling shall be a minimum 12-point in size. The Contractor shall submit all labeling systems and schemes to the Project Contact for approval prior to identification. Labeling shall last as long as the system is in use.

b) The Contractor shall identify each outlet jack and fiber connector with a unique label, in accordance with the drawings or as required by the Project Contact.

c) The Contractor shall identify each end of every cable and shall include the jack/connector, in accordance with the drawings or as required by the Project Contact.

d) The Contractor shall clearly label each cable on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle where the label is obscured from view are not acceptable.

e) The Contractor shall identify the rack or cabinet with the telecommunications room number in accordance with the Project or MAC requirements or as required by the Project Contact.

f) The Contractor shall identify fiber optic cable and innerduct on each floor and by each distribution frame with a plastic tag identifying the origination point and termination point.

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g) The Contractor shall label each end of the riser and tie cables and include on the label the termination communication closet number and the cable pair or cable numbers. The cable numbers shall continue until the total cable quantities for all riser and tie cables are reached.

11.20 Cable Supports

The Contractor shall ensure that the following cable support requirements are met:

a) J-hook hanging supports shall be located on 5-foot centers maximum and shall be located as required to adequately support and distribute the cable's weight. The Contractor shall utilize supports specifically designed for the required cable weight and volume and a minimum of two hangers shall be provided at all 90-degree bends. The Contractor shall provide a hanger to support the extra cable loop at the outlet location.

b) Bridle rings and trapeze hangars are not approved cable supports. Tie wraps shall not be used as cable supports.

c) The Contractor shall utilize cable trays where the cable quantity exceeds the design amount for a J-hook. The Contractor shall utilize a cable tray when any area contains 40 or more cables, unless the use of multiple J-hooks is specifically approved by the DMS Product Manager. The Contractor shall not exceed the cable installation area of the J-hook. The Contractor shall support the cable where the cable leaves the cable tray. Use of ceiling tiles, ceiling grid hanger wires, or lighting fixture wires for support of cables is prohibited.

d) In suspended ceiling and raised floor areas where cable trays or conduits are not utilized, or in the cable tray in the telecommunications room, the Contractor shall bundle station wiring. The bundles shall consist of forty (40) or fewer cables with the cables secured snuggly at appropriate distances with cable ties. Bundling cables shall not deform the cable geometry.

e) The Contractor shall route station cables and tie cables installed within ceiling spaces through these spaces at right angles to electrical power circuits and supported only from the building structure.

f) Cable shall be installed above fire-sprinkler systems and shall not be attached to the fire-sprinkler system or any ancillary equipment or hardware. The cable system and support hardware shall be installed by the Contractor without obscuring any valves, fire alarm conduits, boxes, or other control devices.

g) Where support for horizontal cable is required, the Contractor shall install appropriate carriers to support the cabling.

h) The Contractor shall adhere to the Manufacturers' requirements for bending radius and pulling tension of all data and voice cables. Cable tensions in suspended cable runs shall be minimized by the Contractor by using suitable equipment and practices.

i) The Contractor shall consider electromagnetic interference (EMI) and shall avoid sources of EMI as outlined in section 10.3 of TIA 569A: Pathways.

j) The Contractor shall comply with NFPA 70 Article 800.52 for separation of cable from power conductors.

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k) Open wiring shall be separated and routed away from any cable that passes through or is adjacent to the outside of the building, which might be hit by lightning strikes, or subject to power surges.

11.21 Cabinet Wiring

In cabinets, the Contractor shall bundle station wiring, in bundles of forty (40) or less, with Velcro type cable ties, snug, but not deforming the cable geometry, at appropriate distances to support and secure cable in the cabinets.

The patch panels will be co-located on 19-inch racks with the network hubs and the fiber optical interconnection cabinets as designated on the drawings or as required by the Project Contact. The configuration of the patch panels shall be in an arrangement that minimizes patch cord lengths.

11.22 Racks

The Contractor shall ensure the following requirements are met:

a) The Contractor shall secure racks in place with appropriate fasteners and attached to the concrete floor using a minimum of 3/8-inch hardware or as required by Manufacturer.

b) Each rack shall be mounted on an isolation pad and utilize nonconductive washers to secure the rack to the floor.

c) The Contractor shall provide isolation pads, except where the rack is mounted on vinyl ceramic tile.

d) Floor mounted open racks shall be secured from the top rail to the backboard in the room with a length of cable runway to prevent movement.

e) The Contractor shall place racks with a minimum of 36 inches of clearance from the walls on all sides of the rack. When racks are mounted in a row, the Contractor shall maintain, at a minimum of 36 inches, from the wall behind, in front of the row of racks, and from the wall at each end of the row.

f) All racks shall be grounded to the telecommunications ground bus bar.

g) Rack mount screws not used for installing patch panels and other hardware shall be bagged by the Contractor and left with the Customer upon completion of the installation.

h) The Contractor shall mount all mounted termination block fields on the telecommunication backboard. The telecommunication backboard shall be mounted vertically 12 inches above the finished floor, if possible.

i) Wall mounted termination block fields shall be installed by the Contractor with the lowest edge of the mounting frame 18 inches from the finished floor.

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11.23 Space Cable

a) The Contractor shall terminate copper or fiber cables in the Customer's telecommunication and equipment rooms with enough spare cable length to be routed to the equipment rack with a 10-foot figure-eight service loop neatly managed and secured above the equipment rack in the cable tray.

b) The Contractor shall terminate copper cables at outlets with two feet of spare cable length supported above the ceiling at the closest J-hook location.

c) The Contractor shall ensure that category 5e, 6, or 6a cable maximum length of 295 feet shall include the spare cable lengths listed above. If link length exceeds the maximum length, the Contractor shall coordinate routing and spare cable length with the DMS Product Manager, prior to commencing cable installation.

11.24 Boxes

Telecommunication outlets installed in dry-wall, plaster or concrete block walls must be installed by the Contractor in a 4-inch square by 2 ½-inch deep outlet box. Knockouts shall comply with the size of conduit specified. The Contractor shall comply with the applicable requirements of the NEC for the material and installation of electrical outlet boxes in addition to the following requirements:

a) Outlet boxes shall not be placed back-to-back.

b) Cover plates for wall-mounted outlets shall be single or double gang to match devices specified.

c) Telecommunication outlets shall be installed at the same level as the adjacent duplex receptacles unless otherwise noted.

d) All outlet plates shall be securely mounted, plumb, and level.

e) A blank device plate for each spare or unused box shall be provided.

11.25 Outlets Mounting

a) If the interior walls are not obstructed, the Contractor shall conceal the horizontal wiring internally within the walls. If an obstruction exists, the Contractor shall secure approval from the Project Contact prior to the use of alternate methods of installation.

b) Telecommunication outlets that require surface mounting shall be mounted by Contractor in non-metallic back-boxes with surface raceways and raceways and shall be secured every 16 inches with screws and wall anchors.

c) Telecommunication outlets being installed by Contractor in existing dry wall may utilize a single gang or double gang low voltage mounts specifically designed to accommodate the thickness of the drywall and the outlets specified.

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11.26 Telecommunication Outlets

a) The Contractor shall provide fiber optical outlets with connectors as designated on the drawings or as required by the Project Contact in single or double gang faceplates to match devices specified. The Contractor shall provide recessed angled jacks to protect mating cables. The modular design of the outlet shall allow for the adoption of interchangeable units for standard or customized voice, video, and data applications. The outlets shall include a decorative cover and all associated mounting hardware, modules, couplings, adapters, and connectors. Covers shall come with recessed label space for circuit identifications.

b) The Contractor shall identify outlets with clear permanent typewritten labels matching the numbering plan indicated on the drawings. Each module shall be labeled by the Contractor as to its current function using color-coded icons. All labeling must be permanent. All labeling shall be a minimum 12-point in size. All labeling systems and schemes shall be submitted to the Project Contact for approval prior to labeling. Labeling shall last as long as the system is in use.

c) The Contractor shall provide a surface mounted enclosure that attaches directly over the standard electrical box provided.

d) The Contractor shall provide a means of securing fiber cables while maintaining a minimum bend radius of 30 millimeters.

11.27 Structural Supports

The Contractor shall utilize hardware specifically designed to support the weight of: conduits, raceways, cable trays, cables, and J-hooks when suspending these materials from or attaching these materials to structural ceilings or walls. Supports shall be structurally independent of the suspended ceiling. All conduits, cable trays, and raceways shall be reamed and free of burrs, sharp edges, or projections that can damage cable insulation. The Contractor shall maintain a 3-inch separation between cable supports and suspended ceilings. Horizontal cables shall not rest directly on ceiling panels of suspended ceilings.

11.28 Conduits and Fittings

11.28.1 Contractor is required to meet or exceed the following specifications for all conduits and fittings:

11.28.1.1 Electrical Metallic Tubing (EMT)

The electrical metallic tubing shall use compression type, malleable iron either cadmium plated or hot dipped galvanized fittings. The EMT conduit shall be UL 797 Listed.

11.28.1.2 Electrical Non-Metallic Tubing (ENT)

The electrical non-metallic tubing shall be corrugated and hand bendable PVC. The ENT conduit shall be UL 1653 Listed.

11.28.1.3 Rigid Nonmetallic Conduit (RNMC)

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The rigid nonmetallic conduit shall be 90 degrees Celsius rated Schedule 40 PVC suitable for direct burial and contain solvent weld socket type fittings. The rigid nonmetallic shall be UL 651 Listed.

11.28.1.4 Galvanized Rigid Conduit (GRC)

The hot dipped galvanized rigid conduit shall be constructed from steel with zinc coated threads and an outer coating of zinc chromate. Threaded, malleable iron, either cadmium plated or hot dipped galvanized fittings. The GRC shall be UL 6 Listed.

11.28.1.5 Intermediate Metal Conduit (IMC)

The galvanized intermediate conduit shall be constructed from steel with zinc coated threads and an outer coating of zinc chromate and contain threaded, steel either cadmium plated or hot dipped galvanized fittings. The IMC shall be UL 1242 Listed.

11.28.2 Contractor shall ensure that all conduits comply with the following requirements:

- Conduits shall be ¾-inch minimum.
- Contain no conduit bodies, or 90-degree conduits (i.e. el backs, LBs).
- Contain no more than two 90-degree bends or a total of 180 degrees of bend between pull boxes.
- Contain no metal flexible conduit.
- Contain no more than 100 feet between pull boxes.
- Conduit bend radius internal diameter (I.D.)
  - Conduit 2-inch I.D. or less: radius = 6 times I.D.
  - Conduit greater than 2-inch I.D.: radius = 10 times I.D.
  - Conduit for optical fiber: radius = 10 times I.D.

a) All conduits shall be clean, dry, unobstructed, capped for protection, and labeled for identification. The Contractor shall provide a nylon or plastic line with a minimum test rating of 200 pounds on all conduits. The Contractor shall clean and swab dry conduits installed below slab or below the exterior grade of the structure prior to the installation of cabling.

b) The Contractor shall terminate all conduits entering Customer's telecommunication room as close to the wall nearest the backboard or rack to minimize the cable route inside the closet. Conduits from the floor shall be terminated 4 inches above finished floor. Conduits above racks shall terminate 4 inches above the rack.

c) Conduits installed in ceilings and walls shall be electrical metallic tube and shall meet the NEC requirements. The Contractor shall conceal conduit in finished areas.

d) Conduits installed above exterior grade shall be galvanized rigid steel conduit. If service is in floor slab, the Contractor shall use galvanized rigid steel conduit. Outside plant cable not rated for interior use installed 50-foot or greater in the building shall be installed by the Contractor in a galvanized rigid steel conduit within the building.

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e) The Contractor shall install conduits below exterior grade, and shall be Schedule 40 PVC unless noted otherwise. The Contractor shall provide rigid steel conduit elbows coated with black asphaltic paint.

f) The Contractor shall terminate metal conduit using plastic bushings.

g) The Contract shall place conduit runs in the shortest straight route possible. Any section of conduit longer than 100 feet or containing more than the equivalent of two 90-degree bends for telecommunications cabling and of four 90-degree bends for electrical wiring will require pull boxes.

h) The Contractor shall ensure that each conduit bend be a long sweep radius wherever possible. In no instance shall the inside radius or bend be less than 6 times the internal diameter of the conduit. All bends shall be free from flattening or indentations.

i) Contractor shall bury conduit at a minimum depth of 24 inches and meet all applicable codes.

j) Contractor shall thread all riser sleeves, extended 4 inches above finished floor and equipped with caps.

k) Conduit shall be provided by the Contractor from the communication cabinet(s) and outlet boxes to above the ceiling with a 90 degree bend and shall be sized for the number of cables installed within maximum fill limits set by BICSI and TIA 569-A or 40 percent, whichever is more stringent and shall include 25 percent spare capacity.

l) The Contractor shall ensure that all electrical power conduits are continuous between outlets, junction and pull boxes, and panels. Metallic conduit shall enter and be secured to enclosures so that each system is electrically continuous throughout. Where knockouts are used, provide double locknuts, one on each side.

m) The Contractor shall run concealed conduit as directly and with the largest radius bends as possible. The Contractor shall run exposed conduit parallel or perpendicular to the building or other construction lines in an organized and orderly manner.

n) The Contractor shall securely fasten and support exposed conduit to metal framing using hot dipped galvanized steel pipe straps or other approved means.

o) The fill ratio of innerduct should not exceed 50 percent. The Contractor shall avoid excessive tension and deformation when placing innerduct. Any innerduct damaged during placement shall be replaced by the Contractor at no cost to the Customer. Where innerduct will be continuous, the Contractor shall allow sufficient slack so it can be secured on racks and maintain bend radius. Where the innerduct is not continuous, the Contractor shall allow for slack due to innerduct relax. The Contractor shall provide fiber optic warning signs on innerduct which identify the cable as containing fiber optic cable.

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11.29 Electrical Power Work

a) The Contractor shall install all materials in accordance with Manufacturer's instructions.

b) The Contractor shall not install the conductors until the conduit raceway system is complete. The Contractor shall not exceed Manufacturer's maximum pulling tension or bending radius recommended for the conductors.

c) The Contractor shall mount receptacles vertically in a suitable steel outlet box at the height required by the Project or MAC requirements.

d) After all electrical power circuits have been completed and put into operation, the Contractor shall test each electrical power circuit under design conditions simulating the intended use to assure proper operation. All work shall be tested and adjusted by Contractor to ensure proper operation.

11.30 Outside Plant Installation Preparation

a) Prior to placing any cable or duct for outside plant projects, the Contractor shall provide in writing for DMS approval accurate route surveys and maps to the DMS Product Manager with the installation method to be used and all potential problems and obstructions noted on it.

b) The Contractor shall resolve all right-of-way issues and obtain permits necessary for the services provided pursuant to the Customer's Project or MAC from the authorities having jurisdiction before beginning installation. The Contractor shall obtain permitting in order to provide services under this Contract and as necessary to meet state, federal, and local requirements.

c) The Contractor shall obtain written permission from all property owners prior to working on private property.

d) The Contractor shall allocate sufficient safety personnel and equipment for safe installation of the outside plant cabling and coordinate the placement of pedestrian and vehicular traffic barricades, traffic cones, and warnings signs with appropriate agencies.

e) The Contractor shall investigate and accommodate any potential future road and utility improvements that may impact the cable placement route.

f) The Contractor shall design the location of all splice points along the route and provide enough cable slack on each cable to reach a splice vehicle plus 16 feet. Subsequent splice points will need to be approved by the Project Contact and DMS Product Manager prior to cutting the cable.

g) The Contractor shall comply with the Manufacturer's minimum bend radius and the maximum pulling tension and avoid cutting or crushing the cable during the installation process.

11.31 Outside Plant Aerial Installations

a) The Contractor shall maintain required clearance from electric power lines and other cables based on the NESC and applicable local codes and requirements and ensure that

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there is sufficient separation to avoid flashover from a power line when installing a metallic messenger cable.

b) The Contractor shall verify existing pole and guy support capabilities and any owner restrictions.

c) Telecommunications aerial construction shall meet applicable codes and the NESC and ANSI O5.1, whichever is more stringent.

d) The Contractor shall secure all equipment to prevent it from falling when working on ladders, lifts, or bucket trucks.

11.32 Outside Plant Underground Installations

a) Open trenches and holes shall be refilled by the Contractor as soon as possible and shall be protected by barricades. The Contractor shall avoid unnecessarily damaging of tree roots, shrubs, or other vegetation.

b) Prior to installation, the Contractor shall locate all existing underground facilities including, but not limited to, power, water, sewer, gas, CATV, fiber, and telephone and install all materials to comply with all local requirements regarding separation distances from other utilities, with a minimum of 12 inches of separation.

c) Fiber Optic backbone cables shall be installed by the Contractor with a conductive marker tape secured at each end of the conduit for future location of fiber run. At a minimum, the tape shall be marked “Warning-Optical Cable.”

d) Minimum underground depth placement is 24 inches under finished grade. Additional depth may be required based on the specific location, local codes, or Customer requirements.

e) Rigid metallic or rigid PVC duct is required under any vehicular, cycle, or pedestrian transportation pathway.

f) The Contractor shall provide any rodding or slugging on all existing underground duct banks as required to install all necessary cabling.

g) The Contractor shall backfill trenches with soil, sand, or sandy loam free of large rocks or debris greater than 9 inches in diameter. The material used to backfill shall be uniformly compacted in 6-inch to 9-inch horizontal layers. The Contractor shall not use water to compact fill. Indigenous soil shall be used by the Contractor to complete backfill of trenches. The Contractor shall remove any debris, trash, and excess soil after completion of backfilling and restore the ground surface with seed or sod as required to match the original conditions of the ground surface.

h) The Contractor shall remove concrete or paved surfaces, where necessary, for the purposes of cabling and equipment installation. Any removed surfacing material shall be disposed of by Contractor at approved disposal sites. The Contractor shall match the existing surface when replacing the damaged concrete or paved surface. Where trenching is done through and under said paved surfaces, the trench shall be backfilled with clean, dry sand.

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i) Nonmetallic conduits shall be encased in concrete that is at a minimum 2500 pounds per square inch compressive strength where vehicular traffic is above the pathway, or where a bend or sweep is placed. For direct burial or encasement in concrete, the conduits shall meet NEMA standard TC-2.

j) To prevent the accumulation of water, the Contractor shall install underground conduit a drain slope of no less than 0.125 inch per foot when extending conduits away from building structures and from the middle of the span where conduit extends between maintenance holes.

11.33 Hand Holes

The contractor will ensure that the following requirements regarding hand holes are met:

a) Hand hole boxes shall be lightweight, sunlight resistant, and resistant to weathering and chemicals. Hand hole boxes shall include stainless steel inserts and bolts. The top surface of the hand hole cover shall be labeled with “TELECOM” and shall include a communications logo.

b) Enclosures and covers shall be concrete gray colored and not rated for less than 8000-pound design load. Hand holes shall be designed for sidewalk applications with a safety factor for light vehicular traffic. Where the area of installation is subject to vehicular traffic, traffic bearing covers shall be installed. Hand Holes shall be made of closed mold pre-cast polymer concrete.

c) The Contractor shall provide six to eight inches of gravel or crushed rock for drainage below the box. The hand hole shall be installed by the Contractor flush with finished grade.

d) Hand holes shall be placed by the Contractor where conduits or duct section lengths exceed 600 feet.

e) Hand holes shall have provisions for drainage and shall not be shared with electrical installations other than those needed for telecommunications equipment.

f) The hand holes shall not exceed 4 feet long by 2.5 feet wide and 3 feet deep and shall include racking devices and clearance space.

g) The Contractor shall place cable slack horizontally in the hand hole and ensure bend radius and cable is routed through hand hole. The Contractor shall store the cable slack so that the cable is not damaged. The Contractor shall provide larger quantities of cable slack where there are large numbers of intermediate hand holes.

h) All conduits sealed in the hand holes shall be sealed with bell housing covers to protect the cable from rocks and debris.

11.34 Directional Drilling

The contractor will ensure that the following requirements regarding directional drilling are met:

a) Directional drilling, also referred to as directional boring, horizontal directional drilling, or fluid assisted boring, will be considered on a case-by-case basis by the Customer

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and DMS Product Manager.

b) Where directional drilling is required, the Contractor shall furnish all labor, materials, tools, and equipment to install conduit/duct beneath roads, driveways, the ground surface, and existing underground utilities without surface damage or disruption of above ground activities.

c) the Contractor shall install the materials in accordance with the Manufacturer instructions. The Contractor shall provide “as built” maps of the cable installation developed from actual depth and conduit locations as specified by the Project or MAC specification. The Contractor shall furnish all labor, materials, tools, and equipment to install conduits and ducts beneath roads, driveways, the ground surface, and existing underground utilities without surface damage or disruption of above ground activities.

d) The Contractor’s installation crew, including the supervisor, rig operator, locator, mud system operator, backhoe/track hoe operator, and any additional helpers shall be trained in correct operational procedures and experienced in the safe operation of all equipment.

e) The Contractor shall not exceed Manufacturer's maximum bending radius on the conduits.

f) The Contractor shall not infringe on the right-of-way of existing underground or overhead utilities. The Contractor shall repair all damage to Customer property, surfaces, or existing underground utilities damaged by the directional drilling equipment.

g) The Contractor shall provide all equipment necessary for a directional drilling installation including, but not limited to, a drill frame, power source, hydraulic drilling fluid, and conduit and guidance system with all the features and options needed for a safe installation.

h) The Contractor shall provide overhead electronic tracking of the depth and location of the bore head.

i) The Contractor shall provide directional drilling equipment with the required thrust and pullback for the installation of the conduit system.

j) The Contractor shall provide the correct drilling fluid with the appropriate mixed additive for the soil conditions. All fluids and additives shall meet DEP and EPA Regulations.

k) Polyduct: The Contractor shall provide high-density polyethylene conduit that is smooth on the inside and outside. The Contractor shall include a 1/8-inch poly rope pull-string in each duct and any connection fittings for continuation of conduit system.

l) Multiduct: The Contractor shall provide high-density polyethylene conduit with multi-cell inner ducts that are smooth on the inside and outside. The Contractor shall include a 1/8-inch poly rope pull-string in each duct and any connection fittings for continuation of conduit system.

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m) Should the Contractor subcontract out these services, the Contractor shall obtain written approval from the DMS Product Manager, noting the Subcontractor's business name, Subcontractor's representative name and contact information, and written certification of the following:

- The Subcontractor shall have at least three (3) years of successful installation experience on similar installations

11.35 Core Drilling and Boring

a) The Contractor shall provide all equipment necessary for wet or dry drilling where core drilling or boring is required. The installation crew shall be trained in correct operational procedures and experienced in the safe operation of all equipment and shall operate the equipment in accordance with the manufacturer's instructions.

b) The Contractor shall avoid structural damage to all structural members and pre-stressed concrete, and avoid all conduits, piping, and other equipment embedded in the concrete. Penetrations through steel reinforced walls and all concrete floors and ceilings require x-ray analysis to assure conduit and reinforcing rod locations prior to performing core drilling or boring.

c) The Contractor shall review all as-built drawings and obtain the approval of a structural engineer licensed in the State of Florida prior to cutting any structural member.

d) The Contractor shall provide and maintain water and dust barriers to prevent the spread of dust and dirt to adjacent areas. The Contractor shall protect all structures, finishes, and adjacent equipment and systems from damage.

e) Penetrations through structural concrete walls, floors, and ceilings shall be sealed by the Contractor with an approved UL Listed fire stop system.

11.36 Air Blown Optical Fiber Cable

Contractor will meet the following requirements regarding air blown optical fiber cables:

a) The Contractor shall furnish all labor, materials, tools, and equipment to provide air blown fiber through compact cable infrastructure tubes. The Contractor shall use air blown fiber equipment from a Manufacturer with at least five (5) years of successful manufacturing of products with characteristics and capacities required by this section.

b) The Contractor shall provide racks and key lockable wall-mounted enclosures to terminate optical fibers from the air blown fiber bundles. The enclosures shall support and organize the fibers for termination.

c) Include all breakout cables, tube couplings, plugs, caps, and organizers. All couplings and caps shall be pressure rated to 200 pounds per square inch.

d) All optical fibers shall meet the specifications and requirements per fiber type as stated within the quote Customer.

e) The Contractor shall install the system and all materials in accordance with manufacturer's instructions.

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f) The Contractor shall not install the fiber until the fiber tube cable system is complete.

g) The Contractor shall not exceed the Manufacturer's maximum bending radius on tubes and fiber bundles.

h) The Contractor shall provide all cable blowing heads and all equipment necessary for blowing the fiber in the tubes, including any air or nitrogen gas required.

i) Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

j) Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cable's strength member shall be securely attached to the cable strain relief bracket in the enclosure.

k) Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers shall be routed in the splice tray.

l) Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

m) A maximum of twelve (12) strands of fiber shall be spliced by the Contractor in each tray.

n) All spare strands of fiber shall be installed by the Contractor into spare splice trays.

11.37 Direct Buried Cable

a) Where direct buried cable is indicated on the drawings or permitted by the Project Contact, the Contractor shall install materials in accordance with the Manufacturer instructions and the Contractor shall provide "as built" maps of the cable installation developed from actual depth and conduit locations.

b) The Contractor shall furnish all labor, materials, tools, and equipment to install cable with minimal surface damage or disruption of above ground activities.

c) The Contractor may combine the direct buried cable method with other outside plant installation methods to go beneath roads, driveways, and existing underground utilities.

d) The Contractor shall assure that the prime mover's horsepower is sufficient for the soil type and cable depth required. The Contractor shall provide tracked or wheeled prime movers dependent on the route placement.

e) Static or vibratory plow installation will be considered on a case-by-case basis as required.

f) Should the Contractor subcontract out these services, the Contractor shall use a Subcontractor that has at least three (3) years of installation experience on similar installations. The Contractor shall obtain written approval from the DMS Product Manager, noting the Subcontractor's business name, Subcontractor's representative name and contact information.

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11.38 Testing Requirements

Samples of delivered Commodities may be selected at random by Customers or Department and tested for compliance with the requirements, specifications, terms, and conditions set forth in the Contract and any Customer agreement.

If the delivered Commodities are non-compliant, the Contractor shall provide the Customer a full refund or replace the Commodities with compliant Commodities within 10 Business Days. The Customer has the sole discretion to determine whether a replacement or refund will be provided.

Testing shall be performed by the Contractor after all components have been labeled and prior to system cutover. Test results shall meet or exceed Manufacturer documentation data. All test equipment shall utilize the latest software recommended by the Manufacturer. All test equipment shall be calibrated, tested, and certified within one year of the commencement of the testing or tested within the timeframe recommended by the manufacturer, whichever is more stringent. The Contractor shall perform the applicable calibrations, testing, and certifications listed below:

11.38.1 Telecommunications Bonding Backbone testing shall verify the integrity of all bonding connections and compliance with the NEC and Telecommunications Bonding Backbone contained herein. The Contractor shall verify proper grounding at service entrances and at all surge suppression devices.

11.38.2 All cables and termination hardware shall be 100 percent tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of TIA-568-C. All pairs of each installed cable shall be verified as performing prior to the Contractor submitting the Project or MAC to the Customer for acceptance. Any defect in the cabling system installation including, but not limited to, the cable, connectors, patch panels, and connector blocks shall be repaired or replaced by the Contractor at no cost to the Customer to ensure 100 percent useable conductors in all cables installed.

11.38.3 Contractor shall test all cables in accordance with the specifications of the Contract and the Manufacturer's requirements. If any of these tests are in conflict, the Contractor shall bring any discrepancies to the attention of the DMS Product Manager for clarification and resolution.

11.38.4 All twisted-pair copper cable links shall be tested by Contractor for continuity, pair reversals, shorts, opens, and performance testing required to verify category performance.

11.38.5 The Contractor shall test each cable for correct termination on a pin-by-pin basis and document the results of the testing. The test log shall include outlet identifiers as indicated on the drawings, the test date, the initials of the technician who tested the cable, and the test results. The Contractor shall submit test results with final documentation. The tests for correct termination required by Contractor, at a minimum, are:

a) Continuity: The Contractor shall test each conductor for end-to-end continuity. Each pair of installed cables shall be tested using a test unit that shows opens, shorts, polarity, pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested by the Contractor with a device that

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verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to the Customer's final acceptance of the work performed by the Contractor.

b) Length: Each installed cable link shall be tested by the Contractor for installed length using a time-domain reflectometer type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet, or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the TIA 568-C Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

11.38.6 For Category 5e, 6, 6a or 8 copper cables, each jack in each outlet shall be tested by the Contractor to verify both the integrity of all conductors and the correctness of the termination sequence. Testing shall be performed between modular jacks at the outlets and the modular jacks at the telecommunications closet (TC) station field. For Category 5e, 6, and 6a copper cables, the Contractor shall follow the requirements established in TIA 568-C:

a) The basic tests required to be performed by the Contractor for Category 5e, 6, and 6a copper cables are:

1. Wire Map
2. Length
3. Attenuation
4. Near End Crosstalk (NEXT)
5. Return Loss
6. Equal Level Far End Crosstalk (ELFEXT) Loss
7. Propagation Delay
8. Delay skew
9. Power Sum Near End Crosstalk loss (PSNEXT
10. Power Sum Attenuation to Crosstalk Ratio, Far-End (PSACRF)

b) Provide connector testing of each Category 5e, 6, 6a or 8 data link for TIA 568-C compliance, using an appropriate testing instrument. Every wire and connector pin for each cable from an outlet to the distribution frame shall be tested for continuity, shorts, crossed pairs, reversed pairs, split pairs and any other miss-wires.

c) Provide 100-megahertz sweep tests, continuity, polarity checks, NEXT, insertion loss, and the installed length for all Data/Voice station cables, backbone cables, and pairs.

d) Each cable link shall be labeled and verified to be in working order. The Contractor shall provide a verification sheet for each individual link and include the test data listed above each link, a table of test results, and shall be signed by the Contractor and provided as a PDF in CSAB.

e) All circuits shall be tested to ensure transmission capability of 100 megahertz. The test shall be conducted both ways from the outlets to the patch panel connections.

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The Contractor shall provide in CSAB a transmission verification test sheet recording the cable tested (the cable number), the test results, the date of the test, and the initials of the testing personnel. The Contractor shall submit data on the test equipment being used to the DMS Product Manager prior to commencing tests.

f) Testing shall confirm the Category 5e permanent links shall meet the following transmission characteristics:

Frequency (MHz)	Maximum Insertion loss (dB) @ 20°C	Minimum NEXT loss (dB)	Minimum ACRF (dB)	Minimum PSACRF (dB)	Minimum PSNEXT (dB)
1.0	2.1	60.0	58.6	55.6	57.0
4.0	3.9	54.8	46.6	43.6	51.8
8.0	5.5	50.0	40.6	37.5	47.0
10.0	6.2	48.5	38.6	35.6	45.5
16.0	7.9	45.2	34.5	31.5	42.2
20.0	8.9	43.7	32.6	29.6	40.7
25.0	10.0	42.1	30.7	27.7	39.1
31.25	11.2	40.5	28.7	25.7	37.5
62.5	16.2	35.7	22.7	19.7	32.7
100.0	21.0	32.3	18.6	15.6	29.3

g) Testing shall confirm the Category 6 permanent links shall meet the following transmission characteristics:

Frequency (MHz)	Maximum Insertion loss (dB) @ 20°C	Minimum NEXT loss (dB)	Minimum ACRF (dB)	Minimum PSACRF (dB)	Minimum PSNEXT (dB)
1.0	1.9	65	64.2	61.2	62.0
4.0	3.5	64.1	52.1	49.1	61.8
8.0	5.0	59.4	46.1	43.1	57.0
10.0	5.5	57.8	44.2	41.2	55.5
16.0	7.0	54.6	40.1	37.1	52.2
20.0	7.9	53.1	38.2	35.2	50.7
25.0	8.9	51.5	36.2	33.2	49.1
31.25	10.0	50.0	34.3	31.3	47.5
62.5	14.4	45.1	28.3	25.3	42.7
100.0	18.6	41.8	24.2	21.2	39.3
200.0	27.4	36.9	18.2	15.2	34.3
250.0	31.1	35.3	16.2	13.2	32.7

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h) The Category 6a permanent links shall meet the following transmission characteristics:

Frequency (MHz)	Maximum Insertion loss (dB) @ 20°C	Minimum NEXT loss (dB)	Minimum ACRF (dB)	Minimum PSACRF (dB)	Minimum PSNEXT (dB)
1.0	1.9	65	64.2	61.2	62
4.0	3.5	64.1	52.1	49.1	61.8
8.0	5.0	59.4	46.1	43.1	57.0
10.0	5.5	57.8	44.2	41.2	55.5
16.0	7.0	54.6	40.1	37.1	52.2
20.0	7.8	53.1	38.2	35.2	50.7
25.0	8.8	51.5	36.2	33.2	49.1
31.25	9.8	50.0	34.3	31.3	47.5
62.5	14.0	45.1	28.3	25.3	42.7
100.0	18.0	41.8	24.2	21.2	39.3
200.0	26.1	36.9	18.2	15.2	34.3
250.0	29.50	35.3	16.2	13.2	32.7
300	32.7	34.0	14.6	11.6	31.4
400	38.4	29.9	12.1	9.1	27.1
500	43.8	26.7	10.2	7.2	23.8

i) The testers shall meet TIA – 1152 accuracy level.

11.38.7 Fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in the proposal or Project/MAC specifications. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system, subject to the following:

a) Testing shall be in accordance with TIA-526-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant for multimode fiber; and TIA-526-7 Optical Power Loss Measurements of Installed Single-mode Fiber Plant for single-mode fiber.

b) Each fiber shall undergo a power meter test at 850 nanometers and 1300 nanometers for multimode at 1310 nanometers and 1500 nanometers for single-mode and a high-resolution Optical Time Domain Reflectometer (OTDR) test. Horizontal and backbone fiber links less than 300 feet in length shall not require an OTDR test. Each fiber strand tested is to be recorded in a log with the Project/MAC information, fiber number, date test was performed, attenuation in decibels, and the initials of the technician who tested the fiber.

c) The OTDR tester shall meet TIA – 1152 accuracy level and provide precise, automated fiber analysis software with automatic loss mode and cursor functions.

d) The Contractor shall notify the Project Contact and DMS Product Manager no less than five (5) days prior to commencing fiber optic cable testing. The DMS Product Manager may elect to be present for and witness fiber optic cable testing. The Contractor shall record all test procedures and setup parameters, including test jumper

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length and loss, and include this information with test documentation.

e) If the power meter or OTDR test results, in the judgment of the Project Contact or DMS Product Manager, indicate excessive power loss, the Contractor shall re-polish the fiber, clean the fiber, clean the connector, replace the connector, or replace the affected cable(s) as required to achieve specified performance levels. The cable shall be retested to verify system compliance after the corrective measures are complete.

f) The fiber attenuation characteristic shall not exceed the maximum loss allowable for all components in the link. Maximum loss allowable = (allowable cable loss per kilometer (as stated in TIA -526-14A and TIA-526-7) multiplied by the kilometers of fiber link) plus (0.4 decibels multiplied by the number of connectors) plus (0.3 decibels multiplied by the number of splices).

g) Cable Acceptance: The Contractor shall evaluate the continuity and quality of the cable both on the reel and installed. The Contractor shall use an OTDR to:

   a. Measure normalized fiber loss in decibels per kilometer at 850 nanometers for multimode and 1310 nanometers for single mode.
   b. Detect point faults or discontinuities caused by poor handling during shipping or installation.
   c. Measure overall length.

h) Splice and Connector Loss: The Contractor shall measure and document the losses of individual splices and connectors.

i) Documentation: Printed copies of OTDR traces provide proof of actual system integrity and performance. A trace of the entire length of fiber shall be documented for Customer cable acceptance, maintenance, and system upgrades.

j) Cable Route Diagram: The cable route shall provide locations and routes of "as-built" cable plant and include:

   a. End points
   b. Fiber routing
   c. Splice points
   d. Patch panels
   e. Termination connector type
   f. Cable lengths, including slack

k) Troubleshooting and Fault Location: All fiber backbone cable runs shall be documented as installed with an OTDR for initial cable acceptance. Signature traces of the system shall include a record of:
   a. Wavelength
   b. Fiber type
   c. Fiber and cable number
   d. Measurement direction
   e. Test equipment model and serial numbers
   f. Date of testing
   g. Reference setup, including refraction index
   h. Operator (crew members)

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11.38.8 The Contractor shall provide cable records for cable data, which include the following:

a) Part number
b) Reel or serial number, if available
c) Fiber type
d) Attenuation specifications
e) Bandwidth specifications

11.38.9 The Contractor shall test each coaxial cable for ground, shorts, leakage, radio frequency pickup, continuity, and attenuation and shall check each cable for correct termination. The Contractor shall verify proper grounding at service entrance and at all surge suppression devices. The Contractor shall test each wall tap to verify correct signal strength. The Contractor shall document results of testing and submit to the DMS Product Manager for review and approval. The test log shall include the outlet identifier, the test date, the initials of the technician who tested the cable, and the test results.

11.38.10 The Contractor shall perform a Cumulative Leakage Index (CLI) test on the completed system utilizing industry standard test equipment. Leakage shall be no more than allowed by FCC rules and regulations. The Contractor shall document results of testing and submit to the DMS Product Manager for review and approval. The test results shall include documentation on the instrumentation used, the test date, the name of the technician who performed the test, and the test results, compared to the applicable FCC rules and regulations.

11.38.11 The Contractor shall conduct proof of performance of the system in the presence of the DMS Product Manager or the Project Contact. The Contractor shall supply all applicable test equipment. Any equipment or material not meeting specifications shall be remedied or replaced by the Contractor with other equipment to the satisfaction of the Project Contact. These tests shall be conducted after the Contractor has adjusted the system to its satisfaction. The Project Contact reserves the right to conduct any test in addition to those prescribed in this specification.

11.39 Prohibited Materials—Asbestos

Per section 255.40, Florida Statutes, the use of asbestos or asbestos-based fiber materials is prohibited in any buildings where the construction has commenced after September 30, 1983, which is financed with public funds or is constructed for the express purpose of being leased to any governmental entity. No asbestos or asbestos-based fiber materials are allowed under this Contract.

11.40 The Contractor will meet the following requirements regarding Cabling:

11.40.1 **Copper Cabling**

The copper cable distribution system shall be aerial, direct buried, underground, or any combination thereof, as required by the specific project. Copper cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced at no cost to the Customer. For all copper cabling, the Contractor shall use cable from a cable manufacturer that is ISO-9001 certified.

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11.40.2 **Aerial Copper Cable**

Aerial air core copper cable shall be self-supporting with an integral support messenger or lashed cable consisting of plastic-insulated solid conductors covered by a plastic core wrap and surrounded by an inner polyethylene jacket, a corrugated aluminum shield, a corrugated steel wrap, and a bonded ultraviolet resistant polyethylene jacket. The cable shall meet the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.3 **Plenum Copper Cable**

Plenum rated copper cable shall be certified to conform to NFPA 262, communications metallic plenum (CMP) and shall be marked as such. The plenum cable shall be composed of 22 to 24-gauge bare solid copper conductors insulated with foam fluorinated ethylene propylene (FEP). The insulated conductors are twisted into pairs and jacketed with low smoke, flame-retardant polyvinyl chloride (PVC). The cable shall meet the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.4 **Riser Copper Cable**

Riser rated copper cable shall be certified to conform to UL-1666, communications riser cable (CMR), and IEC 332-1 and shall be marked as such. The non-plenum cable shall be composed of 22 to 24 gage bare solid copper conductors insulated with polyethylene or polyolefin (PE) covered by a PVC jacket and placed in a conduit as required. The PVC sheath shall have improved frictional properties, allowing it to be pulled through a conduit without the use of lubricants. The cable shall meet the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.5 **Outside Plant Copper Cable**

Outside plant copper cables shall be composed of 22 to 24 gage solid bare copper conductors individually insulated with polyethylene. The outside plant fiber cable shall have water blocking technology to prevent the migration of water throughout the cable and jacketed with UV resistant polyethylene. The cable shall meet the requirements of TIA 568-C2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.6 **Category 5e Copper Cable**

The minimum rating of the Category 5e data wiring, distribution system and all support apparatus shall be a minimum of 100-megahertz frequency. All Category 5e U/UTP copper cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated and sheathed with an outer jacket. All Category 5e copper cable shall be capable of being used for plenum, non-plenum, riser, and outside plant and meet or exceed the following requirements:

11.40.6.1 All Category 5e cable shall conform to the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.6.2 Applications include IEEE 802.3 10 Base-T at 10 megabits per second, IEEE 802.3 100 Base-TX at 100 megabits per second, IEEE 802.3 1000 Base-T 1 gigabits per second, and 155 megabits per second ATM.

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11.40.6.3 Each sheath shall contain four (4) unshielded copper pairs. Each pair shall have a different twist ratio per foot.

11.40.6.4 All Category 5e cables shall meet the following representative electrical and transmission characteristics:

Frequency megahertz	Maximum Insertion loss decibels	Minimum NEXT loss decibels	Minimum PSNEXT loss decibels	Minimum ACRF decibels	Minimum PSACRF decibels
1.0	2.0	65.3	62.3	63.8	60.8
4.0	4.1	56.3	53.3	51.8	48.8
8.0	5.8	51.8	48.8	45.7	42.7
10.0	6.5	50.3	47.3	43.8	40.8
16.0	8.2	47.3	44.2	39.7	36.7
20.0	9.3	45.8	42.8	37.8	34.8
25.0	10.4	44.3	41.3	35.8	32.8
31.25	11.7	42.9	39.9	33.9	30.9
62.5	17.0	38.4	35.4	27.9	24.9
100	22.0	35.3	32.3	23.8	20.8

Mutual Capacitance 5.6 nanofarads (Nf) per 100 meters at 1 kilohertz
DC Resistance Maximum 9.38 Ohms per 100 meters

11.40.7 **Category 5e- 25 Pair High Speed Data Tie Copper Cable**

The minimum rating of the Category 5e data wiring, distribution system and all support apparatus shall be a minimum of 100-megahertz frequency. All Category 5e U/UTP copper cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated and sheathed with an outer jacket. All Category 5e copper cable shall be capable of being used for plenum, non-plenum, riser, and outside plant and meet or exceed the following requirements:

11.40.7.1 All Category 5e cable shall conform to the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.7.2 Applications include IEEE 802.3 10Base-T at 10 megabits per second, IEEE 802.3 100 Base-TX at 100 megabits per second, IEEE 802.3 1000 Base-T 1 gigabits per second, and 155 megabits per second ATM.

11.40.7.3 Each cable shall contain 25 unshielded copper pairs. Installed in tight sub-units to meet power sum NEXT and swept insertion loss requirements. The insulated conductors shall be twisted into pairs and stranded into mini units. Each pair shall have a different twist ratio per foot.

11.40.7.4 All Category 5e cables shall meet the following representative electrical and transmission characteristics:

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Frequency megahertz	Maximum Insertion loss decibels	Minimum NEXT loss decibels	Minimum PSNEXT loss Decibels	Minimum ACRF decibels	Minimum PSACRF decibels
1.0	2.0	65.3	62.3	63.8	60.8
4.0	4.1	56.3	53.3	51.8	48.8
8.0	5.8	51.8	48.8	45.7	42.7
10.0	6.5	50.3	47.3	43.8	40.8
16.0	8.2	47.3	44.2	39.7	36.7
20.0	9.3	45.8	42.8	37.8	34.8
25.0	10.4	44.3	41.3	35.8	32.8
31.25	11.7	42.9	39.9	33.9	30.9
62.5	17.0	38.4	35.4	27.9	24.9
100	22.0	35.3	32.3	23.8	20.8

Mutual Capacitance 5.6 nanofarads per 100 meters at 1 kilohertz
DC Resistance Maximum 9.38 Ohms per 100 meters

11.40.8 **Category 6 Copper Cable**

11.40.8.1 All Category 6 Foiled Twisted Pair (U/FTP) copper cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated, the pairs individually shielded with foil and sheathed with an outer jacket.

11.40.8.2 All Category 6 Foiled Unshielded Twisted Pair (F/UTP) copper cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated, with an overall foil sheath, and sheathed with an outer jacket.

11.40.8.3 All Category 6 Screened Foiled Twisted Pair (S/FTP) copper cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated, the pairs individually shielded with foil, with an overall braided screen sheath, and sheathed with an outer jacket.

11.40.8.4 All Category 6 copper cable shall be capable of being used for plenum, non-plenum, riser, and outside plant.

11.40.8.5 All Category 6 copper cable shall meet or exceed the following requirements:

a) All Category 6 copper cable shall conform to the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

b) Applications include IEEE 802.3 10 Base-T at 10 megabits per second, IEEE 802.3 100 Base-TX at 100 megabits per second, IEEE 802.3 1000 Base-T 1 gigabits per second, TIA/EIA-854 1000 Base-TX at 1 gigabits per second, and 155 megabits per second ATM.

c) Each sheath shall contain four unshielded copper pairs. Each pair

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shall have a different twist ratio per foot.

11.40.8.6 All Category 6 copper cables shall meet the following representative electrical and transmission characteristics:

Frequency megahertz	Maximum Insertion loss decibels per 100 meters	Minimum Pair to Pair NEXT loss decibels	Minimum PSNEXT loss decibels	Minimum ACRF decibels	Minimum PSACRF decibels
1.0	2.0	74.3	72.3	67.8	64.8
4.0	3.8	65.3	63.3	55.8	52.8
8.0	5.3	60.8	58.8	49.7	46.7
10.0	6.0	59.3	57.3	47.8	44.8
16.0	7.6	56.2	54.2	43.7	40.7
20.0	8.5	54.8	52.8	41.8	38.8
25.0	9.5	53.3	51.3	39.8	36.8
31.25	10.7	51.9	49.9	37.9	34.9
62.5	15.4	47.4	45.4	31.9	28.9
100	19.8	44.3	42.3	27.8	24.8
200	29.0	39.8	37.8	21.8	18.8
250	32.8	38.3	36.3	19.8	16.8

Mutual Capacitance 5.6 nanofarads per 100 meters at 1 kilohertz
DC Resistance Maximum 9.38 Ohms per 100 meters

11.40.9 **Category 6a Copper Cable**

11.40.9.1 The minimum rating of the Category 6a data wiring, distribution system and all support apparatus shall be a minimum of 500-megahertz frequency. All Category 6a U/UTP copper cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated and sheathed with an outer jacket.

11.40.9.2 All Category 6a U/FTP cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated, the pairs individually shielded with foil and sheathed with an outer jacket.

11.40.9.3 All Category 6a F/UTP cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated, with an overall foil sheath, and sheathed with an outer jacket.

11.40.9.4 All Category 6a S/FTP cables shall be round and consist of 24 AWG solid bare copper conductors individually insulated, the pairs individually shielded with foil, with an overall braided screen sheath, and sheathed with an outer jacket.

11.40.9.5 All Category 6a copper cable shall be capable of being used for plenum, non-plenum, riser, and outside plant.

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11.40.9.6 All Category 6a copper cables shall meet or exceed the following requirements:

11.40.9.6.1 All Category 6a copper cable shall conform to the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.40.9.6.2 Applications include IEEE 802.3 10Base-T at 10 megabits per second, IEEE 802.3 100 Base-TX at 100 megabits per second, IEEE 802.3 1000 Base-T 1 gigabits per second, TIA/EIA-854 1000 Base-TX at 1 gigabits per second, IEEE 802.3 10 GBase-T at 10 gigabits per second, and 155 megabits per second ATM.

11.40.9.6.3 Each sheath shall contain four unshielded copper pairs. Each pair shall have a different twist ratio per foot.

11.40.9.7 All Category 6a copper cables shall meet the following representative electrical and transmission characteristics:

Frequency **megahertz**	**Maximum Insertion loss** **decibels per 100 meters**	**Minimum Pair to Pair NEXT loss** **decibels**	**Minimum PSNEXT loss** **decibels**	**Minimum ACRF** **decibels**	**Minimum PSACRF** **decibels**
1.0	2.1	74.3	72.3	67.8	64.8
4.0	3.8	65.3	63.3	55.8	52.8
8.0	5.3	60.8	58.8	49.7	46.7
10.0	5.9	59.3	57.3	47.8	44.8
16.0	7.5	56.2	54.2	43.7	40.7
20.0	8.4	54.8	52.8	41.8	38.8
25.0	9.4	53.3	51.3	39.8	36.8
31.25	10.5	51.9	49.9	37.9	34.9
62.5	15.0	47.4	45.4	31.9	28.9
100	19.1	44.3	42.3	27.8	24.8
200	27.6	39.8	37.8	21.8	18.8
250	31.1	38.3	36.3	19.8	16.8
300	34.3	37.1	35.1	18.3	15.3
400	40.1	35.3	33.3	15.8	12.8
500	45.3	33.8	31.8	13.8	10.8

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Mutual Capacitance	5.6 nanofarads per 100 meters at 1 kilohertz
DC Resistance Maximum	9.38 Ohms per 100 meters

11.41 The Contractor will meet the following requirements regarding Patch Cords, Patch Panels, and Modular Jacks:

11.41.1 **Category 5e, 6, and 6a Modular Patch Cords**

The Category 5e, 6 and 6a patch cords shall be 100 percent factory assembled and tested for each modular patch panel jack. Cable shall be sized for the longest cross connects and installed in accordance with a schedule developed by the installation Contractor. The length of the patch cable shall not exceed 25 feet. The Contractor shall provide color coded boot assemblies to match the Project Contact's requirements.

11.41.1.1 All Category 5e, 6, or 6a patch cords shall be round, and consist of 24 AWG copper, stranded conductors insulated with high density polyethylene, tightly twisted into individual pairs and jacketed with flame retardant PVC and shall meet or exceed the specifications listed below:

a) Plug insertion life - minimum 750 plug insertions
b) Plug Retention Force - 110 newton minimum between modular plug and jack

11.41.1.2 All Category 5e, 6, and 6a patch cord cables shall conform to the requirements of TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards and shall meet the electrical and transmission characteristics therein.

11.41.1.3 All Category 5e, 6, and 6a patch cord cables shall meet the requirements of Category 5e, 6, and 6a copper cables in SOW section 11.47, 11.49, and 11.50 respectively.

11.41.1.4 All Category 5e, 6, or 6a patch cords shall have built-in exclusion features to prevent accidental polarity reversals and split pairs.

11.41.1.5 For all Category 5e, 6, or 6a patch cords, the Contractor shall use patch cords from a manufacturer that is ISO-9001 certified.

11.41.1.6 The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. The Contractor will replace all damaged cable at no extra cost to the Customer.

11.41.2 **Category 5e, 6, 6a and 8 Patch Panels with 110 Termination**

All Category 5e, 6, 6a and 8 patch panels with 110 termination shall have eight wires, 8-position modular jacks (RJ-45) with 110 terminations on the rear for connection of station cables. The Category 5e, 6, 6a and 8 copper cables to the outlets will be directly connected to 110 insulation displacement hardware associated with each jack on the patch panel. These patch panels will be designed to operate at a minimum of 100, 250, 500 and 2000 MHz for Category 5e, 6, 6a and 8 patch panels respectively. Modular jack quantities sufficient for all positions

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of every outlet are required.

11.41.2.1 The patch panel shall be a Category 5e, 6, 6a and 8 modular jack panel with the following characteristics:

a) The patch panel will utilize a 110-insulation displacement connector field on the back of the panel to terminate the horizontal cables. The 110 field is to remain continuous to the 8-pin modular jack field in the front of the panel.

b) The cross-connect patch panel shall meet TIA 568-C.2 and TIA 568-C.2-1 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

11.41.2.2 The Category 5e patch panels shall be approved to work in all applications up to 100 megahertz.

11.41.2.3 The Category 5e patch panels shall meet or exceed the following representative electrical and transmission characteristics:

Frequency **megahertz**	**Maximum Insertion loss** **Decibels**	**Minimum NEXT loss** **decibels**	**Minimum FEXT loss** **decibels**
1.0	0.10	65.0	65.0
4.0	0.10	65.0	63.1
8.0	0.11	64.9	57.0
10.0	0.13	63.0	55.1
16.0	0.16	58.9	51.0
20.0	0.18	57.0	49.1
25.0	0.20	55.0	47.1
31.25	0.22	53.1	45.2
62.5	0.32	47.1	39.2
100.	0.40	43.0	35.1

11.41.2.4 The Category 6 patch panels shall be approved to work in all applications up to 250 megahertz.

11.41.2.5 The Category 6 patch panels shall meet or exceed the following representative electrical and transmission characteristics:

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Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
1.0	0.10	75.0	75.0
4.0	0.10	75.0	71.1
8.0	0.10	75.0	65.0
10.0	0.10	74.0	63.1
16.0	0.10	69.9	59.0
20.0	0.10	68.0	57.1
25.0	0.10	66.0	55.1
31.25	0.11	64.1	53.2
62.5	0.16	58.1	47.2
100	0.20	54.0	43.1
200	0.28	48.0	37.1
250	0.32	46.0	35.1

11.41.2.6 The Category 6a patch panels shall be approved to work in all applications up to 500 megahertz.

11.41.2.7 The Category 6a patch panels shall meet or exceed the following representative electrical and transmission characteristics:

Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
1.0	0.10	75.0	75.0
4.0	0.10	75.0	71.1
8.0	0.10	75.0	65.0
10.0	0.10	74.0	63.1
16.0	0.10	69.9	59.0
20.0	0.10	68.0	57.1
25.0	0.10	66.0	55.1
31.25	0.11	64.1	53.2
62.5	0.16	58.1	47.2
100	0.20	54.0	43.1
200	0.28	48.0	37.1
250	0.32	46.0	35.1
300	0.35	42.9	33.6
400	0.40	37.9	31.1
500	0.45	34.0	29.1

11.41.3 Category 5e, 6, 6a and 8 Blank Face Patch Panels

The blank patch panels shall have blank faces with cutouts that accept Category 5e, 6, 6a and 8 snap-in modular jacks. These blank face patch panels, when populated, will be designed to operate at a minimum of 100, 250, and 500 megahertz for Category 5e, 6, 6a and 8 respectively. Modular jack quantities sufficient for all positions of every outlet are required.

11.41.3.1 The blank face patch panels shall be Category 5e, 6, 6a and 8 and shall meet TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling

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and Components Standards.

11.41.3.2 The Category 5e blank face patch panels shall be approved to work in all applications up to 100 megahertz and shall meet or exceed the electrical and transmission characteristics contained herein.

11.41.3.3 The Category 6 blank face patch panels shall be approved to work in all applications up to 250 megahertz and shall meet or exceed the electrical and transmission characteristics contained herein.

11.41.3.4 The Category 6a blank face patch panels shall be approved to work in all applications up to 500 megahertz jacks shall meet or exceed the electrical and transmission characteristics contained herein.

11.41.3.5 All Category 8 blank face patch panels shall be approved to work in all applications up to 2 gigahertz and shall meet or exceed the electrical and transmission characteristics contained herein.

11.41.4 Category 5e Modular Jacks

The Category 5e modular jacks shall meet or exceed the following standards:

11.41.4.1 TIA 568-C Commercial Building Wiring Standard

11.41.4.2 The Category 5e modular jacks shall meet the following electrical performance and certification requirements:

a) Insulation resistance: 500 megaohms
b) Dielectric: withstand 1500 VAC RMS, minimum, contact to contact 1000 VAC RMS, 60 hertz minimum to exposed conductive surface
c) Contact Resistance: 20 megaohms maximum
d) Current Rating: 1.5 amps at 20 degrees Celsius

11.41.4.3 The Category 5e modular jacks shall meet the following physical requirements:

Connectors shall accept 22 to 24-gauge AWG solid conductor wire as applicable. Jack wires shall be square copper alloy wires with 50 micro-inch lubricated gold plating over 100 micro-inch nickel plate, high impact, flame retardant UL-rated 94V-0 thermoplastic.

11.41.4.4 The Category 5e modular jacks shall meet the following mechanical requirements:

Plug insertion life:	minimum 750 plug insertions
Contact Force:	100 grams minimum using FCC-approved modular plugs
Plug Retention Force:	30 pound-force (133 newtons) minimum between modular plug and jack
Temperature Range:	negative 40 degrees Fahrenheit to 150 degrees Fahrenheit

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11.41.4.5 The Category 5e modular jacks shall be approved to work in all applications up to 100 megahertz.

Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
1.0	0.10	65.0	65.0
4.0	0.10	65.0	63.1
8.0	0.11	64.9	57.0
10.0	0.13	63.0	55.1
16.0	0.16	58.9	51.0
20.0	0.18	57.0	49.1
25.0	0.20	55.0	47.1
31.25	0.22	53.1	45.2
62.5	0.32	47.1	39.2
100	0.40	43.0	35.1

11.41.5 **Category 6 Modular Jacks**

The Category 6 modular jacks shall meet or exceed the following standards:

11.41.5.1 TIA 568-C Commercial Building Wiring Standard

11.41.5.2 The Category 6 modular jacks shall meet the following physical requirements:

Connectors accepting 22 to 24-gauge AWG solid conductor wire as applicable. Jack wires shall be square copper alloy wires with 50 micro-inch lubricated gold plating over 100 micro-inch nickel plate, high impact, and flame retardant UL-rated 94V-0 thermoplastic.

11.41.5.3 The Category 6 modular jacks shall meet the following mechanical requirements:

Plug insertion life:	minimum 750 plug insertions
Contact Force:	100 grams minimum using FCC-approved modular plugs
Plug Retention Force:	133 newtons minimum between modular plug and jack
Temperature Range:	negative 40 degrees Fahrenheit to 150 degrees Fahrenheit

The Category 6 modular jack shall be approved to work in all applications up to 250 MHz.

Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
1.0	0.10	75.0	75.0
4.0	0.10	75.0	71.1
8.0	0.10	75.0	65.0

Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
10.0	0.10	74.0	63.1
16.0	0.10	69.9	59.0
20.0	0.10	68.0	57.1
25.0	0.10	66.0	55.1
31.25	0.11	64.1	53.2
62.5	0.16	58.1	47.2
100	0.20	54.0	43.1
200	0.28	48.0	37.1
250	0.32	46.0	35.1

11.41.6 **Category 6 Modular Jacks**

The Category 6a modular jacks shall meet or exceed the following standards:

11.41.6.1 TIA 568-C Commercial Building Wiring Standard

11.41.6.2 The Category 6 modular jacks shall meet the following physical requirements:

Connectors accepting 22 to 24-gauge AWG solid conductor wire as applicable. Jack wires shall be square copper alloy wires with 50 micro-inch lubricated gold plating over 100 micro-inch nickel plate, high impact, and flame retardant UL-rated 94V-0 thermoplastic.

11.41.6.3 The Category 6 modular jacks shall meet the following mechanical requirements:

Plug insertion life:	minimum 750 plug insertions
Contact Force:	100 grams minimum using FCC-approved modular plugs
Plug Retention Force:	133 newtons minimum between modular plug and jack
Temperature Range:	negative 40 degrees Fahrenheit to 150 degrees Fahrenheit

11.41.6.4 The Category 6 modular jack shall be approved to work in all applications up to 500 megahertz.

Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
1.0	0.10	75.0	75.0
4.0	0.10	75.0	71.1
8.0	0.10	75.0	65.0
10.0	0.10	74.0	63.1

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Frequency megahertz	Maximum Insertion loss Decibels	Minimum NEXT loss decibels	Minimum FEXT loss decibels
16.0	0.10	69.9	59.0
20.0	0.10	68.0	57.1
25.0	0.10	66.0	55.1
31.25	0.11	64.1	53.2
62.5	0.16	58.1	47.2
100	0.20	54.0	43.1
200	0.28	48.0	37.1
250	0.32	46.0	35.1
300	0.35	42.9	33.6
400	0.40	37.9	31.1
500	0.45	34.0	29.1

8.41.7.5 The Category 8 modular jack shall be approved to work in all applications up to 2 gigahertz and must meet the ANSI/TIA 568C.2-1 requirements.

11.42 The Contractor will meet all requirements below with regard to Fiber Cables, Connections and Terminations:

11.42.1 **Optical Fiber Cable**

The optical fiber cable distribution system shall be aerial, buried, underground, or any combination thereof, as required by the specific project. All optical fiber cable shall meet the following requirements:

11.42.1.1 All optical fiber cable shall conform to the requirements of TIA 568-C.3 Optical Fiber Cabling Components.

11.42.1.2 The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, including but not limited to: plenum, non-plenum, riser, armored or outside plant.

11.42.1.3 Cable manufacturer shall be ISO-9001 certified.

11.42.1.4 The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

11.42.1.5 All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of the specification. All fibers in the cable must be usable.

11.42.1.6 All fibers in the cable shall meet the industry standard for maximum attenuation and minimum bandwidth. Cables that state attenuation and bandwidth as average or nominal values are unacceptable. All optical fibers shall be 100 percent attenuation tested. The attenuation of each fiber shall be provided with each cable reel. The attenuation shall be measured at 850 nanometers and 1300 nanometers for multimode

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fibers and 1310 nanometers and 1550 nanometers for single-mode fibers.

11.42.2 **Plenum Fiber Cable**
Plenum rated fiber cable shall be certified to conform to NFPA 262 and be optical fiber nonconductive plenum (OFNP) rated.

11.42.3 **Riser Fiber Cable**
Riser rated fiber cable shall be certified to conform to UL-1666 and be optical fiber nonconductive riser (OFNR) rated.

11.42.4 **Outside Plant Fiber Cable**
Outside plant fiber cable shall have a medium-density polyethylene jacket to provide durability and superior protection against ultraviolet radiation, fungus, and abrasions. The outside plant fiber cable shall have water blocking technology to prevent the migration of water throughout the cable. Outside Plant fiber cable shall have minimum pull strength of 260 newtons (600 pound-force). Outside Plant fiber cable shall support a bend radius of 10 times the cable outside diameter when not subject to tensile load, and 20 times the cable outside diameter when subject to tensile loading up to the cable's rated limit.

11.42.5 **Indoor/Outdoor Fiber Cable**
The indoor/outdoor fiber cable shall be suitable for both riser and campus distribution applications. The fiber cable shall comply with the water-blocking requirement of TIA/EIA 455-82. Indoor/outdoor fiber cable shall have minimum pull strength of 260 newtons (600 pound-force). Indoor/outdoor fiber cable shall support a bend radius of 10 times the cable outside diameter when not subject to tensile load, and 20 times the cable outside diameter when subject to tensile loading up to the cable's rated limit.

11.42.6 **Indoor/Outdoor (Tight Buffer) Fiber Cable**
The tight buffer fiber cable shall be engineered to provide a superior operating environment for optimum fiber performance. Cable shall be a dry type swell-able cable waterblocking or a gel-filled or flooded technology. Tight buffer fiber cable shall meet the following specifications:

11.42.6.1 Buffer

The coated fiber shall have a low friction slip layer placed between the acrylate coating of the optical fiber and the thermoplastic buffer.

The fiber coating and buffer shall each be removable with commercially available stripping tools in a single pass for connector termination or splicing.

Both buffer tubes and fibers shall be individually color-coded for easy identification. Every cable shall be clearly marked for ease of identification.

11.42.6.2 Strength Yarns

The fibers shall be stranded around a dielectric strength element consisting of water blocking aramid strength yarns. The strength yarns shall be water swell-able to prevent the migration of water throughout

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the cable. The water blocking element shall be non-nutritive to fungus, electrically non-conductive, and homogenous. The purpose of the strength element is to provide tensile strength. The aramid yarns shall be helically stranded evenly around the buffered fibers.

Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking and dielectric with low shrinkage. Non-toxic and non-irritant talc shall be applied to the yarns to allow them to be easily separated from the fibers and the outer jacket.

11.42.6.3 Jacket

Cables shall be sheathed with flame-retardant polyvinyl chloride (PVC). The PVC shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The cable shall contain at least one ripcord under the sheath for easy sheath removal.

The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. Jackets extruded under high pressure are not acceptable.

The jacket or sheath shall be marked with the Manufacturer's name, the year of manufacture, the sequential meter or foot markings, fiber count, fiber type, flame rating and listing marking. The markings shall be repeated at least every one (1) meter. The actual length of the cable shall be within plus or minus one percent of the length marking. The marking shall be in a contrasting color to the cable jacket. The height of the marking shall be approximately 2.5 millimeters.

11.42.6.4 Armor

Armored tight buffered fiber cables shall include an interlocking aluminum armor applied helically around the outside of the cable jacket. The interlocking armor may be left un-jacketed or may have a PVC outer jacket. The armor for these cables shall be comparable to liquid tight flexible metal conduit if jacketed or flexible metal conduit if not jacketed.

11.42.6.5 Temperature

The installation temperature range for the tight buffered fiber cable shall be 0 degrees Celsius to 60 degrees Celsius for plenum cables and negative 10 degrees Celsius to 60 degrees Celsius for riser cable. The operating temperature range for the cable shall be negative 40 degrees Celsius to 70 degrees Celsius.

11.42.7 **Loose Tube Fiber Cable Construction**

The loose tube fiber cable shall be engineered to provide a superior operating environment for optimum fiber performance. Fibers shall be placed in buffer tubes and suspended in a filling compound that mechanically decouples the fiber from the cable

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structure. Fiber cable shall be a dry type swell-able cable waterblocking or a gel-filled or flooded technology. Loose tube fiber cable shall meet the following specifications:

11.42.7.1 Buffer Tubes

Optical fiber shall be placed inside a 2.5-millimeter outer diameter loose buffer tube. Each buffer tube shall contain up to 12 fibers. The fibers shall not adhere to the inside of the buffer tube.

The cable shall utilize a highly reliable loose buffer tube design that shall contain multiple fibers within a buffer tube several times larger in diameter than the fibers. The extra space shall effectively isolate the fibers from the effects of tension and temperature felt by the cable, ensuring stable optical performance over a wide range of conditions.

Buffer tubes shall be of a dual-layer construction with the inner layer made of polycarbonate and the outer layer made of polyester. Fillers shall be included in the cable core to lend symmetry to the cable cross-section where needed. Buffer tubes shall be stranded around a central member using the reverse oscillating, or "SZ," stranding process to provide maximum cable flexibility while minimizing fiber strain.

Each buffer tube shall contain a water blocking element for water-blocking protection. The water swell-able element shall be non-nutritive to fungus, electrically non-conductive, and homogenous. The buffer tubes shall be resistant to kinking. A one-meter length of un-aged cable shall withstand a one meter static head or equivalent continuous pressure of water for one hour without leakage through the open cable end.

Both buffer tubes and fibers shall be individually color coded for easy identification. Every cable shall be clearly marked for ease of identification.

11.42.7.2 Cable Core

The required number of buffer tubes containing 1 to 12 optical fibers in each tube, shall be stranded around a central member to form the cable core. The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod. The purpose of the central member is to provide tensile strength and prevent buckling of the cable.

The tensile strength shall be provided by the central member, and additional dielectric yarns as required. The dielectric yarns shall be helically stranded evenly around the cable core. Filler rods may be included as necessary to maintain the circularity of the cable core.

Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking and dielectric with low shrinkage.

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11.42.7.3 Jacket

Cables shall be sheathed with flame-retardant PVC. The PVC shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The cable shall contain at least one ripcord under the sheath for easy sheath removal.

The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. Jackets extruded under high pressure are not acceptable.

The jacket shall be marked with the Manufacturer's name, the year of manufacture, the sequential meter or foot markings, fiber count, fiber type, flame rating and listing marking. The markings shall be repeated at least every one (1) meter. The actual length of the cable shall be within plus or minus one percent of the length marking. The marking shall be in a contrasting color to the cable jacket. The height of the marking shall be approximately 2.5 millimeters.

11.42.7.4 Armor

Armored loose tube fiber cables shall include an interlocking aluminum armor applied helically around the outside of the cable jacket. The interlocking armor may be left un-jacketed or may have a PVC outer jacket. The armor for these cables shall be comparable to liquid tight flexible metal conduit if jacketed or flexible metal conduit if not jacketed.

11.42.7.5 Pulling Tension

The maximum pulling tension shall be 2700 newtons (600 pound-force) during installation (short term) and 810 newtons (180 pound-force) long term installed.

11.42.7.6 Temperature

The installation temperature range for the loose tube fiber cable shall be negative 10 degrees Celsius to 60 degrees Celsius. The operating temperature range for the cable shall be negative 40 degrees Celsius to 70 degrees Celsius.

11.42.8 **Multimode 62.5/125 micron Tight Buffer Fiber (OM1)**

The multimode fiber utilized in the cable specified herein shall meet EIA/TIA-492AAAA-A and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, including but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 62.5/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	3.4 decibels per kilometer
	minimum OFL bandwidth	200 megahertz-kilometer
	minimum Gigabit distance	300 meters

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1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	550 meters

The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	62.5/125 micron
Core Diameter:	62.5 plus or minus 2.5 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers
	242 micron coating plus or minus 5 micrometers

11.42.9 **Multimode 62.5/125 micron Loose Tube Fiber (OM1)**

The multimode fiber utilized in the cable specified herein shall meet EIA/TIA-492AAAA-A and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 62.5/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	3.4 decibels per kilometer
	minimum OFL bandwidth	200 megahertz-kilometer
	minimum Gigabit distance	300 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	550 meters

The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	62.5/125 micron
Core Diameter:	62.5 plus or minus 2.5 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers
	242 micron coating plus or minus 5 micrometers

11.42.10 **Multimode 50/125 micron Tight Buffer Fiber (OM2)**

The multimode fiber utilized in the cable specified herein shall meet TIA/EIA-492AAAB and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 50/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	2.8 decibels per kilometer
	minimum OFL bandwidth	700 megahertz-kilometer
	minimum Gigabit distance	750 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	600 meters

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The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	50/125 micron
Core Diameter:	50 plus or minus 2 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers 242 micron coating plus or minus 5 micrometers

11.42.11 **Multimode 50/125 micron Loose Tube Fiber (OM2)**

The multimode fiber utilized in the cable specified herein shall meet EIA/TIA-492AAAB and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 50/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	3.0 decibels per kilometer
	minimum OFL bandwidth	700 megahertz-kilometer
	minimum Gigabit distance	750 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	600 meters

The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	50/125 micron
Core Diameter:	50 plus or minus 2 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers 242 micron coating plus or minus 5 micrometers

11.42.12 **Multimode 50/125 micron Tight Buffer Fiber (OM3)**

The multimode fiber utilized in the cable specified herein shall meet TIA/EIA-492AAAC and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 50/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	2.8 decibels per kilometer
	minimum OFL bandwidth	1500 megahertz-kilometer
	minimum Gigabit distance	1000 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	600 meters

The multimode fiber utilized in the cable specified herein shall conform to the following

specifications:

Buffered Fiber:	50/125 micron
Core Diameter:	50 plus or minus 2 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers 242 micron coating plus or minus 5 micrometers

11.42.13 **Multimode 50/125 micron Loose Tube Fiber (OM3)**

The multimode fiber utilized in the cable specified herein shall meet EIA/TIA-492AAAC and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 50/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	3.0 decibels per kilometer
	minimum OFL bandwidth	1500 megahertz-kilometer
	minimum Gigabit distance	1000 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	600 meters

The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	50/125 micron
Core Diameter:	50 plus or minus 2 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers 242 micron coating plus or minus 5 micrometers

11.42.14 **Multimode 50/125 micron Tight Buffer Fiber (OM4)**

The multimode fiber utilized in the cable specified herein shall meet TIA/EIA-492AAAD and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 50/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	2.8 decibels per kilometer
	minimum OFL bandwidth	3500 megahertz-kilometer
	minimum Gigabit distance	1100 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	600 meters

The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	50/125 micron

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Core Diameter:	50 plus or minus 2 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers 242 micron coating plus or minus 5 micrometers

11.42.15 **Multimode 50/125 micron Loose Tube Fiber (OM4)**

The multimode fiber utilized in the cable specified herein shall meet TIA/EIA-492AAAD and IEC 60793-2-10. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The 50/125 micron multimode optical fiber shall meet the following optical characteristics:

850 nanometers:	maximum attenuation	3.0 decibels per kilometer
	minimum OFL bandwidth	3500 megahertz-kilometer
	minimum Gigabit distance	1100 meters
1300 nanometers:	maximum attenuation	1.0 decibels per kilometer
	minimum OFL bandwidth	500 megahertz-kilometer
	minimum Gigabit distance	600 meters

The multimode fiber utilized in the cable specified herein shall conform to the following specifications:

Buffered Fiber:	50/125 micron
Core Diameter:	50 plus or minus 2 micrometers
Core-to-Cladding Offset:	less than or equal to 1.5 micrometers
Fiber Dimensions:	125 micron cladding plus or minus 2 micrometers 242 micron coating plus or minus 5 micrometers

11.42.16 **Single-mode Tight Buffer Fiber**

The single-mode fiber utilized in the cable specified herein shall meet TIA/EIA-492CAAB. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The single-mode optical fiber shall meet the following optical characteristics:

1310 nanometers:	maximum attenuation	0.65 decibels per kilometer
	minimum Gigabit distance	5000 meters
1550 nanometers:	maximum attenuation	0.50 decibels per kilometer

The single-mode fiber utilized in the cable specified herein shall conform to the following specifications:

Core-to-Cladding Concentricity:	less than or equal to 0.5 micrometers
Cladding Non-circularity:	less than or equal to 0.7 percent
Fiber Dimensions:	125 micron cladding plus or minus 0.7 micrometers 245 micron coating plus or minus 5 micrometers
Zero Dispersion Wavelength:	1313 plus or minus 11 nanometers
Cable Cutoff Wavelength:	1260 nanometers

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11.42.17 Single-mode Loose Filled Fiber

The single-mode fiber utilized in the cable specified herein shall meet TIA/EIA-492CAAB and IEC 60793-2-50. The cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to, plenum, riser, armored, indoor/outdoor or outside plant. The single-mode optical fiber shall meet the following optical characteristics:

1310 nanometers:	maximum attenuation	0.4 decibels per kilometer
	minimum Gigabit distance	5000 meters
1550 nanometers:	maximum attenuation	0.30 decibels per kilometer

The single-mode fiber utilized in the cable specified herein shall conform to the following specifications:

Core-to-Cladding Concentricity:	less than or equal to 0.5 micrometers
Cladding Non-circularity:	less than or equal to 0.7 percent
Fiber Dimensions:	125 micron cladding plus or minus 0.7 micrometers
	245 micron coating plus or minus 5 micrometers
Zero Dispersion Wavelength:	1313 plus or minus 11 nanometers
Cable Cutoff Wavelength:	1260 nanometers

11.42.18 Fiber Patch Cables

Fiber connectors for the fiber patch cables shall match the fiber connector specifications specified herein. The patch cable fiber shall match the optical characteristics and specifications of the fiber cable specified herein.

11.42.19 ST Fiber Connector and Termination

The only approved method of fiber termination using a straight tip (ST) connector is one approved by the cable manufacturer for the specific cable supplied. The connector shall be installed on the fiber utilizing a manufacturer approved tool kit. This kit contains all tools and instructions to mount the connector quickly and easily, utilizing the manufacturer's installation procedures. The ST fiber connectors and terminations shall meet the following specifications:

11.42.19.1 Multimode

The only approved method of termination is as specified in TIA-568 C.3 Optical Fiber Cabling Components. The connector shall meet the following requirements:

Durability:	500 re-matings
Typical Insertion Loss:	0.2 decibels
Maximum Insertion Loss:	0.5 decibels
Maximum Temperature Cycling:	0.3 decibels

11.42.19.2 Single-mode

The only approved method of termination is as specified in TIA-568 C.3 Optical Fiber Cabling Components. The connector shall meet the following requirements:

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Durability:	500 re-matings
Typical Insertion Loss:	0.2 decibels
Maximum Insertion Loss:	0.5 decibels
Maximum Temperature Cycling:	0.3 decibels

11.42.20 SC Fiber Connector and Termination

The only approved method of fiber termination using a standard or subscriber connector (SC) is one approved by the cable manufacturer for the specific cable supplied. The connector shall be installed on the fiber utilizing a manufacturer approved tool kit. This kit contains all tools and instructions to mount the connector quickly and easily, utilizing the manufacturer's installation procedures. The SC fiber connectors and terminations shall meet the following specifications:

11.42.20.1 Multimode

The only approved method of termination is as specified in TIA-568 C.3 Optical Fiber Cabling Components. The connector shall meet the following requirements:

Durability:	500 re-matings
Typical Insertion Loss:	0.1 decibels
Maximum Insertion Loss:	0.5 decibels
Maximum Temperature Cycling:	0.3 decibels

11.42.20.2 Single-mode

The only approved method of termination is as specified in TIA-568 C.3 Optical Fiber Cabling Components. The connector shall meet the following requirements:

Durability:	500 re-matings
Typical Insertion Loss:	0.2 decibels
Maximum Insertion Loss:	0.5 decibels
Maximum Temperature Cycling:	0.3 decibels

11.42.21 LC Fiber Connector and Termination

The only approved method of fiber termination using a lucent connector (LC) is one approved by the cable manufacturer for the specific cable supplied. The connector shall be installed on the fiber utilizing a manufacturer approved tool kit. This kit contains all tools and instructions to mount the connector quickly and easily, utilizing the manufacturer's installation procedures. The LC fiber connectors and terminations shall meet the following specifications:

11.42.21.1 Multimode

The only approved method of termination is as specified in TIA-568 C.3 Optical Fiber Cabling Components. The connector shall meet the following requirements:

Durability:	500 re-matings
Typical Insertion Loss:	0.1 decibels
Maximum Insertion Loss:	0.5 decibels
Maximum Temperature Cycling:	0.3 decibels

11.42.21.2 Single-mode

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The only approved method of termination is as specified in TIA-568 C.3 Optical Fiber Cabling Components. The connector shall meet the following requirements:

Durability:	500 re-matings
Typical Insertion Loss:	0.2 decibels
Maximum Insertion Loss:	0.5 decibels
Maximum Temperature Cycling:	0.3 decibels

11.42.22 Optical Fiber Cable Interconnect Cabinet

All fiber cables will be terminated at the Customer's telecommunication room sites in fiber interconnect cabinets. These cabinets will be wall or rack mounted, as designated on the drawings or as required by the Project Contact. Rack mounted interconnect cabinets shall be placed at the top of the rack and located to minimize cable distance to electronic equipment. The Contractor shall provide quantities and configurations as shown on the Customer drawings. The fiber interconnect cabinet shall be a manufacturer-certified component and will directly terminate the fiber building cable. The fiber interconnect cabinet shall meet or exceed all the following requirements:

11.42.22.1 The fiber unit kit shall contain all parts required for termination of the cable with the specified connectors and couplings.

11.42.22.2 The unit shall accommodate the specified connectors.

11.42.22.3 Provide plastic split rings fiber bend limiters for routing and expressing cables to manage slack fiber within the unit and rings for routing cable through the unit. It will also contain cable tie brackets for entry and exit of the fiber cable.

11.42.22.4 Include provision for labeling of the terminations and installation instructions.

11.42.22.5 Labeling for fiber cabling and the fiber interconnect cabinet shall be by distribution frame number, plus the color suffix designating which fiber is terminated.

11.42.22.6 Include access for cable entry and provide inserts to enclose the cabinet around the cable entry area.

11.42.22.7 The fiber interconnect cabinet shall be UL listed.

11.42.22.8 Include grounding lugs in the rear of the unit.

11.42.22.9 The fiber interconnect cabinet shall provide cross-connect, inter- connect, splicing capabilities, and contain the proper troughs for supporting and routing the fiber cables.

11.42.22.10 The fiber interconnect cabinet shall consist of a modular enclosure with retainer rings in the slack storage section to limit the bending radius of fibers.

11.42.22.11 The fiber interconnect cabinet shall have a steel enclosure, designed for industrial application, and shall come with a removable outer door and inner door for securing the network section. The interconnect cabinet shall have bottom knockouts for cable entry and shall have a "window" section to insert connector panels for mounting of

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terminated fibers.

11.42.22.12 All loose tube filled cables shall be provided with fan-out kits at each termination point.

11.42.22.13 The Contractor shall assure that the connectors for each cabling segment are installed in the correct orientation to ensure proper polarity of an optical fiber system from the main cross-connect to the telecommunications outlet or connector.

11.42.23 Optical Fiber Cable Splices & Closures

All fiber cable splicing shall be performed by the Contractor using the fusion splicing method unless the Project Contact specifically requires the mechanical method. Fiber cable splicing shall meet or exceed the following specifications:

11.42.23.1 Fusion splicing

The fiber splicer shall be fully automatic, calibrated, and operate under the various jobsite environmental conditions (e.g., temperature, humidity, altitude, etc.) for all types of fiber cable being deployed.

1. The mean splice loss for identical dispersion-unshifted single mode fibers shall be equal to 0.05 decibels at 1310 nanometers and 1550 nanometers wavelengths in accordance with CCITT G.652.
2. The microprocessor controlled automatic positioning system shall control the fiber alignment, cleaning, gap-setting correlation of fiber positioning and fusing.
3. The fusion splicer shall measure and document the splice losses of each splice. These measurements shall be saved and submitted to the DMS Product Manager, during final documentation reporting requirements.
4. Heat shrink protection shall be provided for each splice.

11.42.23.2 Mechanical splicing

The fiber splice module shall meet the following specifications:

1. Accept 250 and 900 micron fibers
2. Re-enterable, rearrangeable and reusable
3. Require no polishing
4. Require no adhesives
5. No loose parts
6. Mean splice loss of 0.15 decibels
7. Blind splice loss of less than 0.5 decibels
8. One part index matching gel

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9. Stable from negative 40 degrees Celsius to 75 degrees Celsius

11.42.23.3 Splice Closures

The fiber splice canister closure shall seal, bond, anchor, and protect fiber optic cable splices. The splice closure shall be re-enterable with a maximum of six cable entries in a butt-end configuration. The splice cap shall be capable of accepting additional cables without disturbing existing splices. The splice closure shall be designed for application required aerial, underground, and direct buried. It shall use corrosion free construction designed for splicing fibers. The unit shall include slack storage and the splice trays required for the specific installation.

11.43 The Contractor will meet the following requirements regarding Coaxial Cabling:

11.43.1 Plenum Coaxial Cable

Plenum rated coaxial cable shall be certified to conform to NFPA 262 and shall be marked as CMP. The plenum coaxial cable shall be composed of 22 to 24 gauge bare solid copper conductors insulated with FEP. The conductor shall be jacketed with low smoke, flame-retardant PVC.

11.43.2 Flooded Coaxial Cable

All flooded coaxial cable shall be injected with a water-resistant flooding compound and jacketed with UV resistant polyethylene.

11.43.3 RG-6/U Coaxial Cable

All RG-6/U coaxial cables shall be round and consist of 18 AWG solid bare copper conductors individually insulated and sheathed with an outer jacket.

11.43.3.1 The RG-6/U coaxial cable shall conform to the requirements of TIA 568-C.4 Broadband Coaxial Cabling and Components Standard.

11.43.3.2 The RG-6/U coaxial cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, for instance but not limited to: plenum, non-plenum, or flooded.

11.43.3.3 The RG-6/U coaxial cable shall meet the following requirements:

Insulation Dielectric:	Foam fluorinated ethylene propylene (FEP)
Shield Type and Minimum Coverage:	braid shield at 95 percent
Nominal Impedance:	75 Ohms
Maximum Attenuation at 750 megahertz:	5.65 decibels per 100 feet

11.43.3.4 Cable manufacturer shall be ISO-9001 certified.

11.43.3.5 The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

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11.43.4 **RG-6/UQ Coaxial Cable**

All RG-6/UQ coaxial cables shall be round and consist of 18 AWG solid bare copper conductors individually insulated, with four layers of shielding, and sheathed with an outer jacket.

11.43.4.1 The RG-6/UQ coaxial cable shall conform to the requirements of TIA 568-C.4 Broadband Coaxial Cabling and Components Standard.

11.43.4.2 The RG-6/UQ coaxial cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, including, but not limited to: plenum, non-plenum, or flooded.

11.43.4.3 The RG-6/UQ coaxial cable shall meet the following requirements:

Insulation Dielectric:	FEP
Shield Type and Minimum Coverage:	braid shield at 95 percent
Nominal Impedance:	75 Ohms
Maximum Attenuation at 750 megahertz:	5.65 decibels per 100 feet

11.43.4.4 Cable manufacturer shall be ISO-9001 certified.

11.43.4.5 The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

11.43.5 **RG-11/U Coaxial Cable**

All RG-11/U coaxial cables shall be round and consist of 14 AWG solid bare copper conductor individually insulated and sheathed with an outer jacket.

11.43.5.1 The RG-11/U coaxial cable shall conform to the requirements of TIA 568-C.4 Broadband Coaxial Cabling and Components Standard.

11.43.5.2 The RG-11/U coaxial cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, including, but not limited to: plenum, non-plenum, or flooded.

11.43.5.3 The RG-11/U coaxial cable shall meet the following requirements:

Insulation Dielectric:	FEP
Shield Type and Minimum Coverage:	braid shield at 95 percent
Nominal Impedance:	75 Ohms
Maximum Attenuation at 750 megahertz:	3.65 decibels per 100 feet

11.43.5.4 Cable manufacturer shall be ISO-9001 certified.

11.43.5.5 The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

11.43.6 **RG-59/U Coaxial Cable**

All RG-59/U coaxial cables shall be round and consist of 23 AWG solid bare copper conductor individually insulated and sheathed with an outer jacket.

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11.43.6.1 The RG-59/U coaxial cable shall conform to the requirements of TIA 568-C.4 Broadband Coaxial Cabling and Components Standard.

11.43.6.2 The RG-59/U coaxial cable construction, including the insulation and outer jacket, shall meet the requirements specified herein and by use, including, but not limited to: plenum, non-plenum, or flooded.

11.43.6.3 The RG-59 coaxial cable shall meet the following requirements:

Insulation Dielectric:	FEP
Shield Type and Minimum Coverage:	braid shield braid shield at 95 percent
Nominal Impedance:	75 Ohms
Maximum Attenuation at 750 megahertz:	9.708 decibels per 100 feet

11.43.6.4 Cable manufacturer shall be ISO-9001 certified.

11.43.6.5 The cable packaging shall be constructed so as to prevent kinking and other damage to the cable during shipping and handling. All damaged cable will be replaced.

11.44 The Contractor will meet the following requirements for Racks and Cabinets:

The main distribution frame (MDF) shall be located in the Customer's communication equipment room, as designated on the drawings or as required by the Project Contact. The intermediate distribution frame (IDF) shall be located in the Customer's telecommunication room, as required by the specific Project or MAC. The MDF and IDF shall house racks, voice termination fields, and required cable routing hardware. Racks shall be placed by the Contractor in a manner that will allow a minimum of 3 feet of clearance from the front, rear, and one-side mounting surface. If one mounting rail of the rack is placed against a wall by the Contractor, the mounting rail shall be no closer than 6 inches to the wall to allow room for vertical management. Where there is more than one rack, the racks shall be ganged by the Contractor with vertical management hardware to provide inter-bay management. Ganged rack frames will be placed by the Contractor in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side of the ganged assembly. The following are additional terms for racks and/or cabinets, where applicable:

11.44.1 3 Inches Wide Floor Mounted Rack (Free Standing)

The rack will be installed as designated on the drawings or as required by the Project Contact, with each distribution frame equipped with a free standing, self-supporting, seven-foot tall, 3 inches wide channel, 19-inch EIA standard equipment rack to house equipment, patch panels and fiber interconnect cabinets. The Contractor shall provide racks with integral vertical wire management pathways and secure in place with appropriate fasteners. Each rack shall be mounted on an isolation pad by the Contractor and utilize nonconductive washers to secure the rack to the floor.

11.44.2 6 Inches Wide Floor Mounted Rack (Free Standing)

The rack will be installed as designated on the drawings or as required by the Project Contact, with each distribution frame equipped with a free standing, self-supporting, seven-foot tall, 6 inches wide channel, 19-inch EIA standard

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equipment rack to house equipment, patch panels, and fiber interconnect cabinets. The Contractor shall provide racks with integral vertical wire management pathways and secure in place with appropriate fasteners. Each rack shall be mounted on an isolation pad by the Contractor and utilize nonconductive washers to secure the rack to the floor.

11.44.3 Floor Mounted Cabinet

The cabinet will be installed as designated on the drawings or as required by the Project Contact, with each distribution frame equipped with 84 inches high by 31.5 inches wide and 48 inches deep electronic cabinet, equipped with 19-inch EIA standard equipment uprights to house equipment, patch panels, and fiber interconnect cabinets. The Contractor shall provide a Plexiglas front door with security lock, vented rear door with security lock, removable side panels, vented top panel, dual packed 275 CFM blower unit, and coasters. All cabinet keys for a Project or MAC shall be keyed alike and provided to the Project Contact upon completion.

11.44.4 Wall Mounted Rack

The rack will be installed as designated on the drawings or as required by the Project Contact, with each distribution frame equipped with a 19-inch EIA standard swing frame equipment rack to house equipment, patch panels, and fiber interconnect cabinets. The Contractor shall secure the wall mounted rack in place with appropriate fasteners.

11.44.5 Wall Mounted Cabinet

The rack will be installed as designated on the drawings, or as required by the Project Contact, with each wall mounted distribution frame equipped with an electronic cabinet. That cabinet shall be equipped with 19-inch EIA standard adjustable equipment uprights to house equipment, patch panels, and fiber interconnect cabinets. The Contractor shall provide a solid front door with security lock and a swing 3-section frame for rear access. The wall mounted cabinet must able to support left hand or right hand opening. All cabinet keys for a Project or MAC shall be keyed alike and provided to the Project Contact upon completion.

11.44.6 Wire Management Components

1. All equipment racks shall be augmented with horizontal and vertical cable management hardware, both front and rear, to properly dress horizontal cables and patch cords.

2. Wire management shall be closed cover or distribution ring with front cover wire management panels, as required by the Project Contact, sized for the quantity wires anticipated at each location. Each horizontal row of patch panels shall have a wire management panel above and below. Common panels may be used between rows provided they are large enough to contain all wiring.

3. The Contractor shall provide a wire management cable support bar or strain relief brackets designed to provide strain relief at the rear of the 19-inch EIA distribution rack for the horizontal wiring cables terminated at the modular

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patch panels.

11.44.7 NEMA Enclosures

NEMA enclosures shall be constructed for either indoor or outdoor use to provide a degree of protection for the equipment inside against falling dirt, water, or damage from the external formation of ice on the enclosure.

11.45 Telecommunications Bonding Backbone

The Contractor shall provide a telecommunications bonding backbone utilizing a number 6 AWG or larger bonding conductor that provides direct bonding between the MDF and IDF. The permanent infrastructure for telecommunications grounding and bonding shall be independent of telecommunications cabling. The co-routed bonding conductor shall be installed by the Contractor as follows:

11.45.1 Communication bonding and grounding shall be in accordance with the NEC, NFPA, NESC, BICSI and TIA Standard 607. Horizontal cables shall be grounded in compliance with NFPA 70 and local requirements and practices. Horizontal equipment includes cross-connect frames, patch panels, racks, active telecommunication equipment, test apparatus, and equipment.

11.45.2 Copper bonding conductors shall be installed by the Contractor through every major telecommunications backbone pathway and directly terminated on a grounding bus bar in each telecommunication equipment location. The grounding bus bar shall be directly bonded to the building's structural steel and other permanent metallic systems. Each pathway bonding conductor must be terminated on the bus bar. The bus bar shall be visible and physically secured.

11.45.3 The Contractor shall route the number 6 AWG copper conductor along each backbone cable route and ensure a minimal separation between the conductor and the cables along the entire distance.

11.45.4 The Contractor shall bond each end of the copper conductor at the nearest approved ground in the area which the associated cables terminate or are spliced or cross-connected onto other cables. Such bonding shall be done with a grounding bus bar.

11.45.5 The main bus bar shall be directly bonded by the Contractor to the electrical service grounding electrode system. The telecommunications grounding system shall be directly attached to the closest point in the building's electrical service grounding system.

11.45.6 The Contractor shall use the grounding bus bars as the local approved ground. Backbone cabling shall be bonded by the Contractor at each sheath opening. All metallic cable trays shall be grounded.

11.45.7 The Contractor shall provide telecommunications bonding connections in accessible locations and make all bonding connections with listed bolts, crimp pressure connectors, clamps, or lugs. Multiple grounding bus bars placed in the building shall be directly bonded by the Contractor with a number 6 AWG copper conductor.

11.45.8 Bonding conductors shall be routed by the Contractor with a minimum number

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of bends. The bends placed in the conductor shall be sweeping.

11.45.9 A number 6 AWG stranded copper wire cable shall be extended by the Contractor between new ground bars located at each intermediate cross-connect and the building main service ground point. This ground conductor shall be utilized for equipment, termination, equipment rack and computer equipment grounding. All cabinets and racks shall be grounded by the Contractor from the Customer's telecommunication room isolated ground bar to the frame using a standard ground lug and number 6 AWG jacketed green ground cable.

11.45.10 When the Customer's telecommunications room contains an electrical panel, the Contractor shall provide a telecommunications ground utilizing a number 6 AWG or larger bonding conductor that provides direct bonding between telecommunications rooms ground bar and a connection to the telecommunications rooms electrical panel Alternating Current Equipment Ground buss ACEG.

11.45.11 All outside plant installations by the Contractor of metallic cable elements shall be grounded at the building entry points and at each splice location.

11.46 Telecommunications Backboard

Telecommunications backboard shall be 3/4 inch, 4 to 8-foot high, void-free, A/C grade plywood as designated on the drawings or as required by the Project Contact. The Contractor shall paint the backboard with one prime coat and two finish coats of fire-retardant pearl-gray latex paint and securely fasten the backboard to a wall.

11.47 Surface Raceways

The Contractor shall mount communication outlets that require surface mounting in non-metallic back-boxes with surface raceways. The Contractor shall omit surface raceways where access into existing walls is available. The Contractor shall mount back-boxes at power receptacle height and secure raceways every 16 inches with screws and wall anchors.

11.47.1 **Metallic Mechanical Construction**

Contractor is required to meet or exceed the following specifications for all metallic mechanical raceways:

1. Constructed of extruded steel with either durable satin anodized finish or coated with epoxy powder coating.

2. Incorporate a minimum of 2-inch radius control at all bending points (elbows and similar fittings).

3. Incorporate a complete line of modular termination boxes and external means of coupling sections and fittings of raceway together so that no sharp edges, field cuts or threaded ends of fasteners shall be visible or protrude into the raceway. The raceway fittings shall not reduce interior cross sectional area at the couplers.

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11.47.2 **Non-metallic Mechanical Construction**

All non-metallic mechanical raceways shall meet or exceed the following specifications:

1. Constructed of self-extinguishing high impact extruded PVC with internal coloring. The hinge shall allow the raceway to be opened repeatedly without fracture and shall latch secure to prevent accidental opening.

2. Incorporate a snap fit cover design with cover removal groove accessible from either the top or side of the raceway.

3. Incorporate a minimum of 2-inch radius control at all bending points (elbows and similar fittings).

4. Incorporate a complete line of modular termination boxes and external means of coupling sections and fittings of raceway together so that no sharp edges, field cuts or threaded ends of fasteners shall be visible or protrude into the raceway. The raceway fittings shall not reduce interior cross-sectional area at the couplers.

11.48 Innerduct

All fiber backbone cables shall be installed by the Contractor in innerduct for physical protection. Innerduct shall be 1-inch, 1 ½-inch, or 2-inch non-metallic corrugated flexible innerduct for use in plenum, outdoor, or riser applications and Contractor will meet or exceed the following specifications for innerducts:

11.48.1 Riser Innerduct

The riser rated multi-tube innerduct shall have a flame-resistant PVC outer jacket and meet TIA standards. The operating temperature range shall be 32 degrees Fahrenheit to 122 degrees Fahrenheit. The minimum bending radius shall be 20 cable diameters during installation and 10 cable diameters after installation. The riser rated multi-tube innerduct shall be UL 1666 OFNR rated.

11.48.2 Indoor Plenum Rated Fiber Tubes

The plenum rated multi-tube innerduct shall have a low smoke, flame resistant outer jacket and meet TIA standards. The operating temperature range shall be 32 degrees Fahrenheit to 122 degrees Fahrenheit. The minimum bending radius shall be 20 cable diameters during installation and 10 cable diameters after installation. The plenum rated multi-tube innerduct shall be UL 910 OFNP rated.

11.48.3 Outdoor Innerduct

The multi-tube innerduct shall have a polyethylene outer jacket with a dry tape water blocked cable core and meet TIA standards. The operating temperature range shall be negative 40 degrees Fahrenheit to 158 degrees Fahrenheit. The minimum bending radius shall be 20 cable diameters during installation and 10 cable diameters after installation. The multi-tube innerduct should be UL 1651 OFCP rated.

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11.49 Flexible Engineered Fabric

Where specifically requested, the Contractor shall provide a flexible engineered fabric conduit. Engineered fabric shall not rip or tear, shall contain three cells, and shall be chemically resistant to chemicals and petroleum products. The Contractor shall install a pull cord in each cell. In plenum rated areas, the Contractor shall provide plenum rated fabric.

11.50 Cable Trays

The cable trays shall be classified into three categories: ladder cable tray, solid bottom cable tray, and wire mesh cable tray. Above drop ceiling areas, ladder cable trays or wire mesh cable trays shall be installed by the Contractor, dependent on the cable loading. Ladder cable trays shall be installed by the Contractor in the Customer's telecommunication room. Tray size is dependent on the cable loading. Contractor will meet or exceed the following specifications for all trays:

11.50.1 Ladder Cable Tray

Cable management system shall be installed using support components as recommended by the manufacturer. The Contractor shall install cable trays according to NEC Article 318 or in accordance with Manufacturer recommendations, whichever is more stringent. The ladder cable tray shall be hot rolled carbon steel and hot dipped galvanized after fabrication with 6 inch rung spacing utilizing either hot dipped galvanized or cadmium plated fasteners.

11.50.2 Solid Bottom Cable Tray

The solid bottom cable tray shall be constructed from ASTM A36 steel bar. It shall have a baked powder painted surface treatment using polyester coating. The cable management tray width shall be dependent on the cable loading. The Contractor shall utilize cable management fittings and hardware recommended by the Manufacturer and shall provide drop-offs, 90 degrees, and tees as required for the equipment served, and support of the cable.

11.50.3 Wire Mesh Cable Tray

The wire mesh cable tray shall be constructed of welded wire mesh with a continuous safety edge wire lip. Provide the mesh system for continuous ventilation of cables and maximum heat dissipation. The mesh size shall be 4 inches by 2 inches.

The wire mesh cable tray shall be surface treated after manufacture. The surface treatment shall meet or exceed the following specifications:

1. Electroplated zinc galvanizing shall be electrodeposited zinc coating applied to an average thickness of 0.7 mils to 0.8 mils.

2. Hot dip galvanizing in molten zinc bath providing an average coating thickness of 2.4 mils to 3.2 mils.

3. Powder painted surface treatment using ASA 61 Gray Polyester coating.

4. Cable management tray width and depth is dependent on the cable loading

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and design.

The cable management fittings shall be field manufactured from straight sections through use of hardware and instructions recommended by manufacturer. The Contractor shall provide drop-offs, 90 degrees, and tees as required for the equipment served, and support of the cable.

The cable management system shall be installed by the Contractor using splice connectors and support components as recommended by the manufacturer. The Contractor shall install cable trays, where shown, according to NEC Article 392 and in accordance with Manufacturer recommendations and suggested span load

11.51 Tele-data Power Poles

11.51.1 Tele-data poles shall be provided by the Contractor to extend telecommunication and electrical services from a ceiling to the workstation outlets. The tele-data poles shall include dual channel poles for electrical power circuits in one channel and telecommunication cabling in the other channel.

11.51.2 The tele-data power poles shall be provided by the Contractor with circuit feed fittings, ceiling trim plates, T-bar mounting hardware, carpet/floor grippers, and other associated accessories for a complete installation. The tele-data pole shall allow inserts for various manufacturers' telecommunication outlet plates.

11.51.3 Tele-data poles shall accommodate the installation ceiling requirement, 10-foot, 12-foot, and 15-foot ceilings. Contractor will coordinate the finish with the Project Contact and will offer Customers a variety of painted, polished and satin anodized finishes.

11.52 Electrical Protection Devices

All copper circuits shall be provided by the Contractor with protection between each building with an entrance cable protector panel. All building-to-building circuits shall be routed by the Contractor through this protector. The protector shall be connected by the Contractor with a number 6 AWG copper bonding conductor between the protector ground lug and the Customer's telecommunication room ground point. Each protector chassis shall be provided by the Contractor with solid state plug-in or gas-tube protector modules for each pair terminated on the chassis. For small pair-count applications, the Contractor shall supply electrical protection apparatus that consists of a mounting panel for a series of solid-state or gas-tube protector units and a wiring block. The wiring block shall be used for input and output cable terminations. Insertion of the protector units into the mounting block will complete the circuit. The Contractor will meet or exceed the following specification with regard to electrical protection devices:

11.52.1 Solid-State Protector

The solid-state protector unit shall meet the following requirements:

Operating Temperature Range:	-40°F to +149°F (-40°C to +65°C)
DC Breakdown Voltage (at 2 kV/sec):	220-300V
Surge Breakdown Voltage (at 100V/µsec):	220-300 V
Insulation Resistance (PE-80):	>100 MW typical
DC Holdover Current:	260 mA/52V, 200 mA/135V, 140 mA/150V

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On-State Voltage (at 100A):	<19/V
Response Time:	<100 nsec
Rated Impulse Discharge:	200 A
Capacitance:	<100 pF
Line Series Resistance:	<4W
Sneak Current Operation (heat coils):	540 mA:<210 sec, 1 A: <15 sec
Number of Operations:	unlimited
UL Listed	
ISO 9001 Certified Manufacturer	

11.52.2 Gas-Tub Protector

The gas-tube protector unit shall meet the following electrical specifications:

DC Breakdown Voltage (at 2 kV/sec):	265-425V
Surge Breakdown Voltage (at 100V/µsec):	200-800 V
Insulation Resistance (PE-80):	>100 MW typical
DC Holdover Current:	260 mA/52V, 200 mA/135V, 140 mA/150V
Vented Breakdown Voltage:	<1,000 V
DC Arc Voltage:	20 V typical
Glow-to-Arc Transition Current:	0.5 A typical
Capacitance (PE-80):	<10 pF
AC Discharge (PE-80):	65 A(11 cycles at 60 Hz)
Maximum Impulse Discharge (PE-80):	20 kA (8/20 µsec waveform)
Sneak Current Operation (heat coils):	540 mA: <219 secm 1A: <15 sec
Short Life Duration 60 Hz AC:	1 A, 60 Hz/1 sec burst: >60 operations 10 A, 60 Hz/1 sec burst: >20 operations
Continuous Life:	60 Hz AC, 0.5 A: 140 sec 10 A Surge (10/1,000 µsec waveform) : >1,000 operations
100 A Surge (10/1,000 µsec waveform) :	>100 operations
300 A Surge (10/1,000 µsec waveform) :	>50 operations
UL Listed	
ISO 9001 Certified Manufacturer	

11.53 Line Voltage Electrical Power Work

When line voltage electrical power for telecommunication spaces, data centers, cabinets, and equipment is not installed by third parties and is essential to the telephony or data infrastructure system for Customers use of the system, the Contractor shall furnish all labor, materials, tools, and equipment to provide line voltage electrical power for telecommunication spaces, data centers, cabinets, and equipment. Any line voltage electrical power work performed by the Contractor shall meet or exceed SOW section 11.1, Codes and Standards, and the following specifications:

11.53.1 Contractor

All line voltage electrical power work shall be performed by an individual with at least five (5) years of successful installation experience on similar installations

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and a current and valid State of Florida electrician license with the Department of Business and Professional Regulation.

11.53.2 Subcontracting

Should the Contractor subcontract out these services, the Contractor shall obtain written approval from the DMS Product Manager, provide the information required in SOW section 4.5, Subcontracting, to the DMS Product Manager, and written certification of the following:

1. The electrical equipment manufacturer shall have at least five (5) years of successful manufacturing of products with characteristics and capacities required; and

2. For all line voltage electrical power work, the Subcontractor shall have an individual with at least five (5) years of successful installation experience on similar installations who has a current and valid State of Florida electrician licensed with the Department of Business and Professional Regulation.

11.53.3 Insulated Conductors

Insulated conductors shall be new 600 volt, soft-drawn, annealed, 98 percent conductivity, copper insulated conductors. The copper conductors shall meet the following specifications:

1. Insulation shall be Thermoplastic Heat and Water-Resistant Insulated Wire or Thermoplastic High Heat-Resistant Nylon Coated for number 10 & 12 AWG sizes and shall be sized in accordance with the NEC. The Contractor shall provide number 10 conductors for a single phase and 20 ampere circuits that are more than 100 feet from the panel board.

2. The Contractor shall use pressure type lugs or connectors for stranded conductor terminations.

3. The Contractor shall mark conductors according to NEC Article 310 or equal cable markers and provide colored insulated conductors for all circuits as follows:

120/240 volt shall have L1 Black, L2 Red, Neutral White, Ground Green
120/208 volt shall have L1 Black, L2 Red, L3 Blue, Neutral White, Ground Green UL 83 Listed

11.53.4 Electrical Outlet Boxes

Electrical outlet boxes shall be galvanized steel boxes of sufficient size to accommodate wiring devices to be installed at flush outlet. Unless otherwise noted, the Contractor shall provide 2-1/8 inch deep by 4-inch square box and securely fasten outlet boxes in position using the fastener design for the wall type involved. The Contractor shall provide box rings for all boxes in sheetrock and plastered walls and provide an extension ring for the device to be installed. The Contractor shall provide one-piece cast outlet boxes with threaded openings for surface mounting in areas having exposed conduit systems.

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11.53.5 Electrical junction Boxes

Electrical junction boxes shall be galvanized steel junction boxes with an associated cover conforming to NEC and that are UL 514 Listed. The Contractor shall provide NEMA 1 type boxes for interior spaces and NEMA 3R type boxes for exterior spaces.

11.53.6 Receptacles

Receptacles shall be 3-wire, NEMA 5-20R, 20 ampere, 120 VAC duplex receptacles with plastic, steel or stainless steel receptacle plates of the type required for service and device involved. The receptacles shall be UL 498 Listed.

11.53.7 Circuit Breakers

The Contractor shall provide circuit breakers for the existing or specified manufacturer's panel involved, with the number of poles and ampere ratings required for the equipment installation indicated and UL 67 Listed. The circuit breakers shall meet or exceed the following specifications:

1. Factory assembled molded case quick-break breakers shall be both manual and automatic operation with trip indication.

2. The Contractor shall provide a common trip mechanism that will trip all poles simultaneously on an overload or fault on one pole.

3. The Contractor shall provide single pole 120 VAC breakers, or 208/240 VAC multi-pole breakers with a minimum interrupting rating of 10,000 RMS symmetrical amperes at rated voltage. For each breaker, the Contractor shall provide typewritten circuit identification mounted inside the door for identifying the outlet served.

11.54 Outlets & Adapters

Outlets shall consist of single or double gang wall plates equipped with 8-position modular jacks or as specified in the Project and TIA 568-C standard. All outlet cabling shall terminate at the associated intermediate distribution frame. Unless otherwise noted on the floor plans or specified, Contractor will provide all jacks for 24 AWG copper cables with the following specifications:

11.54.1 8-position/ 8-conductor modular with insulation displacement, universal application, multivendor supportive, and accepting phone and data plugs.

11.54.2 Contain blank module inserts for all unused module locations. Jack module arrangement shall be as required by the specific Project. The Contractor shall provide color-coded inserts at each outlet and at patch panels as specified.

11.54.3 All outlets shall be identified in accordance with TIA 606-A.

11.54.4 Modular furniture adapters shall snap directly into the standard cutouts in most major modular furniture systems and include any spacers or adapters to ensure a proper fit when used with the panels. The Contractor shall coordinate the adapter with modular furniture being supplied prior to ordering.

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11.54.5 Floor box adapters shall snap directly into the standard cutouts in most major floor boxes and include any spacers or adapters to ensure a proper fit when used with the panels. The Contractor shall coordinate the adapter with floor boxes provided prior to ordering.

11.55 Utility Telephony Connections

Contractor will originate wiring utilized for a telephone company central office-based voice, video, and data services at the wall-mounted cross-connect provided by the telephone company per the State of Florida Public Service Commission rules and regulations. The Contractor will locate this service demarcation field in the MDF and shall originate it at a RJ-21X cross-connect. The contractor will install, terminate, and identify the wiring between the demarcation cross-connect and the premise distribution system in accordance with the specifications herein. The Contractor will identify each telephone company telephone number on the inside cover of the RJ21X.

11.56 Voice Termination, Backbone, and Riser Modular Tower Systems

The Contractor will follow the following specifications with regard to voice termination, backbone, and riser modular tower systems:

11.56.1 The Contractor shall provide a modular tower system to provide high-density field terminations, cross-connections, and cable management that are designed for wall mount. The Contractor shall provide assemblies for vertical cable routing including vertical cable managers. Assembly shall include mounting hardware consisting of alternate rows of 110 wiring blocks and horizontal managers and a cable manager at the bottom of the unit. The system shall be securely fastened by the Contractor to the telecommunication backboard, with all required D-rings or other approved cable guides as required, providing an organized and orderly installation.

11.56.2 Voice distribution frame locations shall be equipped with 110 patch blocks for termination of voice station and cross-connect cable pairs. The station field blocks shall be supplied by the Contractor as dictated by cable counts with 10 percent spare capacity on total voice cables indicated. Designation strips shall meet the ANSI/TIA/EIA 606 Standards. The Contractor shall terminate all cables in numerical sequence.

11.56.3 The termination block shall support the appropriate Category 5e, Category 6, or Category 6a applications and facilitate cross-connection and inter-connection using either cross-connect wire or patch cords.

11.56.4 The wiring blocks shall be fire retardant molded plastic, with the base consisting of horizontal index strips for terminating 25 pairs of conductors each. To establish pair location, the index strips shall be marked with five colors on the high teeth, separating the tip and ring of each pair. A series of fanning strips shall be located on each side of the block for dressing the cable pairs terminated on the adjacent index strips. Clear label holders with the appropriate colored inserts shall be provided with the wiring blocks. The insert labels shall contain vertical lines spaced on the basis of circuit size (3, 4, or 5 pair) and shall not interfere with running, tracing, or removing jumper wire or patch cords. Separation of the backbone sections is required with two sections of cable managers if the backbone sections are located in the same tower.

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11.57 110 Cross-Connect

Contractor will match the 110 cross-connect terminations with the termination on the 110 type communications outlet so that the color codes at both terminations will be the same and the color code will match the cable being installed. The connector shall allow many reconnections with consistent repeatable performance. The cross-connect shall be UL Listed and meet NFPA 70 standards, 47 CFR 15 and 47 CFR 68 standards, and the manufacturer shall be ISO 9001 certified. The contractor will ensure that the 110 blocks meet the following physical requirements:

wire insulation:	
Size:	0.050 inches diameter over Dielectric Maximum for top of connecting block 0.07 inches diameter over Dielectric Maximum for bottom of connecting block
Types:	all plastic insulants (including PVC, irradiated PVC, Polyethylene, polypropylene, PTFE Polyurethane, Nylon, Teflon)
terminations:	
Solid:	wire ranges 22 to 26 AWG greater than 200 terminations
Stranded:	7 strands wire ranges 22 to 26 AWG greater than 200 terminations
Wire termination:	insulation displacement, slotted beam contact
Wire insertion force:	13 to 28 pound-force
Wire pullout force:	2.2 pound-force
Reconnects:	500 repeated insertions
Wire retention force:	horizontal 8 pound-force (36 newtons), vertical 2 pound-force (9 newtons)
Contact material:	phosphor bronze
Plating for IDC:	solder plate (60 percent tin/40 percent lead)
Temperature:	14 degrees Fahrenheit to 140 degrees Fahrenheit
Humidity:	95 percent (noncondensing)

11.58 Elevator Conduit & Cable

Where the elevator control room is located at the top of the building, the Contractor shall install a one-inch conduit from the telecommunication space located on the upper most floor to each elevator control room. Where the elevator control room is located on the lowest floor of the building the Contractor shall provide a one-inch conduit from the telecommunication space located on the lowermost floor to each elevator control room. The conduit shall originate in the vicinity of the 110 termination blocks and terminate in a four-inch square telecommunication outlet box, with a voice jack, located as requested by the Project or MAC specifications or the Project Contact. The Contractor shall install one Category 5e cable from the outlet box to the voice demarcation point.

11.59 Fire Alarm Conduit & Cable

The Contractor shall install a one-inch conduit from the telecommunication space

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located closest to the fire alarm panel. The conduit shall originate in the vicinity of the 110 termination blocks and terminate in a 4-inch square telecommunication outlet box, with two voice jacks, located as requested by the Project specifications or the Project Contact. The Contractor shall install two Category 5e cables from the outlet box to the voice demarcation point.

11.60 Security Alarm Conduit & Cable

The Contractor shall install a one-inch conduit from the telecommunication space located closest to the security alarm panel. The conduit shall originate in the vicinity of the 110 termination blocks and terminate in a 4-inch square telecommunication outlet box, with a voice jack, located as requested by the Project specifications or the Project Contact. The Contractor shall install one Category 5e cable from the outlet box to the voice demarcation point.

11.61 T1 Transmission

The Contractor shall provide outlets and circuit wiring for video teleconferencing over T1 transmission lines. The T1 service cable shall be run from the T1 outlet jack to the T1 demarcation outlets as required by the Project or MAC. Each T1 demarcation outlet shall include a RJ48X miniature, non-keyed, 8-position 8-wire jack for each T1 outlet. Each T1 outlet shall include two TIA 568-C 8-position Category 5e modular voice (telephone) jacks connected to a four pair Category 5e cable and one RJ48X miniature. This T1 jack shall be non-keyed, 8-position 8-wire jack with shorting bars on pins 1 & 4 and 2 & 5, 110 type terminations shall be connected to a four pair Category 5e cable.

11.62 Directional Buried Cable Placement

11.62.1 Static or vibratory plow installation will be considered on a case-by-case basis as required.

11.62.2 The Contractor shall furnish all labor, materials, tools, and equipment to install fiber cable with minimal surface damage or disruption of above ground activities.

11.62.3 The Contractor shall assure that the prime mover horsepower is sufficient for the soil type and cable depth required. The Contractor shall provide tracked or wheeled prime movers dependent on the route placement.

11.62.4 Should the Contractor subcontract out these directional buried cable placement services, the Contractor shall obtain written approval from the DMS Product Manager, noting the Subcontractor's business name, Subcontractor's representative name and contact information, and written certification of the following:

1. The Subcontractor shall have at least three (3) years of successful installation experience on similar directional buried cable placement installations.
2. The Subcontractor shall have at least three (3) years of successful installation experience on directional buried cable installations.

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
	Sub-Division 5e Copper Cabling			
1.01	4-Pair Category 5e U/UTP Plenum	ft.	$ 0.92	$ 0.92
1.02	4-Pair Category 5e U/UTP Non-Plenum	ft.	$ 0.83	$ 0.83
1.03	4-Pair Category 5e U/UTP Outside Plant Filled Cable	ft.	$ 0.95	$ 0.95
1.04	25-Pair Category 5e U/UTP Plenum	ft.	$ 5.00	$ 5.00
1.05	25-Pair Category 5e U/UTP Non-Plenum	ft.	$ 4.50	$ 4.50
1.06	Dual 25-Pair Category 5e U/UTP Non-Plenum	ft.	$ 10.00	$ 10.00
1.07	Quad 25-Pair Category 5e U/UTP Plenum	ft.	$ 12.00	$ 12.00
1.08	Quad 25-Pair Category 5e U/UTP Non-Plenum	ft.	$ 12.00	$ 12.00
	Sub-total average unit price		$ 5.78	$ 5.78
	Sub-Division Price for Single Drop Outlets			
1.09	4-Pair Category 5e Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 185.00	$ 185.00
1.10	4-Pair Category 5e Drop U/UTP Plenum - Quantity Over 50	ea.	$ 164.00	$ 164.00
1.11	4-Pair Category 5e Drop U/UTP Non-plenum - Quantity 1 to 50	ea.	$ 155.00	$ 155.00
1.12	4-Pair Category 5e Drop U/UTP Non-plenum - Quantity Over 50	ea.	$ 140.00	$ 140.00
	Sub-total average unit price		$ 161.00	$ 161.00
	Sub-Division Price for Multiple Drop Outlets			
1.13	Dual 4-Pair Category 5e Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 290.00	$ 290.00
1.14	Dual 4-Pair Category 5e Drop U/UTP Plenum - Quantity Over 50	ea.	$ 272.00	$ 272.00
1.15	Dual 4-Pair Category 5e Drop U/UTP Non-plenum - Quantity 1 to 50	ea.	$ 235.00	$ 235.00
1.16	Dual 4-Pair Category 5e Drop U/UTP Non-plenum - Quantity Over 50	ea.	$ 217.00	$ 217.00
1.17	Quad 4-Pair Category 5e Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 460.00	$ 460.00
1.18	Quad 4-Pair Category 5e Drop U/UTP Plenum - Quantity Over 50	ea.	$ 445.00	$ 445.00
1.19	Quad 4-Pair Category 5e Drop U/UTP Non-plenum - Quantity 1 to 50	ea.	$ 352.00	$ 352.00

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
1.20	Quad 4-Pair Category 5e Drop U/UTP Non-plenum - Quantity Over 50	ea.	$ 335.00	$ 335.00
	Sub-total average unit price		$ 325.75	$ 325.75
	Sub-Division - Category 5e Patch Cables			
1.21	Category 5e patch cable (3' foot)	ea.	$ 3.00	$ 3.00
1.22	Category 5e patch cable (5' foot)	ea.	$ 4.00	$ 4.00
1.23	Category 5e patch cable (10' foot)	ea.	$ 5.00	$ 5.00
1.24	Category 5e patch cable (15' foot)	ea.	$ 6.00	$ 6.00
	Sub-total average unit price		$ 4.50	$ 4.50
	Sub-Division - Category 5e Copper Connectivity Items			
1.25	Category 5e Patch Panel 12 port 110 Termination	ea.	$ 137.08	$ 137.08
1.26	Category 5e Patch Panel 24 port 110 Termination	ea.	$ 200.00	$ 200.00
1.27	Category 5e Patch Panel 48 port 110 Termination	ea.	$ 295.32	$ 295.32
1.28	Category 5e Patch Panel 24 port 110 Termination - Angled	ea.	$ 221.27	$ 221.27
1.29	Category 5e Patch Panel 48 port 110 Termination - Angled	ea.	$ 355.47	$ 355.47
1.30	Category 5e Blank Patch Panel 12 port with Modular Jack Termination	ea.	$ 135.48	$ 135.48
1.31	Category 5e Blank Patch Panel 24 port with Modular Jack Termination	ea.	$ 287.73	$ 287.73
1.32	Category 5e Blank Patch Panel 48 port with Modular Jack Termination	ea.	$ 400.00	$ 400.00
1.33	Category 5e Blank Patch Panel 24 port with Modular Jack Termination - Angled	ea.	$ 262.48	$ 262.48
1.34	Category 5e Blank Patch Panel 48 port with Modular Jack Termination - Angled	ea.	$ 400.00	$ 400.00
1.35	Category 5e 110 Block 100 Pair Base	ea.	$ 75.00	$ 75.00
1.36	Category 5e 110 Block 100 Pair Base With Legs	ea.	$ 110.00	$ 110.00
1.37	Category 5e 110 Block 300 Pair Base	ea.	$ 75.00	$ 75.00
1.38	Category 5e 110 Block 300 Pair Base With Legs	ea.	$ 110.00	$ 110.00
1.39	Category 5e 110 Connecting Block 3 Pair	ea.	$ 0.95	$ 0.95

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
1.40	Category 5e 110 Connecting Block 4 Pair	ea.	$ 0.95	$ 0.95
1.41	Category 5e 110 Connecting Block 5 Pair	ea.	$ 1.00	$ 1.00
1.42	100-Pair Tower System	ea.	$ 75.00	$ 75.00
1.43	300-Pair Tower System	ea.	$ 110.00	$ 110.00
1.44	Category 5e 66 Block	ea.	$ 20.00	$ 20.00
	Sub-total average unit price		$ 163.64	$ 163.64
2.01	4-Pair Category 6 U/UTP Plenum	ft.	$ 1.00	$ 1.00
2.02	4-Pair Category 6 U/UTP Non-Plenum	ft.	$ 0.75	$ 0.75
2.03	4-Pair Category 6 U/FTP Plenum	ft.	$ 1.95	$ 1.95
2.04	4-Pair Category 6 U/FTP Non-Plenum	ft.	$ 1.70	$ 1.70
	Sub-total average unit price		$ 1.35	$ 1.35
	Sub-Division - Price for Single Drop Outlets			
2.05	4-Pair Category 6 Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 305.00	$ 305.00
2.06	4-Pair Category 6 Drop U/UTP Plenum - Quantity Over 50	ea.	$ 285.00	$ 285.00
2.07	4-Pair Category 6 Drop U/UTP Non-Plenum - Quantity 1 to 50	ea.	$ 245.00	$ 245.00
2.08	4-Pair Category 6 Drop U/UTP Non-Plenum - Quantity Over 50	ea.	$ 230.00	$ 230.00
2.09	4-Pair Category 6 Drop U/FTP Plenum - Quantity 1 to 50	ea.	$ 510.00	$ 510.00
2.10	4-Pair Category 6 Drop U/FTP Plenum - Quantity Over 50	ea.	$ 500.00	$ 500.00
2.11	4-Pair Category 6 Drop U/FTP Non-Plenum - Quantity 1 to 50	ea.	$ 425.00	$ 425.00
2.12	4-Pair Category 6 Drop U/FTP Non-Plenum - Quantity Over 50	ea.	$ 400.00	$ 400.00
	Sub-total average unit price		$ 362.50	$ 362.50
	Sub-Division - Price for Multiple Drop Outlets			
2.13	Dual 4-Pair Category 6 Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 480.00	$ 480.00

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
2.14	Dual 4-Pair Category 6 Drop U/UTP Plenum - Quantity Over 50	ea.	$ 465.00	$ 465.00
2.15	Dual 4-Pair Category 6 Drop U/UTP Non-Plenum - Quantity 1 to 50	ea.	$ 355.00	$ 355.00
2.16	Dual 4-Pair Category 6 Drop U/UTP Non-Plenum - Quantity Over 50	ea.	$ 340.00	$ 340.00
2.17	Dual 4-Pair Category 6 Drop U/FTP Plenum - Quantity 1 to 50	ea.	$ 790.00	$ 790.00
2.18	Dual 4-Pair Category 6 Drop U/FTP Plenum - Quantity Over 50	ea.	$ 780.00	$ 780.00
2.19	Dual 4-Pair Category 6 Drop U/FTP Non-Plenum - Quantity 1 to 50	ea.	$ 550.00	$ 550.00
2.20	Dual 4-Pair Category 6 Drop U/FTP Non-Plenum - Quantity Over 50	ea.	$ 535.00	$ 535.00
2.21	Quad 4-Pair Category 6 Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 725.00	$ 725.00
2.22	Quad 4-Pair Category 6 Drop U/UTP Plenum - Quantity Over 50	ea.	$ 715.00	$ 715.00
2.23	Quad 4-Pair Category 6 Drop U/UTP Non-Plenum - Quantity 1 to 50	ea.	$ 695.00	$ 695.00
2.24	Quad 4-Pair Category 6 Drop U/UTP Non-Plenum - Quantity Over 50	ea.	$ 680.00	$ 680.00
2.25	Quad 4-Pair Category 6 Drop U/FTP Plenum - Quantity 1 to 50	ea.	$ 1,500.00	$ 1,500.00
2.26	Quad 4-Pair Category 6 Drop U/FTP Plenum - Quantity Over 50	ea.	$ 1,420.00	$ 1,420.00
2.27	Quad 4-Pair Category 6 Drop U/FTP Non-Plenum - Quantity 1 to 50	ea.	$ 890.00	$ 890.00
2.28	Quad 4-Pair Category 6 Drop U/FTP Non-Plenum - Quantity Over 50	ea.	$ 850.00	$ 850.00
	Sub-total average unit price		$ 735.63	$ 735.63
	Sub-Division - Category 6 Patch Cables			
2.29	Category 6 patch cable (3' foot)	ea.	$ 7.00	$ 7.00
2.30	Category 6 patch cable (5' foot)	ea.	$ 8.00	$ 8.00
2.31	Category 6 patch cable (10' foot)	ea.	$ 10.00	$ 10.00
2.32	Category 6 patch cable (15' foot)	ea.	$ 14.00	$ 14.00
	Sub-total average unit price		$ 9.75	$ 9.75
	Sub-Division - Category 6 Copper Connectivity Items			
2.33	Category 6 Patch Panel 12 port 110 Termination	ea.	$ 165.00	$ 165.00

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
2.34	Category 6 Patch Panel 24 port 110 Termination	ea.	$ 300.00	$ 300.00
2.35	Category 6 Patch Panel 48 port 110 Termination	ea.	$ 594.00	$ 594.00
2.36	Category 6 Patch Panel 24 port 110 Termination - Angled	ea.	$ 300.00	$ 300.00
2.37	Category 6 Patch Panel 48 port 110 Termination - Angled	ea.	$ 594.00	$ 594.00
2.38	Category 6 Blank Patch Panel 12 port with Modular Jack Termination	ea.	$ 260.00	$ 260.00
2.39	Category 6 Blank Patch Panel 24 port with Modular Jack Termination	ea.	$ 435.00	$ 435.00
2.40	Category 6 Blank Patch Panel 48 port with Modular Jack Termination	ea.	$ 550.00	$ 550.00
2.41	Category 6 Blank Patch Panel 24 port with Modular Jack Termination - Angled	ea.	$ 435.00	$ 435.00
2.42	Category 6 Blank Patch Panel 48 port with Modular Jack Termination - Angled	ea.	$ 550.00	$ 550.00
2.43	Category 6 110 Block 96 Pair Base	ea.	$ 80.00	$ 80.00
2.44	Category 6 110 Block 96 Pair Base With Legs	ea.	$ 80.00	$ 80.00
2.45	Category 6 110 Block 288 Pair Base	ea.	$ 178.00	$ 178.00
2.46	Category 6 110 Block 288 Pair Base With Legs	ea.	$ 178.00	$ 178.00
2.47	Category 6 110 Connecting Block 4 Pair	ea.	$ 2.00	$ 2.00
2.48	Category 6 110 Connecting Block 5 Pair	ea.	$ 2.00	$ 2.00
	Sub-total average unit price		$ 293.94	$ 293.94
	Sub-Division - Category 6a Copper Cabling			
3.01	4-Pair Category 6a U/UTP Plenum	ft.	$ 2.00	$ 2.00
3.02	4-Pair Category 6a U/UTP Non-Plenum	ft.	$ 1.95	$ 1.95
3.03	4-Pair Category 6a U/FTP Plenum	ft.	$ 2.60	$ 2.60
3.04	4-Pair Category 6a U/FTP Non-Plenum	ft.	$ 2.45	$ 2.45
	Sub-total average unit price		$ 2.25	$ 2.25
	Sub-Division - Price for Single Drop Outlets			
3.05	4-Pair Category 6a Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 465.00	$ 465.00

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
3.06	4-Pair Category 6a Drop U/UTP Plenum - Quantity Over 50	ea.	$ 450.00	$ 450.00
3.07	4-Pair Category 6a Drop U/UTP Non-Plenum - Quantity 1 to 50	ea.	$ 300.00	$ 300.00
3.08	4-Pair Category 6a Drop U/UTP Non-Plenum - Quantity Over 50	ea.	$ 290.00	$ 290.00
3.09	4-Pair Category 6a Drop U/FTP Plenum - Quantity 1 to 50	ea.	$ 520.00	$ 520.00
3.10	4-Pair Category 6a Drop U/FTP Plenum - Quantity Over 50	ea.	$ 510.00	$ 510.00
3.11	4-Pair Category 6a Drop U/FTP Non-Plenum - Quantity 1 to 50	ea.	$ 380.00	$ 380.00
3.12	4-Pair Category 6a Drop U/FTP Non-Plenum - Quantity Over 50	ea.	$ 370.00	$ 370.00
	Sub-total average unit price		$ 410.63	$ 410.63
	Sub-Division - Price for Multiple Drop Outlets			
3.13	Dual 4-Pair Category 6a Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 645.00	$ 645.00
3.14	Dual 4-Pair Category 6a Drop U/UTP Plenum - Quantity Over 50	ea.	$ 620.00	$ 620.00
3.15	Dual 4-Pair Category 6a Drop U/UTP Non-Plenum - Quantity 1 to 50	ea.	$ 560.00	$ 560.00
3.16	Dual 4-Pair Category 6a Drop U/UTP Non-Plenum - Quantity Over 50	ea.	$ 545.00	$ 545.00
3.17	Dual 4-Pair Category 6a Drop U/FTP Plenum - Quantity 1 to 50	ea.	$ 825.00	$ 825.00
3.18	Dual 4-Pair Category 6a Drop U/FTP Plenum - Quantity Over 50	ea.	$ 800.00	$ 800.00
3.19	Dual 4-Pair Category 6a Drop U/FTP Non-Plenum - Quantity 1 to 50	ea.	$ 600.00	$ 600.00
3.20	Dual 4-Pair Category 6a Drop U/FTP Non-Plenum - Quantity Over 50	ea.	$ 590.00	$ 590.00
3.21	Quad 4-Pair Category 6a Drop U/UTP Plenum - Quantity 1 to 50	ea.	$ 1,200.00	$ 1,200.00
3.22	Quad 4-Pair Category 6a Drop U/UTP Plenum - Quantity Over 50	ea.	$ 1,163.75	$ 1,163.75
3.23	Quad 4-Pair Category 6a Drop U/UTP Non-Plenum - Quantity 1 to 50	ea.	$ 675.85	$ 675.85
3.24	Quad 4-Pair Category 6a Drop U/UTP Non-Plenum - Quantity Over 50	ea.	$ 650.90	$ 650.90
3.25	Quad 4-Pair Category 6a Drop U/FTP Plenum - Quantity 1 to 50	ea.	$ 1,450.00	$ 1,450.00
3.26	Quad 4-Pair Category 6a Drop U/FTP Plenum - Quantity Over 50	ea.	$ 1,425.00	$ 1,425.00
3.27	Quad 4-Pair Category 6a Drop U/FTP Non-Plenum - Quantity 1 to 50	ea.	$ 998.00	$ 998.00

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Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
3.28	Quad 4-Pair Category 6a Drop U/FTP Non-Plenum - Quantity Over 50	ea.	$ 990.00	$ 990.00
	Sub-total average unit price		$ 858.66	$ 858.66
	Sub-Division - Category 6a Patch Cables			
3.29	Category 6a patch cable (3' foot)	ea.	$ 10.84	$ 10.84
3.30	Category 6a patch cable (5' foot)	ea.	$ 12.55	$ 12.55
3.31	Category 6a patch cable (10' foot)	ea.	$ 15.47	$ 15.47
3.32	Category 6a patch cable (15' foot)	ea.	$ 19.10	$ 19.10
	Sub-total average unit price		$ 14.49	$ 14.49
	Sub-Division - Category 6A Copper Connectivity Items			
3.33	Category 6a Patch Panel 24 port 110 Termination	ea.	$ 565.00	$ 565.00
3.34	Category 6a Patch Panel 48 port 110 Termination	ea.	$ 890.00	$ 890.00
3.35	Category 6a Patch Panel 24 port 110 Termination - Angled	ea.	$ 565.00	$ 565.00
3.36	Category 6a Patch Panel 48 port 110 Termination - Angled	ea.	$ 905.00	$ 905.00
3.37	Category 6a Blank Patch Panel 24 port with Modular Jack Termination	ea.	$ 430.00	$ 430.00
3.38	Category 6a Blank Patch Panel 48 port with Modular Jack Termination	ea.	$ 818.00	$ 818.00
3.39	Category 6a Blank Patch Panel 24 port with Modular Jack Termination - Angled	ea.	$ 430.00	$ 430.00
3.40	Category 6a Blank Patch Panel 48 port with Modular Jack Termination - Angled	ea.	$ 818.00	$ 818.00
	Sub-total average unit price		$ 677.63	$ 677.63
	Sub-Division - Misc. Copper Connectivity Items			
4.01	MRJ21 3 Cassette Panel	ea.	$ 25.00	$ 25.00
4.02	MRJ21 6 Port Cassette	ea.	$ 25.00	$ 25.00
4.03	MRJ21 12 Port Cassette	ea.	$ 25.00	$ 25.00
4.04	Copper Splice Enclosure 4" x 22"	ea.	$ 420.00	$ 420.00
4.05	Copper Splice Enclosure 8.5" x 22.5"	ea.	$ 632.00	$ 632.00

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Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
4.06	Copper Splice Enclosure 8" x 36"	ea.	$ 632.00	$ 632.00
4.07	Copper Splice (one Pair)	ea.	$ 2.50	$ 2.50
4.08	Building Entrance Protector - Solid State Modules - 6 Pair	ea.	$ 95.00	$ 95.00
4.09	Building Entrance Protector - Solid State Modules - 12 Pair	ea.	$ 121.36	$ 121.36
4.10	Building Entrance Protector - Solid State Modules - 25 Pair	ea.	$ 230.00	$ 230.00
4.11	Building Entrance Protector - Solid State Modules - 50 Pair	ea.	$ 400.00	$ 400.00
4.12	Building Entrance Protector - Solid State Modules - 100 Pair	ea.	$ 500.00	$ 500.00
4.13	Building Entrance Protector - Gas-tube Modules - 6 Pair	ea.	$ 125.00	$ 125.00
4.14	Building Entrance Protector - Gas-tube Modules - 12 Pair	ea.	$ 125.00	$ 125.00
4.15	Building Entrance Protector - Gas-tube Modules - 25 Pair	ea.	$ 225.00	$ 225.00
4.16	Building Entrance Protector - Gas-tube Modules - 50 Pair	ea.	$ 400.00	$ 400.00
4.17	Building Entrance Protector - Gas-tube Modules - 100 Pair	ea.	$ 500.00	$ 500.00
	Sub-total average unit price		$ 263.70	$ 263.70
	Sub-Division - OM1 Multimode Fiber Optics - Section 5			
5.01	6-Strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Plenum	ft.	$ 4.70	$ 4.70
5.02	6-Strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Riser	ft.	$ 4.56	$ 4.56
5.03	6-Strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Plenum	ft.	$ 4.16	$ 4.16
5.04	6-Strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Riser	ft.	$ 3.67	$ 3.67
5.05	6-Strand OM1 Optical Fiber (62.5/125µm) Outside Plant	ft.	$ 2.25	$ 2.25
5.06	12-Strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Plenum	ft.	$ 5.41	$ 5.41
5.07	12-Strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Riser	ft.	$ 4.28	$ 4.28
5.08	12-Strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Plenum	ft.	$ 4.07	$ 4.07
5.09	12-Strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Riser	ft.	$ 3.56	$ 3.56
5.10	12-Strand OM1 Optical Fiber (62.5/125µm) Outside Plant	ft.	$ 2.77	$ 2.77

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Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
5.11	24-Strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Plenum	ft.	$ 6.17	$ 6.17
5.12	24-Strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Riser	ft.	$ 5.51	$ 5.51
5.13	24-Strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Plenum	ft.	$ 5.82	$ 5.82
5.14	24-Strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Riser	ft.	$ 4.45	$ 4.45
5.15	24-Strand OM1 Optical Fiber (62.5/125µm) Outside Plant	ft.	$ 4.95	$ 4.95
5.16	48-strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Plenum	ft.	$ 11.38	$ 11.38
5.17	48-strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Riser	ft.	$ 9.64	$ 9.64
5.18	48-strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Plenum	ft.	$ 9.75	$ 9.75
5.19	48-strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Riser	ft.	$ 8.25	$ 8.25
5.20	48-strand OM1 Optical Fiber (62.5/125µm) Outside Plant	ft.	$ 6.02	$ 6.02
5.21	96-strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Plenum	ft.	$ 19.01	$ 19.01
5.22	96-strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Riser	ft.	$ 15.00	$ 15.00
5.23	96-strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Plenum	ft.	$ 15.00	$ 15.00
5.24	96-strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Riser	ft.	$ 12.00	$ 12.00
5.25	96-strand OM1 Optical Fiber (62.5/125µm) Outside Plant	ft.	$ 12.00	$ 12.00
5.26	144-strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Plenum	ft.	$ 15.00	$ 15.00
5.27	144-strand OM1 Optical Fiber (62.5/125µm) Distribution Cable Riser	ft.	$ 15.00	$ 15.00
5.28	144-strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Plenum	ft.	$ 15.00	$ 15.00
5.29	144-strand OM1 Optical Fiber (62.5/125µm) Indoor/Outdoor Riser	ft.	$ 15.00	$ 15.00
5.30	144-strand OM1 Optical Fiber (62.5/125µm) Outside Plant	ft.	$ 15.00	$ 15.00
	Sub-total average unit price		$ 8.65	$ 8.65
	Sub-Division - OM1 Multimode Fiber Optic Patch Cables			
5.31	OM1 Optical Fiber Duplex Patch Cord LC/LC 62.5/125µm (2 meter)	ea.	$ 35.00	$ 35.00
5.32	OM1 Optical Fiber Duplex Patch Cord LC/LC 62.5/125µm (3 meter)	ea.	$ 36.00	$ 36.00

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Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
5.33	OM1 Optical Fiber Duplex Patch Cord LC/LC 62.5/125µm (5 meter)	ea.	$ 38.00	$ 38.00
5.34	OM1 Optical Fiber Patch Cord LC/MT-RJ 62.5/125µm (2 meter)	ea.	$ 43.00	$ 43.00
5.35	OM1 Optical Fiber Patch Cord LC/MT-RJ 62.5/125µm (3 meter)	ea.	$ 44.91	$ 44.91
5.36	OM1 Optical Fiber Patch Cord LC/MT-RJ 62.5/125µm (5 meter)	ea.	$ 25.00	$ 25.00
5.37	OM1 Optical Fiber Duplex Patch Cord LC/SC 62.5/125µm (2 meter)	ea.	$ 16.63	$ 16.63
5.38	OM1 Optical Fiber Duplex Patch Cord LC/SC 62.5/125µm (3 meter)	ea.	$ 17.42	$ 17.42
5.39	OM1 Optical Fiber Duplex Patch Cord LC/SC 62.5/125µm (5 meter)	ea.	$ 19.16	$ 19.16
5.40	OM1 Optical Fiber Patch Cord LC/Dual ST 62.5/125µm (2 meter)	ea.	$ 16.68	$ 16.68
5.41	OM1 Optical Fiber Patch Cord LC/Dual ST 62.5/125µm (3 meter)	ea.	$ 18.00	$ 18.00
5.42	OM1 Optical Fiber Patch Cord LC/Dual ST 62.5/125µm (5 meter)	ea.	$ 20.61	$ 20.61
5.43	OM1 Optical Fiber Patch Cord MT-RJ/MT-RJ 62.5/125µm (2 meter)	ea.	$ 10.00	$ 10.00
5.44	OM1 Optical Fiber Patch Cord MT-RJ/MT-RJ 62.5/125µm (3 meter)	ea.	$ 10.00	$ 10.00
5.45	OM1 Optical Fiber Patch Cord MT-RJ/MT-RJ 62.5/125µm (5 meter)	ea.	$ 12.00	$ 12.00
5.46	OM1 Optical Fiber Patch Cord MT-RJ/SC Simplex 62.5/125µm (2 meter)	ea.	$ 12.00	$ 12.00
5.47	OM1 Optical Fiber Patch Cord MT-RJ/SC Simplex 62.5/125µm (3 meter)	ea.	$ 14.11	$ 14.11
5.48	OM1 Optical Fiber Patch Cord MT-RJ/SC Simplex 62.5/125µm (5 meter)	ea.	$ 12.63	$ 12.63
5.49	OM1 Optical Fiber Patch Cord MT-RJ/SC Duplex 62.5/125µm (2 meter)	ea.	$ 15.81	$ 15.91
5.50	OM1 Optical Fiber Patch Cord MT-RJ/SC Duplex 62.5/125µm (3 meter)	ea.	$ 16.76	$ 16.76
5.51	OM1 Optical Fiber Patch Cord MT-RJ/SC Duplex 62.5/125µm (5 meter)	ea.	$ 12.00	$ 12.00
5.52	OM1 Optical Fiber Patch Cord MT-RJ/ST (Dual) 62.5/125µm (2 meter)	ea.	$ 15.00	$ 15.00
5.53	OM1 Optical Fiber Patch Cord MT-RJ/ST (Dual) 62.5/125µm (3 meter)	ea.	$ 14.00	$ 14.00
5.54	OM1 Optical Fiber Patch Cord MT-RJ/ST (Dual) 62.5/125µm (5 meter)	ea.	$ 12.00	$ 12.00
5.55	OM1 Optical Fiber Patch Cord SC Duplex/SC Duplex 62.5/125µm (2 meter)	ea.	$ 15.00	$ 15.00
5.56	OM1 Optical Fiber Patch Cord SC Duplex/SC Duplex 62.5/125µm (3 meter)	ea.	$ 20.00	$ 20.00

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DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
5.57	OM1 Optical Fiber Patch Cord SC Duplex/SC Duplex 62.5/125µm (5 meter)	ea.	$ 17.81	$ 17.81
5.58	OM1 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 62.5/125µm (2 meter)	ea.	$ 20.00	$ 20.00
5.59	OM1 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 62.5/125µm (3 meter)	ea.	$ 25.00	$ 25.00
5.60	OM1 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 62.5/125µm (5 meter)	ea.	$ 17.81	$ 17.81
5.61	OM1 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 62.5/125µm (2 meter)	ea.	$ 20.00	$ 20.00
5.62	OM1 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 62.5/125µm (3 meter)	ea.	$ 12.35	$ 12.35
5.63	OM1 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 62.5/125µm (5 meter)	ea.	$ 14.12	$ 14.12
	Sub-total average unit price		$ 19.66	$ 19.66
	Sub-Division - OM1 Multimode Fiber Optic Connectivity Items			
5.64	OM1 MPO Optical Fiber Cassette, LC Duplex, 62.5/125 µm, 12-Fiber	ea.	$ 450.75	$ 450.75
5.65	OM1 MPO Optical Fiber Cassette, LC Duplex, 62.5/125 µm, 24-Fiber	ea.	$ 670.36	$ 670.36
5.66	OM1 MPO Optical Fiber Cassette, MT-RJ, 62.5/125 µm, 12-Fiber	ea.	$ 200.00	$ 200.00
5.67	OM1 MPO Optical Fiber Cassette, MT-RJ, 62.5/125 µm, 24-Fiber	ea.	$ 200.00	$ 200.00
5.68	OM1 MPO Optical Fiber Cassette, SC Duplex, 62.5/125 µm, 12-Fiber	ea.	$ 435.00	$ 435.00
5.69	OM1 MPO Optical Fiber Cassette, SC Duplex, 62.5/125 µm, 24-Fiber	ea.	$ 670.00	$ 670.00
5.70	OM1 MPO Optical Fiber Cassette, ST, 62.5/125 µm, 12-Fiber	ea.	$ 200.00	$ 200.00
5.71	OM1 MPO Optical Fiber Cassette, ST, 62.5/125 µm, 24-Fiber	ea.	$ 200.00	$ 200.00
5.72	OM1 Optical Fiber LC Duplex Snap-in Adapter Plate 62.5/125µm 12 Fiber	ea.	$ 120.00	$ 120.00
5.73	OM1 Optical Fiber LC Duplex Snap-in Adapter Plate 62.5/125µm 24 Fiber	ea.	$ 150.00	$ 150.00
5.74	OM1 Optical Fiber MT-RJ Snap-in Adapter Plate 62.5/125µm 12 Fiber	ea.	$ 50.00	$ 50.00
5.75	OM1 Optical Fiber MT-RJ Snap-in Adapter Plate 62.5/125µm 24 Fiber	ea.	$ 50.00	$ 50.00
5.76	OM1 Optical Fiber SC Simplex Snap-in Adapter Plate 62.5/125µm 6 Fiber	ea.	$ 95.43	$ 95.43
5.77	OM1 Optical Fiber SC Duplex Snap-in Adapter Plate 62.5/125µm 6 Fiber	ea.	$ 95.43	$ 95.43
5.78	OM1 Optical Fiber SC Duplex Snap-in Adapter Plate 62.5/125µm 12 Fiber	ea.	$ 110.00	$ 110.00

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
5.79	OM1 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 62.5/125µm 6 Fiber	ea.	$ 20.00	$ 20.00
5.80	OM1 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 62.5/125µm 12 Fiber	ea.	$ 20.00	$ 20.00
5.81	OM1 Optical Fiber ST Snap-in Adapter Plate 62.5/125µm 6 Fiber	ea.	$ 95.43	$ 95.43
5.82	OM1 Optical Fiber ST Duplex Snap-in Adapter Plate 62.5/125µm 12 Fiber	ea.	$ 110.00	$ 110.00
	Sub-total average unit price		$ 207.49	$ 207.49
	Sub-Division - OM2 Multimode Fiber Optics - Section 6			
6.01	6-Strand OM2 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 2.35	$ 2.35
6.02	6-Strand OM2 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 2.00	$ 2.00
6.03	6-Strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 2.35	$ 2.35
6.04	6-Strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 2.00	$ 2.00
6.05	6-Strand OM2 Optical Fiber (50/125µm) Outside Plant	ft.	$ 1.50	$ 1.50
6.06	12-Strand OM2 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 3.00	$ 3.00
6.07	12-Strand OM2 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 2.65	$ 2.65
6.08	12-Strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 3.00	$ 3.00
6.09	12-Strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 2.65	$ 2.65
6.10	12-Strand OM2 Optical Fiber (50/125µm) Outside Plant	ft.	$ 3.00	$ 3.00
6.11	24-Strand OM2 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 4.50	$ 4.50
6.12	24-Strand OM2 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 4.00	$ 4.00
6.13	24-Strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 4.50	$ 4.50
6.14	24-Strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 4.00	$ 4.00
6.15	24-Strand OM2 Optical Fiber (50/125µm) Outside Plant	ft.	$ 3.65	$ 3.65
6.16	48-strand OM2 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 8.00	$ 8.00
6.17	48-strand OM2 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 7.75	$ 7.75
6.18	48-strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 8.00	$ 8.00

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
6.19	48-strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 6.75	$ 6.75
6.20	48-strand OM2 Optical Fiber (50/125µm) Outside Plant	ft.	$ 6.00	$ 6.00
6.21	96-strand OM2 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 16.00	$ 16.00
6.22	96-strand OM2 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 14.62	$ 14.62
6.23	96-strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 16.92	$ 16.92
6.24	96-strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 14.75	$ 14.75
6.25	96-strand OM2 Optical Fiber (50/125µm) Outside Plant	ft.	$ 10.41	$ 10.41
6.26	144-strand OM2 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 25.00	$ 25.00
6.27	144-strand OM2 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 20.45	$ 20.45
6.28	144-strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 20.45	$ 20.45
6.29	144-strand OM2 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 15.69	$ 15.69
6.30	144-strand OM2 Optical Fiber (50/125µm) Outside Plant	ft.	$ 14.23	$ 14.23
	Sub-total average unit price		$ 8.34	$ 8.34
	Sub-Division - OM2 Multimode Fiber Optic Patch Cables			
6.31	OM2 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (2 meter)	ea.	$ 25.00	$ 25.00
6.32	OM2 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (3 meter)	ea.	$ 27.00	$ 27.00
6.33	OM2 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (5 meter)	ea.	$ 37.41	$ 37.41
6.34	OM2 Optical Fiber Patch Cord LC/MT-RJ 50/125µm (2 meter)	ea.	$ 22.12	$ 22.12
6.35	OM2 Optical Fiber Patch Cord LC/MT-RJ 50/125µm (3 meter)	ea.	$ 23.00	$ 23.00
6.36	OM2 Optical Fiber Patch Cord LC/MT-RJ 50/125µm (5 meter)	ea.	$ 25.14	$ 25.14
6.37	OM2 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (2 meter)	ea.	$ 17.70	$ 17.70
6.38	OM2 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (3 meter)	ea.	$ 19.25	$ 19.25
6.39	OM2 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (5 meter)	ea.	$ 16.61	$ 16.61
6.40	OM2 Optical Fiber Patch Cord LC/Dual ST 50/125µm (2 meter)	ea.	$ 17.54	$ 17.54

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
6.41	OM2 Optical Fiber Patch Cord LC/Dual ST 50/125µm (3 meter)	ea.	$ 19.50	$ 19.50
6.42	OM2 Optical Fiber Patch Cord LC/Dual ST 50/125µm (5 meter)	ea.	$ 16.30	$ 16.30
6.43	OM2 Optical Fiber Patch Cord MT-RJ/MT-RJ 50/125µm (2 meter)	ea.	$ 12.46	$ 12.46
6.44	OM2 Optical Fiber Patch Cord MT-RJ/MT-RJ 50/125µm (3 meter)	ea.	$ 14.60	$ 14.60
6.45	OM2 Optical Fiber Patch Cord MT-RJ/MT-RJ 50/125µm (5 meter)	ea.	$ 18.60	$ 18.60
6.46	OM2 Optical Fiber Patch Cord MT-RJ/SC Simplex 50/125µm (2 meter)	ea.	$ 19.76	$ 19.76
6.47	OM2 Optical Fiber Patch Cord MT-RJ/SC Simplex 50/125µm (3 meter)	ea.	$ 19.79	$ 19.79
6.48	OM2 Optical Fiber Patch Cord MT-RJ/SC Simplex 50/125µm (5 meter)	ea.	$ 19.79	$ 19.79
6.49	OM2 Optical Fiber Patch Cord MT-RJ/SC Duplex 50/125µm (2 meter)	ea.	$ 16.30	$ 16.30
6.50	OM2 Optical Fiber Patch Cord MT-RJ/SC Duplex 50/125µm (3 meter)	ea.	$ 17.46	$ 17.46
6.51	OM2 Optical Fiber Patch Cord MT-RJ/SC Duplex 50/125µm (5 meter)	ea.	$ 19.79	$ 19.79
6.52	OM2 Optical Fiber Patch Cord MT-RJ/ST (Dual) 50/125µm (2 meter)	ea.	$ 16.30	$ 16.30
6.53	OM2 Optical Fiber Patch Cord MT-RJ/ST (Dual) 50/125µm (3 meter)	ea.	$ 17.46	$ 17.46
6.54	OM2 Optical Fiber Patch Cord MT-RJ/ST (Dual) 50/125µm (5 meter)	ea.	$ 19.79	$ 19.79
6.55	OM2 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (2 meter)	ea.	$ 11.22	$ 11.22
6.56	OM2 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (3 meter)	ea.	$ 12.35	$ 12.35
6.57	OM2 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (5 meter)	ea.	$ 25.00	$ 25.00
6.58	OM2 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 50/125µm (2 meter)	ea.	$ 11.22	$ 11.22
6.59	OM2 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 50/125µm (3 meter)	ea.	$ 12.35	$ 12.35
6.60	OM2 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 50/125µm (5 meter)	ea.	$ 14.12	$ 14.12
6.61	OM2 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 50/125µm (2 meter)	ea.	$ 11.22	$ 11.22
6.62	OM2 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 50/125µm (3 meter)	ea.	$ 12.35	$ 12.35
6.63	OM2 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 50/125µm (5 meter)	ea.	$ 14.12	$ 14.12
	Sub-total average unit price		$ 18.26	$ 18.26

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term		Renewal Term
Item #	Description	Unit	Unit Price Region Six		Unit Price Region Six
Sub-Division - OM2 Multimode Fiber Optic Connectivity Items					
6.64	OM2 MPO Optical Fiber Cassette, LC Duplex, 50/125 µm, 12-Fiber	ea.	**$ 460.00**		**$ 460.00**
6.65	OM2 MPO Optical Fiber Cassette, LC Duplex, 50/125 µm, 24-Fiber	ea.	**$ 545.00**		**$ 545.00**
6.66	OM2 MPO Optical Fiber Cassette, MT-RJ, 50/125 µm, 12-Fiber	ea.	**$ 216.20**		**$ 216.20**
6.67	OM2 MPO Optical Fiber Cassette, MT-RJ, 50/125 µm, 24-Fiber	ea.	**$ 266.25**		**$ 266.25**
6.68	OM2 MPO Optical Fiber Cassette, SC Duplex, 50/125 µm, 12-Fiber	ea.	**$ 460.00**		**$ 460.00**
6.69	OM2 MPO Optical Fiber Cassette, SC Duplex, 50/125 µm, 24-Fiber	ea.	**$ 545.00**		**$ 545.00**
6.70	OM2 MPO Optical Fiber Cassette, ST, 50/125 µm, 12-Fiber	ea.	**$ 200.00**		**$ 200.00**
6.71	OM2 MPO Optical Fiber Cassette, ST, 50/125 µm, 24-Fiber	ea.	**$ 200.00**		**$ 200.00**
6.72	OM2 Optical Fiber LC Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 125.00**		**$ 125.00**
6.73	OM2 Optical Fiber LC Duplex Snap-in Adapter Plate 50/125µm 24 Fiber	ea.	**$ 155.00**		**$ 155.00**
6.74	OM2 Optical Fiber MT-RJ Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 75.00**		**$ 75.00**
6.75	OM2 Optical Fiber MT-RJ Snap-in Adapter Plate 50/125µm 24 Fiber	ea.	**$ 110.00**		**$ 110.00**
6.76	OM2 Optical Fiber SC Simplex Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 90.00**		**$ 90.00**
6.77	OM2 Optical Fiber SC Duplex Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 90.00**		**$ 90.00**
6.78	OM2 Optical Fiber SC Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 110.00**		**$ 110.00**
6.79	OM2 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 75.00**		**$ 75.00**
6.80	OM2 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 75.00**		**$ 75.00**
6.81	OM2 Optical Fiber ST Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 75.00**		**$ 75.00**
6.82	OM2 Optical Fiber ST Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 75.00**		**$ 75.00**
Sub-total average unit price			$ 207.76		$ 207.76
Sub-Division - OM3 Multimode Fiber Optics - Section 7					
7.01	6-Strand OM3 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	**$ 3.90**		**$ 3.90**
7.02	6-Strand OM3 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	**$ 3.80**		**$ 3.80**

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DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
7.03	6-Strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 3.90	$ 3.90
7.04	6-Strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 3.80	$ 3.80
7.05	6-Strand OM3 Optical Fiber (50/125µm) Outside Plant	ft.	$ 3.90	$ 3.90
7.06	12-Strand OM3 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 4.65	$ 4.65
7.07	12-Strand OM3 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 4.55	$ 4.55
7.08	12-Strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 4.79	$ 4.79
7.09	12-Strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 4.55	$ 4.55
7.10	12-Strand OM3 Optical Fiber (50/125µm) Outside Plant	ft.	$ 4.55	$ 4.55
7.11	24-Strand OM3 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 8.57	$ 8.57
7.12	24-Strand OM3 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 4.25	$ 4.25
7.13	24-Strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 8.57	$ 8.57
7.14	24-Strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 4.25	$ 4.25
7.15	24-Strand OM3 Optical Fiber (50/125µm) Outside Plant	ft.	$ 4.25	$ 4.25
7.16	48-strand OM3 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 14.31	$ 14.31
7.17	48-strand OM3 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 12.16	$ 12.16
7.18	48-strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 14.31	$ 14.31
7.19	48-strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 12.16	$ 12.16
7.20	48-strand OM3 Optical Fiber (50/125µm) Outside Plant	ft.	$ 11.23	$ 11.23
7.21	96-strand OM3 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 25.03	$ 25.03
7.22	96-strand OM3 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 24.03	$ 24.03
7.23	96-strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 22.55	$ 22.55
7.24	96-strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 22.55	$ 22.55
7.25	96-strand OM3 Optical Fiber (50/125µm) Outside Plant	ft.	$ 22.16	$ 22.16
7.26	144-strand OM3 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 21.11	$ 21.11

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
7.27	144-strand OM3 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 35.58	$ 35.58
7.28	144-strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 32.44	$ 32.44
7.29	144-strand OM3 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 32.44	$ 32.44
7.30	144-strand OM3 Optical Fiber (50/125µm) Outside Plant	ft.	$ 28.74	$ 28.74
	Sub-total average unit price		$ 13.44	$ 13.44
	Sub-Division - OM3 Multimode Fiber Optic Patch Cables			
7.31	OM3 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (2 meter)	ea.	$ 28.45	$ 28.45
7.32	OM3 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (3 meter)	ea.	$ 30.38	$ 30.38
7.33	OM3 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (5 meter)	ea.	$ 33.67	$ 33.67
7.34	OM3 Optical Fiber Patch Cord LC/MT-RJ 50/125µm (2 meter)	ea.	$ 12.00	$ 12.00
7.35	OM3 Optical Fiber Patch Cord LC/MT-RJ 50/125µm (3 meter)	ea.	$ 12.00	$ 12.00
7.36	OM3 Optical Fiber Patch Cord LC/MT-RJ 50/125µm (5 meter)	ea.	$ 12.00	$ 12.00
7.37	OM3 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (2 meter)	ea.	$ 21.65	$ 21.65
7.38	OM3 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (3 meter)	ea.	$ 23.41	$ 23.41
7.39	OM3 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (5 meter)	ea.	$ 28.08	$ 28.08
7.40	OM3 Optical Fiber Patch Cord LC/Dual ST 50/125µm (2 meter)	ea.	$ 17.32	$ 17.32
7.41	OM3 Optical Fiber Patch Cord LC/Dual ST 50/125µm (3 meter)	ea.	$ 18.73	$ 18.73
7.42	OM3 Optical Fiber Patch Cord LC/Dual ST 50/125µm (5 meter)	ea.	$ 22.47	$ 22.47
7.43	OM3 Optical Fiber Patch Cord MT-RJ/MT-RJ 50/125µm (2 meter)	ea.	$ 12.31	$ 12.31
7.44	OM3 Optical Fiber Patch Cord MT-RJ/MT-RJ 50/125µm (3 meter)	ea.	$ 12.45	$ 12.45
7.45	OM3 Optical Fiber Patch Cord MT-RJ/MT-RJ 50/125µm (5 meter)	ea.	$ 12.65	$ 12.65
7.46	OM3 Optical Fiber Patch Cord MT-RJ/SC Simplex 50/125µm (2 meter)	ea.	$ 12.75	$ 12.75
7.47	OM3 Optical Fiber Patch Cord MT-RJ/SC Simplex 50/125µm (3 meter)	ea.	$ 12.16	$ 12.16
7.48	OM3 Optical Fiber Patch Cord MT-RJ/SC Simplex 50/125µm (5 meter)	ea.	$ 12.65	$ 12.65

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item	Description	Unit	Initial Term Unit Price Region Six	Renewal Term Unit Price Region Six
7.49	OM3 Optical Fiber Patch Cord MT-RJ/SC Duplex 50/125µm (2 meter)	ea.	**$ 12.75**	**$ 12.75**
7.50	OM3 Optical Fiber Patch Cord MT-RJ/SC Duplex 50/125µm (3 meter)	ea.	**$ 12.85**	**$ 12.85**
7.51	OM3 Optical Fiber Patch Cord MT-RJ/SC Duplex 50/125µm (5 meter)	ea.	**$ 14.65**	**$ 14.65**
7.52	OM3 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (2 meter)	ea.	**$ 16.20**	**$ 16.20**
7.53	OM3 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (3 meter)	ea.	**$ 17.32**	**$ 17.32**
7.54	OM3 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (5 meter)	ea.	**$ 23.05**	**$ 23.05**
7.55	OM3 Optical Fiber Patch Cord SC Duplex/SC Duplex 50/125µm (10 meter)	ea.	**$ 16.20**	**$ 16.20**
7.56	OM3 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 50/125µm (2 meter)	ea.	**$ 17.32**	**$ 17.32**
7.57	OM3 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 50/125µm (3 meter)	ea.	**$ 20.17**	**$ 20.17**
7.58	OM3 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 50/125µm (5 meter)	ea.	**$ 20.56**	**$ 20.56**
7.59	OM3 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 50/125µm (2 meter)	ea.	**$ 20.56**	**$ 20.56**
7.60	OM3 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 50/125µm (3 meter)	ea.	**$ 12.16**	**$ 12.16**
7.61	OM3 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 50/125µm (5 meter)	ea.	**$ 25.00**	**$ 25.00**
	Sub-total average unit price		$ 18.19	$ 18.19
	Sub-Division - OM3 Multimode Fiber Optic Connectivity Items			
7.62	OM3 MPO Optical Fiber Cassette, LC Duplex, 50/125 µm, 12-Fiber	ea.	**$ 460.00**	**$ 460.00**
7.63	OM3 MPO Optical Fiber Cassette, LC Duplex, 50/125 µm, 24-Fiber	ea.	**$ 760.00**	**$ 760.00**
7.64	OM3 MPO Optical Fiber Cassette, MT-RJ, 50/125 µm, 12-Fiber	ea.	**$ 125.00**	**$ 125.00**
7.65	OM3 MPO Optical Fiber Cassette, MT-RJ, 50/125 µm, 24-Fiber	ea.	**$ 128.00**	**$ 128.00**
7.66	OM3 MPO Optical Fiber Cassette, SC Duplex, 50/125 µm, 12-Fiber	ea.	**$ 375.00**	**$ 375.00**
7.67	OM3 MPO Optical Fiber Cassette, SC Duplex, 50/125 µm, 24-Fiber	ea.	**$ 122.22**	**$ 122.22**
7.68	OM3 Optical Fiber LC Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 190.04**	**$ 190.04**
7.69	OM3 Optical Fiber LC Duplex Snap-in Adapter Plate 50/125µm 24 Fiber	ea.	**$ 84.60**	**$ 84.60**
7.70	OM3 Optical Fiber MT-RJ Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 55.00**	**$ 55.00**

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
7.71	OM3 Optical Fiber MT-RJ Snap-in Adapter Plate 50/125µm 24 Fiber	ea.	$ 84.60	$ 84.60
7.72	OM3 Optical Fiber SC Simplex Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	$ 84.60	$ 84.60
7.73	OM3 Optical Fiber SC Duplex Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	$ 110.00	$ 110.00
7.74	OM3 Optical Fiber SC Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	$ 84.60	$ 84.60
7.75	OM3 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	$ 84.60	$ 84.60
7.76	OM3 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	$ 102.00	$ 102.00
7.77	OM3 Optical Fiber ST Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	$ 35.00	$ 35.00
7.78	OM3 Optical Fiber ST Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	$ 45.00	$ 45.00
	Sub-total average unit price		$ 172.37	$ 172.37
	Sub-Division - OM4 Multimode Fiber Optics - Section 8			
8.01	6-Strand OM4 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 4.22	$ 4.22
8.02	6-Strand OM4 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 4.02	$ 4.02
8.03	6-Strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 4.22	$ 4.22
8.04	6-Strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 3.25	$ 3.25
8.05	6-Strand OM4 Optical Fiber (50/125µm) Outside Plant	ft.	$ 4.29	$ 4.29
8.06	12-Strand OM4 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 5.00	$ 5.00
8.07	12-Strand OM4 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 4.70	$ 4.70
8.08	12-Strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 4.47	$ 4.47
8.09	12-Strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 3.50	$ 3.50
8.10	12-Strand OM4 Optical Fiber (50/125µm) Outside Plant	ft.	$ 3.50	$ 3.50
8.11	24-Strand OM4 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 5.51	$ 5.51
8.12	24-Strand OM4 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 7.46	$ 7.46
8.13	24-Strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 6.95	$ 6.95
8.14	24-Strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 7.05	$ 7.05

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
8.15	24-Strand OM4 Optical Fiber (50/125µm) Outside Plant	ft.	$ 7.37	$ 7.37
8.16	48-strand OM4 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 16.88	$ 16.88
8.17	48-strand OM4 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 14.75	$ 14.75
8.18	48-strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 16.88	$ 16.88
8.19	48-strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 14.75	$ 14.75
8.20	48-strand OM4 Optical Fiber (50/125µm) Outside Plant	ft.	$ 13.07	$ 13.07
8.21	96-strand OM4 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 32.01	$ 32.01
8.22	96-strand OM4 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 29.91	$ 29.91
8.23	96-strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 32.82	$ 32.82
8.24	96-strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 29.91	$ 29.91
8.25	96-strand OM4 Optical Fiber (50/125µm) Outside Plant	ft.	$ 30.01	$ 30.01
8.26	144-strand OM4 Optical Fiber (50/125µm) Distribution Cable Plenum	ft.	$ 45.38	$ 45.38
8.27	144-strand OM4 Optical Fiber (50/125µm) Distribution Cable Riser	ft.	$ 39.00	$ 39.00
8.28	144-strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Plenum	ft.	$ 45.38	$ 45.38
8.29	144-strand OM4 Optical Fiber (50/125µm) Indoor/Outdoor Riser	ft.	$ 38.16	$ 38.16
8.30	144-strand OM4 Optical Fiber (50/125µm) Outside Plant	ft.	$ 42.68	$ 42.68
	Sub-total average unit price		$ 17.24	$ 17.24
	Sub-Division - OM4 Multimode Fiber Optic Patch Cables			
8.31	OM4 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (2 meter)	ea.	$ 37.52	$ 37.52
8.32	OM4 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (3 meter)	ea.	$ 39.69	$ 39.69
8.33	OM4 Optical Fiber Duplex Patch Cord LC/LC 50/125µm (5 meter)	ea.	$ 44.02	$ 44.02
8.34	OM4 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (2 meter)	ea.	$ 35.02	$ 35.02
8.35	OM4 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (3 meter)	ea.	$ 37.19	$ 37.19
8.36	OM4 Optical Fiber Duplex Patch Cord LC/SC 50/125µm (5 meter)	ea.	$ 41.52	$ 41.52

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EXHIBIT B - PRICING WORKBOOK 3.0
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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
	Sub-total average unit price		$ 39.16	$ 39.16
	Sub-Division - OM4 Multimode Fiber Optic Connectivity Items			
8.37	OM4 MPO Optical Fiber Cassette, LC Duplex, 50/125 µm, 12-Fiber	ea.	**$ 483.42**	**$ 483.42**
8.38	OM4 MPO Optical Fiber Cassette, LC Duplex, 50/125 µm, 24-Fiber	ea.	**$ 510.00**	**$ 510.00**
8.39	OM4 MPO Optical Fiber Cassette, SC Duplex, 50/125 µm, 12-Fiber	ea.	**$ 451.55**	**$ 451.55**
8.40	OM4 MPO Optical Fiber Cassette, SC Duplex, 50/125 µm, 24-Fiber	ea.	**$ 510.00**	**$ 510.00**
8.41	OM4 Optical Fiber LC Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 120.31**	**$ 120.31**
8.42	OM4 Optical Fiber LC Duplex Snap-in Adapter Plate 50/125µm 24 Fiber	ea.	**$ 186.47**	**$ 186.47**
8.43	OM4 Optical Fiber MT-RJ Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 84.60**	**$ 84.60**
8.44	OM4 Optical Fiber MT-RJ Snap-in Adapter Plate 50/125µm 24 Fiber	ea.	**$ 110.00**	**$ 110.00**
8.45	OM4 Optical Fiber SC Simplex Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 84.60**	**$ 84.60**
8.46	OM4 Optical Fiber SC Duplex Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 84.60**	**$ 84.60**
8.47	OM4 Optical Fiber SC Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 111.00**	**$ 111.00**
8.48	OM4 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 35.00**	**$ 35.00**
8.49	OM4 Optical Fiber SC Duplex To Dual ST Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 45.00**	**$ 45.00**
8.50	OM4 Optical Fiber ST Snap-in Adapter Plate 50/125µm 6 Fiber	ea.	**$ 35.00**	**$ 35.00**
8.51	OM4 Optical Fiber ST Duplex Snap-in Adapter Plate 50/125µm 12 Fiber	ea.	**$ 45.00**	**$ 45.00**
	Sub-total average unit price		$ 193.10	$ 193.10
	Sub-Division - OS1 or OS2 Single-mode Fiber Optics - Section 9			
9.01	6-strand OS1 Optical Fiber (9/125µm) Distribution Cable Plenum	ft.	**$ 2.87**	**$ 2.87**
9.02	6-strand OS1 Optical Fiber (9/125µm) Distribution Cable Riser	ft.	**$ 2.75**	**$ 2.75**
9.03	6-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Plenum	ft.	**$ 3.00**	**$ 3.00**
9.04	6-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Riser	ft.	**$ 2.75**	**$ 2.75**
9.05	6-strand OS2 Optical Fiber (9/125µm) Outside Plant	ft.	**$ 2.87**	**$ 2.87**

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
9.06	12-strand OS1 Optical Fiber (9/125µm) Distribution Cable Plenum	ft.	$ 3.50	$ 3.50
9.07	12-strand OS1 Optical Fiber (9/125µm) Distribution Cable Riser	ft.	$ 3.57	$ 3.57
9.08	12-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Plenum	ft.	$ 3.81	$ 3.81
9.09	12-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Riser	ft.	$ 3.57	$ 3.57
9.10	12-strand OS2 Optical Fiber (9/125µm) Outside Plant	ft.	$ 2.95	$ 2.95
9.11	24-strand OS1 Optical Fiber (9/125µm) Distribution Cable Plenum	ft.	$ 4.80	$ 4.80
9.12	24-strand OS1 Optical Fiber (9/125µm) Distribution Cable Riser	ft.	$ 4.51	$ 4.51
9.13	24-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Plenum	ft.	$ 5.25	$ 5.25
9.14	24-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Riser	ft.	$ 5.01	$ 5.01
9.15	24-strand OS2 Optical Fiber (9/125µm) Outside Plant	ft.	$ 3.05	$ 3.05
9.16	48-strand OS1 Optical Fiber (9/125µm) Distribution Cable Plenum	ft.	$ 10.25	$ 10.25
9.17	48-strand OS1 Optical Fiber (9/125µm) Distribution Cable Riser	ft.	$ 8.88	$ 8.88
9.18	48-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Plenum	ft.	$ 10.25	$ 10.25
9.19	48-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Riser	ft.	$ 8.88	$ 8.88
9.20	48-strand OS2 Optical Fiber (9/125µm) Outside Plant	ft.	$ 3.22	$ 3.22
9.21	96-strand OS1 Optical Fiber (9/125µm) Distribution Cable Plenum	ft.	$ 16.88	$ 16.88
9.22	96-strand OS1 Optical Fiber (9/125µm) Distribution Cable Riser	ft.	$ 15.88	$ 15.88
9.23	96-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Plenum	ft.	$ 16.88	$ 16.88
9.24	96-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Riser	ft.	$ 15.88	$ 15.88
9.25	96-strand OS2 Optical Fiber (9/125µm) Outside Plant	ft.	$ 3.78	$ 3.78
9.26	144-strand OS1 Optical Fiber (9/125µm) Distribution Cable Plenum	ft.	$ 27.24	$ 27.24
9.27	144-strand OS1 Optical Fiber (9/125µm) Distribution Cable Riser	ft.	$ 23.92	$ 23.92
9.28	144-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Plenum	ft.	$ 27.24	$ 27.24
9.29	144-strand OS2 Optical Fiber (9/125µm) Indoor/Outdoor Riser	ft.	$ 23.92	$ 23.92

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
9.30	144-strand OS2 Optical Fiber (9/125µm) Outside Plant	ft.	$ 10.76	$ 10.76
	Sub-total average unit price		$ 9.27	$ 9.27
	Sub-Division - OS1 Single-mode Fiber Optic Patch Cables			
9.31	OS1 Optical Fiber Duplex Patch Cord LC/LC 9/125µm (2 meter)	ea.	$ 15.00	$ 15.00
9.32	OS1 Optical Fiber Duplex Patch Cord LC/LC 9/125µm (3 meter)	ea.	$ 17.00	$ 17.00
9.33	OS1 Optical Fiber Duplex Patch Cord LC/LC 9/125µm (5 meter)	ea.	$ 22.86	$ 22.86
9.34	OS1 Optical Fiber Patch Cord LC/MT-RJ 9/125µm (2 meter)	ea.	$ 22.65	$ 22.65
9.35	OS1 Optical Fiber Patch Cord LC/MT-RJ 9/125µm (3 meter)	ea.	$ 5.00	$ 5.00
9.36	OS1 Optical Fiber Patch Cord LC/MT-RJ 9/125µm (5 meter)	ea.	$ 5.00	$ 5.00
9.37	OS1 Optical Fiber Duplex Patch Cord LC/SC 9/125µm (2 meter)	ea.	$ 18.91	$ 18.91
9.38	OS1 Optical Fiber Duplex Patch Cord LC/SC 9/125µm (3 meter)	ea.	$ 19.78	$ 19.78
9.39	OS1 Optical Fiber Duplex Patch Cord LC/SC 9/125µm (5 meter)	ea.	$ 21.55	$ 21.55
9.40	OS1 Optical Fiber Patch Cord LC/Dual ST 9/125µm (2 meter)	ea.	$ 14.50	$ 14.50
9.41	OS1 Optical Fiber Patch Cord LC/Dual ST 9/125µm (3 meter)	ea.	$ 16.50	$ 16.50
9.42	OS1 Optical Fiber Patch Cord LC/Dual ST 9/125µm (5 meter)	ea.	$ 17.50	$ 17.50
9.43	OS1 Optical Fiber Patch Cord MT-RJ/MT-RJ 9/125µm (2 meter)	ea.	$ 5.00	$ 5.00
9.44	OS1 Optical Fiber Patch Cord MT-RJ/MT-RJ 9/125µm (3 meter)	ea.	$ 5.00	$ 5.00
9.45	OS1 Optical Fiber Patch Cord MT-RJ/MT-RJ 9/125µm (5 meter)	ea.	$ 7.50	$ 7.50
9.46	OS1 Optical Fiber Patch Cord MT-RJ/SC Simplex 9/125µm (2 meter)	ea.	$ 8.00	$ 8.00
9.47	OS1 Optical Fiber Patch Cord MT-RJ/SC Simplex 9/125µm (3 meter)	ea.	$ 9.00	$ 9.00
9.48	OS1 Optical Fiber Patch Cord MT-RJ/SC Simplex 9/125µm (5 meter)	ea.	$ 9.01	$ 9.01
9.49	OS1 Optical Fiber Patch Cord MT-RJ/SC Duplex 9/125µm (2 meter)	ea.	$ 8.00	$ 8.00
9.50	OS1 Optical Fiber Patch Cord MT-RJ/SC Duplex 9/125µm (3 meter)	ea.	$ 9.00	$ 9.00
9.51	OS1 Optical Fiber Patch Cord MT-RJ/SC Duplex 9/125µm (5 meter)	ea.	$ 10.00	$ 10.00

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
9.52	OS1 Optical Fiber Patch Cord MT-RJ/ST (Dual) 9/125µm (2 meter)	ea.	$ 12.50	$ 12.50
9.53	OS1 Optical Fiber Patch Cord MT-RJ/ST (Dual) 9/125µm (3 meter)	ea.	$ 9.00	$ 9.00
9.54	OS1 Optical Fiber Patch Cord MT-RJ/ST (Dual) 9/125µm (5 meter)	ea.	$ 9.00	$ 9.00
9.55	OS1 Optical Fiber Patch Cord SC Duplex/SC Duplex 9/125µm (2 meter)	ea.	$ 14.39	$ 14.39
9.56	OS1 Optical Fiber Patch Cord SC Duplex/SC Duplex 9/125µm (3 meter)	ea.	$ 15.00	$ 15.00
9.57	OS1 Optical Fiber Patch Cord SC Duplex/SC Duplex 9/125µm (5 meter)	ea.	$ 16.43	$ 16.43
9.58	OS1 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 9/125µm (2 meter)	ea.	$ 14.39	$ 14.39
9.59	OS1 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 9/125µm (3 meter)	ea.	$ 15.00	$ 15.00
9.60	OS1 Optical Fiber Patch Cord SC Duplex/ ST (Dual) 9/125µm (5 meter)	ea.	$ 15.00	$ 15.00
9.61	OS1 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 9/125µm (2 meter)	ea.	$ 17.50	$ 17.50
9.62	OS1 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 9/125µm (3 meter)	ea.	$ 19.50	$ 19.50
9.63	OS1 Optical Fiber Patch Cord ST (Dual) / ST (Dual) 9/125µm (5 meter)	ea.	$ 16.43	$ 16.43
	Sub-total average unit price		$ 13.36	$ 13.36
	Sub-Division - OS1 Single-mode Fiber Optic Connectivity Items			
9.64	OS1 MPO Optical Fiber Cassette, LC Duplex, 9/125 µm, 12-Fiber	ea.	$ 460.00	$ 460.00
9.65	OS1 MPO Optical Fiber Cassette, LC Duplex, 9/125 µm, 24-Fiber	ea.	$ 760.00	$ 760.00
9.66	OS1 MPO Optical Fiber Cassette, MT-RJ, 9/125 µm, 12-Fiber	ea.	$ 125.00	$ 125.00
9.67	OS1 MPO Optical Fiber Cassette, MT-RJ, 9/125 µm, 24-Fiber	ea.	$ 125.00	$ 125.00
9.68	OS1 MPO Optical Fiber Cassette, SC Duplex, 9/125 µm, 12-Fiber	ea.	$ 460.00	$ 460.00
9.69	OS1 MPO Optical Fiber Cassette, SC Duplex, 9/125 µm, 24-Fiber	ea.	$ 760.00	$ 760.00
	Sub-total average unit price		$ 448.33	$ 448.33
	Sub-Division - Coaxial Cable - Section 10			
10.01	RG-6/U Cable Plenum	ft.	$ 1.48	$ 1.48
10.02	RG-6/U Cable Non-Plenum	ft.	$ 1.07	$ 1.07

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Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
10.03	RG-6/UQ Cable Plenum	ft.	$ 1.47	$ 1.47
10.04	RG-6/UQ Cable Non-Plenum	ft.	$ 1.08	$ 1.08
10.05	RG-11/U Cable Plenum	ft.	$ 2.60	$ 2.60
10.06	RG-11/U Cable Non-Plenum	ft.	$ 1.22	$ 1.22
10.07	RG-59/U Coaxial Cable Plenum	ft.	$ 0.45	$ 0.45
10.08	RG-59/U Coaxial Cable Non-Plenum	ft.	$ 0.35	$ 0.35
	Sub-total average unit price		$ 1.22	$ 1.22
	Sub-Division - Price for Single Coaxial Cable to the Outlet			
10.09	RG-6/U Coaxial Cable Plenum	ea.	$ 250.00	$ 250.00
10.10	RG-6/U Coaxial Cable Non-Plenum	ea.	$ 155.00	$ 155.00
10.11	RG-6/U Coaxial Cable Flooded	ea.	$ 175.00	$ 175.00
10.12	RG-6/UQ Coaxial Cable Plenum	ea.	$ 265.00	$ 265.00
10.13	RG-6/UQ Coaxial Cable Non-Plenum	ea.	$ 155.00	$ 155.00
10.14	RG-6/UQ Coaxial Cable Flooded	ea.	$ 155.00	$ 155.00
10.15	RG-11/U Coaxial Cable Plenum	ea.	$ 350.00	$ 350.00
10.16	RG-11/U Coaxial Cable Non-Plenum	ea.	$ 225.00	$ 225.00
10.17	RG-11/U Coaxial Cable Flooded	ea.	$ 225.00	$ 225.00
10.18	RG-59/U Coaxial Cable Plenum	ea.	$ 45.00	$ 45.00
10.19	RG-59/U Coaxial Cable Non-Plenum	ea.	$ 45.00	$ 45.00
10.20	RG-59/U Coaxial Cable Flooded	ea.	$ 45.00	$ 45.00
	Sub-total average unit price		$ 174.17	$ 174.17
	Sub-Division - Coaxial Connectivity Products			
10.21	Male “F” Connector, Compression, RG-59 Series	ea.	$ 1.00	$ 1.00
10.22	Male “F” Connector,Compression, RG-6 Series	ea.	$ 4.00	$ 4.00

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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
10.23	Male “F” Connector, Compression, RG-11 Series	ea.	$ 6.00	$ 6.00
10.24	Male BNC Connector, Compression, three-piece, RG-59 Series	ea.	$ 1.00	$ 1.00
10.25	Coaxial Adapter, “F” Inline Splice, Female to Female	ea.	$ 2.00	$ 2.00
10.26	Coaxial Adapter, “F” Inline Splice, Female to Female with Nut and Washer	ea.	$ 3.00	$ 3.00
10.27	Coaxial “F” Terminator	ea.	$ 1.00	$ 1.00
10.28	Coaxial BNC Adapter, Female to Female Splice	ea.	$ 1.00	$ 1.00
10.29	Coaxial BNC Adapter, BNC “T” Female	ea.	$ 1.00	$ 1.00
10.30	Coaxial BNC Terminator	ea.	$ 1.00	$ 1.00
10.31	Wall Plate, with Female to Female “F” Connector	ea.	$ 5.00	$ 5.00
10.32	Passive Two-Way Splitter, 5-750 MHz	ea.	$ 2.00	$ 2.00
10.33	Passive Three-Way Splitter, 5-750 MHz	ea.	$ 2.00	$ 2.00
10.34	Passive Four-Way Splitter, 5-750 MHz	ea.	$ 2.00	$ 2.00
10.35	Passive Eight-Way Splitter, 5-750 MHz	ea.	$ 2.00	$ 2.00
10.36	Coaxial protector	ea.	$ 45.00	$ 45.00
10.37	Indoor Directional Tap, Four OU/UTPut, 5-750 MHz	ea.	$ 9.00	$ 9.00
10.38	Indoor Directional Tap, Eight OU/UTPut, 5-750 MHz	ea.	$ 15.75	$ 15.75
10.39	Indoor Directional Tap, Twelve OU/UTPut, 5-750 MHz	ea.	$ 18.00	$ 18.00
10.40	Female-to-Male Fixed Attenuator, 5 to 750 MHz	ea.	$ 5.15	$ 5.15
	Sub-total average unit price		$ 6.35	$ 6.35
	Sub-Division - Enclosures - Section 11			
11.01	Server Cabinet (Approximate Dimensions: 84" H x 31.5" W x 48" D)	ea.	$ 2,850.00	$ 2,850.00
11.02	EIA 19" Four Post Rack (Approximate Dimensions 84" H x 15-20" D)	ea.	$ 1,415.00	$ 1,415.00
11.03	EIA 19" Four Post Rack (Approximate Dimensions 84" H x 21-32" D)	ea.	$ 1,415.00	$ 1,415.00
11.04	EIA 19" Two Post Rack (Approximate Dimensions 84" H x 3" D)	ea.	$ 350.00	$ 350.00

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
11.05	EIA 19" Two Post Rack (Approximate Dimensions 84" H x 6" D)	ea.	$ 425.00	$ 425.00
11.06	EIA 19" Open Wall-Mount Rack With Swing-Out Gate (Approximate Dimensions: 24" H x 12" D)	ea.	$ 250.00	$ 250.00
11.07	EIA 19" Open Wall-Mount Rack With Swing-Out Gate (Approximate Dimensions: 24" H x 25" D)	ea.	$ 250.00	$ 250.00
11.08	EIA 19" Open Wall-Mount Rack With Swing-Out Gate (Approximate Dimensions: 48" H x 12" D)	ea.	$ 350.00	$ 350.00
11.09	EIA 19" Open Wall-Mount Rack With Swing-Out Gate (Approximate Dimensions: 48" H x 25" D)	ea.	$ 350.00	$ 350.00
11.10	EIA 19" Fixed Wall-Mount Equipment Rack (Approximate Dimensions 26" H x 18" D)	ea.	$ 250.00	$ 250.00
11.11	EIA 19" Fixed Wall-Mount Equipment Rack (Approximate Dimensions 38" H x 18" D)	ea.	$ 250.00	$ 250.00
11.12	EIA 19" Fixed Wall-Mount Equipment Rack (Approximate Dimensions 50" H x 18" D)	ea.	$ 250.00	$ 250.00
11.13	EIA 19" Hinged wall Bracket 1 Rack Unit	ea.	$ 85.00	$ 85.00
11.14	EIA 19" Hinged Wall Bracket 2 Rack Units	ea.	$ 95.00	$ 95.00
11.15	EIA 19" Hinged Wall Bracket 3 Rack Units	ea.	$ 95.00	$ 95.00
	Sub-total average unit price		$ 578.67	$ 578.67
	Sub-Division - Fiber Enclosures			
11.16	Rack Mount Fiber Optic Patch Panel For Cassettes or Snap-in's - 1RU	ea.	$ 317.19	$ 317.19
11.17	Rack Mount Fiber Optic Patch Panel For Cassettes or Snap-in's - 2RU	ea.	$ 410.31	$ 410.31
11.18	Angled Rack Mount Fiber Optic Patch Panel For Cassettes or Snap-in's - 1RU	ea.	$ 107.38	$ 107.38
11.19	Angled Rack Mount Fiber Optic Patch Panel For Cassettes or Snap-in's - 2RU	ea.	$ 202.79	$ 202.79
11.20	Unloaded Rack Mount Patch Standard Enclosure - 1RU	ea.	$ 325.00	$ 325.00
11.21	Unloaded Rack Mount Patch Standard Enclosure - 2RU	ea.	$ 365.00	$ 365.00
11.22	Unloaded Rack Mount Patch Standard Enclosure - 3RU	ea.	$ 365.00	$ 365.00
11.23	Unloaded Rack Mount Patch Standard Enclosure - 4RU	ea.	$ 460.00	$ 460.00

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
11.24	Unloaded Rack Mount Patch Armoured/Multiple Trunk Enclosure - 1RU	ea.	$ 150.00	$ 150.00
11.25	Unloaded Rack Mount Patch Armoured/Multiple Trunk Enclosure - 2RU	ea.	$ 165.00	$ 165.00
11.26	Unloaded Rack Mount Patch Armoured/Multiple Trunk Enclosure - 3RU	ea.	$ 195.00	$ 195.00
11.27	Unloaded Rack Mount Patch Armoured/Multiple Trunk Enclosure - 4RU	ea.	$ 225.00	$ 225.00
11.28	MT-RJ Rack Mount Enclosure - 1RU	ea.	$ 125.00	$ 125.00
11.29	Rack Mount Optical Fiber Splice Enclosure - 3RU	ea.	$ 360.00	$ 360.00
11.30	Rack Mount Optical Fiber Splice Enclosure - 4RU	ea.	$ 460.00	$ 460.00
11.31	Wall Mount Fiber Optic Patch Enclosure 2 Slot / 1 Door	ea.	$ 145.00	$ 145.00
11.32	Wall Mount Fiber Optic Patch Enclosure 2 Slot / 2 Door	ea.	$ 145.00	$ 145.00
11.33	Wall Mount Fiber Optic Patch Enclosure 4 Slot / 1 Door	ea.	$ 225.00	$ 225.00
11.34	Wall Mount Fiber Optic Patch Enclosure 4 Slot / 2 Door	ea.	$ 225.00	$ 225.00
11.35	Buffer-tube Fan-out Kits	ea.	$ 85.08	$ 85.08
11.36	LC Fiber Connector	ea.	$ 55.00	$ 55.00
11.37	SC Fiber Connector	ea.	$ 55.00	$ 55.00
11.38	ST Fiber Connector	ea.	$ 55.00	$ 55.00
11.39	MT-RJ Fiber Connector	ea.	$ 20.00	$ 20.00
	Sub-total average unit price		$ 218.45	$ 218.45
	Sub-Division - NEMA Enclosures			
11.40	NEMA 3R Enclosure 16" x 16" x 6"	ea.	$ 368.00	$ 368.00
11.41	NEMA 3R Enclosure 24" x 24" x 8"	ea.	$ 606.92	$ 606.92
11.42	NEMA 3R Enclosure 36" x 36" x 12"	ea.	$ 2,500.00	$ 2,500.00
11.43	NEMA 3R Enclosure 48" x 36' x 16"	ea.	$ 1,550.00	$ 1,550.00
	Sub-total average unit price		$ 1,256.23	$ 1,256.23
	Sub-Division - Rack Accessories			

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
11.44	EIA 19" Front Mount Shelf	ea.	**$ 105.00**	**$ 105.00**
11.45	EIA 19" Cantilevered Shelf (mounts to front and back of EIA racks)	ea.	**$ 160.00**	**$ 160.00**
11.46	EIA 19" Multi-Configuration Shelf	ea.	**$ 105.00**	**$ 105.00**
	Sub-total average unit price		$ 123.33	$ 123.33
	Sub-Division - Blank Plates			
11.47	1 RU Dimensions: 1.8"H x 19.0"W	ea.	**$ 65.00**	**$ 65.00**
11.48	2 RU Dimensions: 3.5"H x 19.0"W	ea.	**$ 75.00**	**$ 75.00**
11.49	4 RU Dimensions: 7.0"H x 19.0"W	ea.	**$ 75.00**	**$ 75.00**
11.50	8 RU Dimensions: 14.0"H x 19.0"W	ea.	**$ 85.00**	**$ 85.00**
11.51	Fiber Optic Cassette/Snap-in Blank Plate	ea.	**$ 6.00**	**$ 6.00**
11.52	MRJ21 Modular Patch Panel Blank Plate	ea.	**$ 1.00**	**$ 1.00**
	Sub-total average unit price		$ 51.17	$ 51.17
	Sub-Division - Cable Management - Section 12			
12.01	Horizontal Cable Manager Front and Rear 1 Rack Unit	ea.	**$ 95.75**	**$ 95.75**
12.02	Horizontal Cable Manager Front and Rear 2 Rack Units	ea.	**$ 99.75**	**$ 99.75**
12.03	Horizontal Cable Manager Front and Rear 3 Rack Units	ea.	**$ 99.75**	**$ 99.75**
12.04	Horizontal Cable Manager Front Only 1 Rack Unit	ea.	**$ 81.92**	**$ 81.92**
12.05	Horizontal Cable Manager Front Only 2 Rack Units	ea.	**$ 87.92**	**$ 87.92**
12.06	Horizontal Cable Manager Front Only 3 Rack Units	ea.	**$ 87.92**	**$ 87.92**
12.07	Horizontal Cable Manager Front Only 4 Rack Units	ea.	**$ 87.92**	**$ 87.92**
12.08	Single Sided Vertical Manager - Approximately 3" deep	ea.	**$ 335.00**	**$ 335.00**
12.09	Single Sided Vertical Manager - Approximately 6" deep	ea.	**$ 390.00**	**$ 390.00**
12.10	Double Sided Vertical Manager - Approximately 3" deep	ea.	**$ 725.00**	**$ 725.00**
12.11	Double Sided Vertical Manager - Approximately 6" deep	ea.	**$ 898.00**	**$ 898.00**

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
	Sub-total average unit price		$ 271.72	$ 271.72
	Sub-Division - Backboards, Grounding, and Bonding - Section 13			
13.01	Full Sheet Backboard 4' x 8' x ¾"	ea.	**$ 150.00**	**$ 150.00**
13.02	Half Sheet Backboard 4' x 4' x ¾"	ea.	**$ 125.00**	**$ 125.00**
13.03	#6 AWG-Stranded copper wire cable	ea.	**$ 1.62**	**$ 1.62**
13.04	Ground Termination	ea.	**$ 25.00**	**$ 25.00**
13.05	Ground Bus Bar	ea.	**$ 35.00**	**$ 35.00**
13.06	Main Ground Bus Bar	ea.	**$ 265.00**	**$ 265.00**
13.07	Rack - Anti-Static Pad	ea.	**$ 125.00**	**$ 125.00**
13.08	Rack - Isolation Pad	ea.	**$ 115.00**	**$ 115.00**
	Sub-total average unit price		$ 105.20	$ 105.20
	Sub-Division - Pathways - Section 14			
14.01	Electrical Metallic Tubing - 3/4"	ft.	**$ 16.56**	**$ 16.56**
14.02	Electrical Metallic Tubing - 1"	ft.	**$ 19.53**	**$ 19.53**
14.03	Electrical Metallic Tubing - 2"	ft.	**$ 31.66**	**$ 31.66**
14.04	Electrical Metallic Tubing - 4"	ft.	**$ 67.80**	**$ 67.80**
14.05	Electrical Metallic Tubing Pull Box 12" x 12" x 12"	ea.	**$ 675.00**	**$ 675.00**
14.06	Electrical Metallic Tubing Pull Box 24" x 24" x 6"	ea.	**$ 1,100.00**	**$ 1,100.00**
14.07	Rigid Non-Metallic Conduit - 3/4"	ft.	**$ 14.33**	**$ 14.33**
14.08	Rigid Non-Metallic Conduit - 1"	ft.	**$ 17.00**	**$ 17.00**
14.09	Rigid Non-Metallic Conduit - 2"	ft.	**$ 26.46**	**$ 26.46**
14.10	Rigid Non-Metallic Conduit - 4"	ft.	**$ 49.13**	**$ 49.13**
14.11	Galvanized Rigid Conduit - 3/4"	ft.	**$ 25.50**	**$ 25.50**
14.12	Galvanized Rigid Conduit - 1"	ft.	**$ 28.56**	**$ 28.56**

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
14.13	Galvanized Rigid Conduit - 2"	ft.	$ 51.75	$ 51.75
14.14	Galvanized Rigid Conduit - 4"	ft.	$ 132.16	$ 132.16
14.15	Intermediate Metallic Conduit - 3/4"	ft.	$ 23.73	$ 23.73
14.16	Intermediate Metallic Conduit - 1"	ft.	$ 28.33	$ 28.33
14.17	Intermediate Metallic Conduit - 2"	ft.	$ 47.00	$ 47.00
14.18	Intermediate Metallic Conduit - 4"	ft.	$ 190.46	$ 190.46
14.19	2" Galvanized Sleeve through block or concrete wall	ea.	$ 100.00	$ 100.00
14.20	4" Galvanized Sleeve through block or concrete wall	ea.	$ 142.00	$ 142.00
14.21	2" EMT sleeve through drywall	ea.	$ 75.00	$ 75.00
14.22	4" EMT sleeve through drywall	ea.	$ 105.00	$ 105.00
14.23	2" Schedule 40 PVC Conduit & Warning Tape at 24" Deep in Ground	ft.	$ 16.00	$ 16.00
14.24	4" Schedule 40 PVC Conduit & Warning Tape at 24" Deep in Ground	ft.	$ 20.00	$ 20.00
14.25	Rod Conduit and install mule tape	ft.	$ 1.00	$ 1.00
	Sub-total average unit price		$ 120.16	$ 120.16
	Sub-Division - Raceway Pathways			
14.26	Metallic Surface Raceway 1/2"	ft.	$ 6.00	$ 6.00
14.27	Metallic Surface Raceway 3/4"	ft.	$ 6.50	$ 6.50
14.28	Non-Metallic Surface Raceway 3/4"	ft.	$ 5.50	$ 5.50
14.29	Non-Metallic Surface Raceway 1 1/4"	ft.	$ 6.00	$ 6.00
14.30	Non-Metallic Surface Raceway 1 3/4"	ft.	$ 6.50	$ 6.50
	Sub-total average unit price		$ 6.10	$ 6.10
	Sub-Division - Innerduct Pathways			
14.31	Innerduct With Pull Tape - Riser Rated - 1"	ft.	$ 2.40	$ 2.40
14.32	Innerduct With Pull Tape - Riser Rated - 1 1/2"	ft.	$ 3.05	$ 3.05

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
14.33	Innerduct With Pull Tape - Riser Rated - 2"	ft.	$ 3.49	$ 3.49
14.34	Innerduct With Pull Tape - Plenum Rated - 1"	ft.	$ 4.05	$ 4.05
14.35	Innerduct With Pull Tape - Plenum Rated - 1 1/2"	ft.	$ 6.00	$ 6.00
14.36	Innerduct With Pull Tape - Plenum Rated - 2"	ft.	$ 6.00	$ 6.00
14.37	Innerduct With Pull Tape - Outdoor Rated - 1"	ft.	$ 1.95	$ 1.95
14.38	Innerduct With Pull Tape - Outdoor Rated - 1 1/2"	ft.	$ 2.33	$ 2.33
14.39	Innerduct With Pull Tape - Outdoor Rated - 2"	ft.	$ 2.51	$ 2.51
14.40	Flexible Engineered Fabric Conduit - 1" - 3 Cell	ft.	$ 4.00	$ 4.00
14.41	Flexible Engineered Fabric Conduit - 2" - 3 Cell	ft.	$ 7.00	$ 7.00
14.42	Flexible Engineered Fabric Conduit - 3" - 3 Cell	ft.	$ 8.00	$ 8.00
14.43	Flexible Engineered Fabric Conduit - 4" - 3 Cell	ft.	$ 9.00	$ 9.00
	Sub-total average unit price		$ 4.60	$ 4.60
	Sub-Division - Misc. Pathway Items			
14.44	Hand hole (approximately 2' x 3' x 1.5' open bottom with bolt down lid)	ea.	$ 1,100.00	$ 1,100.00
14.45	Hand hole (approximately 3.5' x 2.3'x 2' open bottom with bolt down lid)	ea.	$ 1,206.00	$ 1,206.00
14.46	Hand hole (approximately 4' x 2.5' x 3' open bottom with bolt down lid)	ea.	$ 1,525.00	$ 1,525.00
14.47	Hand hole (approximately 4' x 3' x 2' open bottom with bolt down lid)	ea.	$ 1,842.00	$ 1,842.00
14.48	Cable Support Hanger	ea.	$ 14.50	$ 14.50
14.49	Surface Mounted Box	ea.	$ 9.00	$ 9.00
14.50	50 # bag of gravel	ea.	$ 25.00	$ 25.00
14.51	10' Tele-data Power Pole	ea.	$ 197.10	$ 197.10
14.52	12' Tele-data Power Pole	ea.	$ 217.35	$ 217.35
14.53	15' Tele-data Power Pole	ea.	$ 235.00	$ 235.00
	Sub-total average unit price		$ 637.10	$ 637.10

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
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Comco Communication Installation & Service Co Inc.

Item Description			Initial Term	Renewal Term
Item #	Description	Unit	Unit Price Region Six	Unit Price Region Six
	Sub-Division - Cable Trays			
14.54	Ladder Cable Tray with Ladder Attachment Kit - 12" W	ft.	**$ 20.00**	**$ 20.00**
14.55	Ladder Cable Tray with Ladder Attachment Kit - 24" W	ft.	**$ 24.00**	**$ 24.00**
14.56	Solid Bottom Cable Tray (Approximate Dimensions: 12" W x 4" D)	ft.	**$ 46.00**	**$ 46.00**
14.57	Solid Bottom Cable Tray (Approximate Dimensions: 24" W x 4" D)	ft.	**$ 53.55**	**$ 53.55**
14.58	Solid Bottom Cable Tray (Approximate Dimensions: 12" W x 6" D)	ft.	**$ 42.65**	**$ 42.65**
14.59	Solid Bottom Cable Tray (Approximate Dimensions: 24" W x 6" D)	ft.	**$ 50.39**	**$ 50.39**
14.60	Wire Mesh Cable Tray (Approximate Dimensions: 6" W x 2" D)	ft.	**$ 25.00**	**$ 25.00**
14.61	Wire Mesh Cable Tray (Approximate Dimensions: 12" W x 2" D)	ft.	**$ 26.15**	**$ 26.15**
14.62	Wire Mesh Cable Tray (Approximate Dimensions: 24" W x 2" D)	ft.	**$ 27.75**	**$ 27.75**
14.63	Wire Mesh Cable Tray (Approximate Dimensions: 6" W x 4" D)	ft.	**$ 26.15**	**$ 26.15**
14.64	Wire Mesh Cable Tray (Approximate Dimensions: 12" W x 4" D)	ft.	**$ 28.15**	**$ 28.15**
14.65	Wire Mesh Cable Tray (Approximate Dimensions: 24" W x 4" D)	ft.	**$ 35.52**	**$ 35.52**
	Sub-total average unit price		$ 33.78	$ 33.78
	Sub-Division - Services - Section 15			
15.01	1"Conduit Core Drill	ea.	**$ 125.00**	**$ 125.00**
15.02	1"Conduit Core Drill w/ X-RAY	ea.	**$ 625.00**	**$ 625.00**
15.03	2" Conduit Core Drill	ea.	**$ 225.00**	**$ 225.00**
15.04	2" Conduit Core Drill With X-RAY	ea.	**$ 850.00**	**$ 850.00**
15.05	4" Conduit Core Drill	ea.	**$ 225.00**	**$ 225.00**
15.06	4" Conduit Core Drill With X-RAY	ea.	**$ 850.00**	**$ 850.00**
15.07	Fiber Optic Fusion Splice	ea.	**$ 65.00**	**$ 65.00**
15.08	Fiber Optic Mechanical Splice	ea.	**$ 45.00**	**$ 45.00**
15.09	2" Directional boring and trench	ft.	**$ 29.23**	**$ 29.23**

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EXHIBIT B - PRICING WORKBOOK 3.0
DIVISION ONE
TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

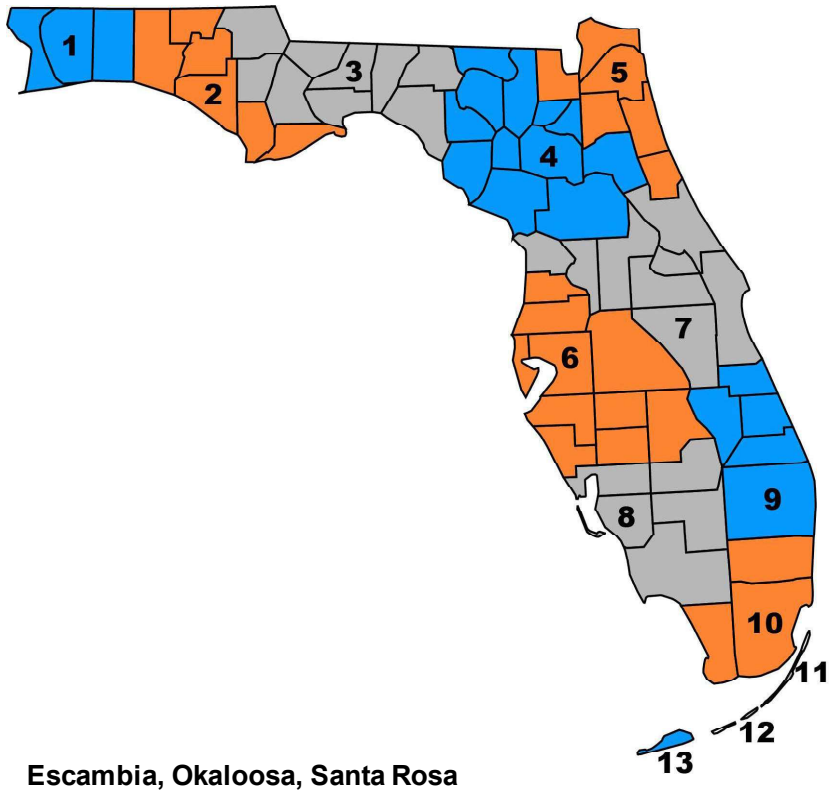
Comco Communication Installation & Service Co Inc.

Item Description			Initial Term		Renewal Term
Item #	Description	Unit	Unit Price Region Six		Unit Price Region Six
15.10	4" Directional boring and trench	ft.	**$ 36.71**		**$ 36.71**
	Sub-total average unit price		$ 307.59		$ 307.59
	Sub-Division - Audio/Video Cabling - Section 16				
16.01	Non-Shielded Plenum Rated Speaker Wire - 16x2	ft.	**$ 1.15**		**$ 1.15**
16.02	Non-Shielded Plenum Rated Speaker Wire - 18x2	ft.	**$ 1.10**		**$ 1.10**
16.03	Non-Shielded Plenum Rated Speaker Wire - 22x2	ft.	**$ 1.05**		**$ 1.05**
16.04	Shielded Plenum Rated Speaker Wire - 16x2	ft.	**$ 1.20**		**$ 1.20**
16.05	Shielded Plenum Rated Speaker Wire - 18x2	ft.	**$ 1.15**		**$ 1.15**
16.06	Shielded Plenum Rated Speaker Wire - 22x2	ft.	**$ 1.10**		**$ 1.10**
16.07	28 AWG CL2 High Speed HDMI Cable - 2ft	ea.	**$ 27.15**		**$ 27.15**
16.08	28 AWG CL2 High Speed HDMI Cable - 3ft	ea.	**$ 37.15**		**$ 37.15**
16.09	28 AWG CL2 High Speed HDMI Cable - 7ft	ea.	**$ 45.00**		**$ 45.00**
16.10	28 AWG CL2 High Speed HDMI Cable - 25ft	ea.	**$ 80.00**		**$ 80.00**
	Sub-total average unit price		$ 19.61		$ 19.61
	Sub-Division - Labor - Section 17				
17.01	Rate per hour - labor only	hr.	**$ 60.00**		**$ 60.00**
17.02	Rate per hour for expedited work - labor only	hr.	**$ 65.00**		**$ 65.00**
17.03	Overtime rate per hour - labor only (above 40 hours per week for the same Project)	hr.	**$ 85.00**		**$ 85.00**
17.04	Demolition of Existing Cabling - labor only	hr.	**$ 45.00**		**$ 45.00**
17.05	Project Coordination - labor only	hr.	**$ 75.00**		**$ 75.00**
	Sub-total average unit price		$ 66.00		$ 66.00
	Overall average of unit prices for all Division One items, per region		$ 197.29		$ 197.29

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EXHIBIT C - REGION MAP

TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3



Region 1	Escambia, Okaloosa, Santa Rosa
Region 2	Bay, Franklin, Gulf, Holmes, Walton, Washington
Region 3	Calhoun, Gadsden, Jackson, Jefferson, Leon, Liberty, Madison, Taylor, Wakulla
Region 4	Alachua, Bradford, Citrus, Columbia, Dixie, Gilchrist, Hamilton, Lafayette, Levy, Marion, Putnam, Suwannee, Union
Region 5	Baker, Clay, Duval, Flagler, Nassau, St. Johns
Region 6	DeSoto, Hardee, Hernando, Highlands, Hillsborough, Manatee, Pasco, Pinellas, Polk, Sarasota
Region 7	Brevard, Lake, Orange, Osceola, Seminole, Sumter, Volusia
Region 8	Charlotte, Collier, Glades, Hendry, Lee
Region 9	Indian River, Martin, Okeechobee, Palm Beach, St. Lucie
Region 10	Broward, Miami-Dade, Monroe
Region 11	Key Largo, Tavernier, Plantation Key, Lignumvitae Key, Indian Key, Upper and Lower, Matecumbe Keys, Islamorada, and Long Key.
Region 12	Conch Key, Duck Key, Grassy Key, Boot Key, Vaca Key, Key Colony Beach, and Pigeon Key
Region 13	Little Duck Key, Big Pine Key, the Torch Keys, Bahia Honda Key, Cudjoe Key, Sugarloaf Key, Summerland Key, the Saddlebunch Keys, Big Coppitt Key, Stock Island, and Key West

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EXHIBIT D - PROJECT COMMENCEMENT SUBMITTAL
SECTION A

TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO.: DMS-24/25-264D

Project Name
Identifier

Project Commencement Date

Customer
Project Contact
Physical Address of the Project
Physical Address of the Project
Project Contact Phone Number
Project Contact Email Address

Department of Management Services
Division of Telecommunications
Derald V. Turner
4030 Esplanade Way, Ste 125B
Tallahassee, Florida 32399-0950
850-414-6771
derald.turner@dms.myflorida.com

Subcontractor
Type of Subcontractor (Electrical)
Subcontractor Contact
Subcontractor Address
Subcontractor Address
Subcontractor Phone Number
Subcontractor Cell Number
Subcontractor Email Address

Contractor
Contractor Project Manager
Contractor Project Manager Address
Contractor Project Manager Address
Contractor Project Manager Phone Number
Contractor Project Manager Cell Number
Contractor Project Manager Email Address

Docusign Envelope ID: E7503C6A-3DF8-4D3A-BD46-E47AA4C07C2F

EXHIBIT E - PROJECT COMMENCEMENT SUBMITTAL
SECTION C

TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO.: DMS-24/25-264D

Project Name and Identifier

Customer
Project Contact
Physical Address of the Project
Physical Address of the Project
Project Contact Phone Number
Project Contact Email Address

Item	Color	Quantity

Docusign Envelope ID: E7503C6A-3DF8-4D3A-BD46-E47AA4C07C2F

EXHIBIT F - PROJECT FINAL SUBMITTAL
SECTION A

TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO: DMS-24/25-264D

Project Name
Identifier

Project Commencement Date

Customer
Project Contact
Physical Address of the Project
Physical Address of the Project
Project Contact Phone Number
Project Contact Email Address

Department of Management Services
Division of Telecommunications
Derald V. Turner
4030 Esplanade Way, Ste 125B
Tallahassee, Florida 32399-0950
850-414-6771
derald.turner@dms.myflorida.com

Subcontractor
Type of Subcontractor (Electrical)
Subcontractor Contact
Subcontractor Address
Subcontractor Address
Subcontractor Phone Number
Subcontractor Cell Number
Subcontractor Email Address

Contractor
Contractor Project Manager
Contractor Project Manager Address
Contractor Project Manager Address
Contractor Project Manager Phone Number
Contractor Project Manager Cell Number
Contractor Project Manager Email Address

Docusign Envelope ID: E7503C6A-3DF8-4D3A-BD46-E47AA4C07C2F

EXHIBIT G - PROJECT FINAL SUBMITTAL
SECTION B

TELECOMMUNICATION INFRASTRUCTURE PROJECT SERVICES 3
CONTRACT NO.: DMS-24/25-264D

Customer
Project Contact
Physical Address of the Project
Physical Address of the Project
Project Contact Phone Number
Project Contact Email Address

Item	Description	Model Number	Serial Number

Docusign Envelope ID: E7503C6A-3DF8-4D3A-BD46-E47AA4C07C2F

Exhibit H - Daily Log

Contract No. DMS-24/25-264D

MAC/Project Name: _____ MAC/Project Identifier: _____

Customer's Project Contact: _____ Contractor Name: _____

Physical Address of the MAC/Project: _____

Date	Technician Name	Time In	Time Out	Total Hours	Contractor Sign Off	Customer Sign Off	Additional Notes

Docusign Envelope ID: E7503C6A-3DF8-4D3A-BD46-E47AA4C07C2F

Exhibit I – Customer and Contractor Sign-Off Form



4030 Esplanade Way
Tallahassee, FL 32399-0950

Ron DeSantis, Governor
Pedro Allende, Secretary

DMS Div/Tel Telecommunication Infrastructure Project Services TIPS

Customer and Contractor Sign-Off Form

MAC/Project Name:_____

MAC/Project Address:_____

Work Order Number:_____

TIPS Vendor:_____

Final Acceptance/Work Completed Date:_____

The above reference MAC/Project has been installed and tested (if applicable by the TIPS Vendor in accordance with the Work Order scope of work.

Customer's Project Contact Signature:_____

Customer's Project Contact Printed Name:_____

TIPS Vendor Signature:_____

TIPS Vendor Printed Name:_____

Comments:

_____

_____

_____

_____

_____

_____

_____



Hillsborough County Aviation Authority

Design Criteria Manual

October 1, 2022

Tampa International Airport

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Introduction

The criteria in this manual applies to all capital development projects administered by the Aviation Authority at Tampa International Airport (TPA), Peter O. Knight Airport (TPF), Tampa Executive Airport (VDF) and Plant City Airport (PCM) each referred to collectively herein as airport. The criteria in this manual is optional for any tenant development on airport property.

The objective of the Design Criteria Manual is to provide guidance to design professionals in areas where Hillsborough County Aviation Authority (Authority or owner) preferences may be provided in a manner that does not detract from the design intent. At all times it remains the responsibility of the design professional to ensure that all aspects of the design including plans, technical specifications and shop drawing reviews provide a finished product that complies with their Contract, project objectives, all applicable codes, standards and regulations. Coordination of the contract documents and information included in Division 0 and 1 of the Project Manual is the responsibility of the design professional.

It is incumbent on the design professional to identify and resolve any conflicts between criteria established in this and other criteria manuals published by the Authority with industry regulatory and advisory criteria and guidance. In some circumstances the term owner refers to a tenant or similar party that commissions design and construction on Authority property under a build-to-suit arrangement.

Other sources of design criteria which should be reviewed and incorporated, as applicable, by the design professional are as follows and can be obtained at tampaairport.com:

- Main Terminal Interior Design Criteria Manual
- Sustainable Design Criteria Manual
- Concessions Design Criteria Manual
- Land Use Standards
- Wayfinding Standards Manual
- CADD Standards Manual

Section 1 – Civil Engineering and Site Work

1.1 Abbreviations for Civil Engineering and Site Work Sections

CFR	Code of Federal Regulations
COT	City of Tampa
DOT	Department of Transportation
EPC	Hillsborough County Environmental Protection Commission
ERP	Environmental Resource Permit
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FAR	Federal Aviation Regulations
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
NGVD	National Geodetic Vertical Datum (1929 or 1983 as applicable)
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination system
OSHA	Occupational Safety and Health Administration
PC	City of Plant City
SWFWMD	Southwest Florida Water Management District
SWPPP	Stormwater Pollution Prevention Plan
SPCC	Spill Prevention Control and Countermeasure Plan

1.2 Roadways

1.2.A Related Sections – Reserved

1.2.B Scope – Reserved

1.2.C Applicable Codes and Reference Standards

The design of all Authority roadways intended for automotive vehicular use, and not otherwise subject to any state or FAA standard, will be in accordance with the design criteria contained in the applicable edition of the State of Florida “Manual of Uniform Minimum Standards for Design, Construction, and Maintenance of Streets and Highways”. Should these standards not be able to be met for any reason, the design professional shall notify the Authority in writing and discuss during design meetings.

1.2.D Planning Objectives

The design professional shall coordinate with FDOT regarding any know planned FDOT improvements which impact the airport.

1.2.E Authority Standards – Reserved

1.2.F Vehicular / Bus Design Consideration

Vehicle types utilized and to be utilized will be taken into consideration for design of proper clearances. When roadways are under signage structures and covered drive lanes, design considerations will be taken to specify appropriate fire protection and material to prevent vehicular / bus exhaust heat damage to the building or actuation of the fire alarm or fire sprinkler system.

1.3 Airfield Paving: Runways, Taxiways, and Aprons

1.3.A Related Sections – Reserved

1.3.B Scope – Reserved

1.3.C Applicable Codes and Reference Standards

Minimum design standards will be in accordance with the appropriate Advisory Circulars and Federal Aviation Regulations.

All proposed construction standards will be in accordance with Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports."

Pavement designs and establishment of subgrade characteristics and properties will be in accordance with the latest edition of the FAA Advisory Circular, AC 150/5320-6, Airport Pavement Design and Evaluation.

Erosion and sediment control measures must conform to the specifications contained in the document, Roadway and Traffic Design Standards Erosion Control and Water Quality, published by the State of Florida Department of Transportation.

Geotechnical testing shall conform to applicable sections or ASTM Volume 04.08, Soil and Rock; Building Stones; Geotextiles.

Geotechnical testing and engineering will be conducted by corporations and experienced individuals licensed to practice this specialty by the State of Florida.

1.3.D Planning and Functional Criteria

Critical Design Aircraft: Critical Design Aircraft (CDA) will be identified for each project design pertaining to any of the following airfield elements:

a. Width, Clearances, and Separations of Taxiways and Parking Aprons: The CDA, or its associated Airplane Design Group Number, per AC 150/5300-13, will be recommended by the design professional and approved by the Authority.

b. Taxiway Design Group will be recommended by the design professional and approved by the Authority.

Geometrics: All airfield geometry will conform to the current Airport Layout Plan (ALP) where applicable, and will accommodate all Group V aircraft unless otherwise directed by the Authority. Detailed geometry not included or referenced on the ALP will conform to the requirements in AC 150/5300-13 and other relevant advisory circulars, except as directed by the Authority.

1.3.D.1 Line-of-Sight

a. All public-use taxiways will conform to the line-of-sight criteria of AC 150/5300-13, Airport Design. Public use taxiways, under the control of the Air Traffic Control (ATC) tower, will be in full view of the tower cab, full length and width. An ATC Tower Line-of-Sight (Shadow) study will be performed by the design professional if in a potential ATC shadow zone. The responsibility for preparing this plan will be as directed by the Authority. Aprons and exclusive-use taxiways are not under the control of ATC and, therefore, normally do not require line-of-sight.

b. Line-of-sight considerations may also be required when facilities are planned and designed near or in the vicinity of FAA NAVAIDS. Unless otherwise

directed by the Authority, all proponents of construction, except those funded under the Airport Improvement Program (AIP), will complete an FAA Form 7460-1, "Notice of Proposed Construction or Alteration," with appropriate information and exhibits required by the FAA on which the FAA can conduct an Aeronautical Study of the proposal.

1.3.D.2 Gradients and Slopes

All paved and turfed areas on the airfield AOA will conform to the requirements of AC 150/5300-13 and the following criteria:

a. Side slopes on excavation (cut) and embankment (fill) areas outside of runway and taxiway safety areas will have 4:1 maximum slope.

b. The standard crowns (transverse slope) on taxiways will be 1.5%, except where flatter grades are necessary due to intersection transition in which case they will be a minimum of 0.5% for concrete pavements and 0.7 % for asphaltic pavements.

c. All taxiway shoulders will be graded 5% surface gradient for 10 feet, and then graded between 3% to 5% surface gradient to the edge of the taxiway safety area.

d. Pavement gradients on aircraft parking aprons will be 0.5 to 1.0%. Where conforming or transitioning to existing facilities, and except for 50 feet from terminal buildings at the gate/parking positions, they will be 1.0% to conform to NFPA Standard 415 on airport terminal buildings, fueling ramp drainage, and loading walkways.

e. Gradients and slopes for the following areas will conform to the requirements of AC 150/5300-13 for the respective aircraft approach category and airplane design group: Obstacle Free Zone, Runway and Taxiway Safety Areas, Clearway, and Stopway.

f. Due to the critical nature of grades for all airfield pavements, safety areas, obstacle free zones, and other related areas, preparation of design plans will include a combination of both cross sections and grading plans to accurately portray the design intent.

1.3.D.3 Aprons

Aircraft parking aprons will be based on an Apron Utilization Plan, approved by the Authority. The responsibility for preparing this plan will be as directed by the Authority. Apron utilization criteria, including wingtip clearance, will be approved by the tenant and the Authority, and will be within the maneuvering limits of the Aircraft Characteristics Manual of the Critical Design Aircraft.

1.3.D.4 Geotechnical Investigation

Guidelines for a geotechnical investigation are contained in FAA AC 150/5320-6, Airport Pavement Design and Evaluation. Standard Penetration Test (STP) boring should be performed per 10,000 square feet of area. At a minimum, the following guidelines should be observed in the design investigation:

a. In taxiway areas, STP borings should be performed at 200-foot intervals along centerlines.

b. Borings should be SPT, and should extend to at least 10 feet in depth. At approximately 500-foot centers, borings should extend a minimum of 25 feet in depth.

c. Any potential borrow material sources should be adequately investigated to evaluate acceptability.

d. Borings and testing locations should carry airport grid coordinate locations, and ground surface NGVD elevations.

e. Testing locations, procedures, and times of testing should be established well in advance of testing, and must be coordinated with representatives of the Authority. Test locations should be cleared for utilities by the Design Consultant, the Authority, and affected utility companies. All areas disturbed by testing should be restored satisfactorily.

f. Sufficient field and laboratory testing should be performed to establish classifications and properties for the various strata encountered. This will include determination of Unified Soil Classifications, plasticity/consolidation properties, permeability, in-place density, typical bearing ratio-moduli values, and groundwater conditions.

1.3.D.5 Earthwork

Specific recommendations will be made for the project needs in the areas of clearing and grubbing, undercutting, proof rolling, embankment construction, suitable materials, compaction, stabilization, subgrade preparation, and any special procedures to be used. FAA Advisory Circulars and/or FDOT standards will be reviewed as applicable. For unit cost projects, the earthwork will be separated into the following pay items as appropriate:

- Unclassified excavation
- Unsuitable excavation
- Embankment
- Borrow

1.3.D.6 Pavement Design

The design professional will provide a pavement design utilizing FAARFIELD software in accordance with the methods prescribed in the latest edition of AC 150/5320-6. The determination of the recommended pavement sections shall consider all factors including initial cost, constructability, long-term maintenance, past experiences at Tampa International Airport or General Aviation Airports as appropriate and adaptability to future changes.

1.3.D.7 Pavement Type

Unless directed otherwise by the Authority, all air carrier airfield pavements will be rigid Portland Cement Concrete (PCC) pavement, General Aviation Taxiways or Ramps and blast protective pavement (shoulders) will be asphaltic concrete pavement. Blast protective pavement type will be recommended by the design professional, based on an occasional pass by the critical maintenance or Airfield Rescue and Fire Fighting (ARFF) equipment. General aviation pavement will be designed for the most demanding aircraft and approved by the Authority.

1.3.D.8 Underdrains

An underdrain/edge drain system should be reviewed for necessity on all pavement sections. If underdrains are not recommended, the design professional will present the basis on which they are not recommended and submit to Authority for approval. System layout, elements, and design will be designed based on soils investigation results, pavement function, and other relevant factors and parameters.

1.3.D.9 Concrete Demolition

All existing airfield concrete pavement to be removed will be crushed to meet the FAA P-209 grading specification for use in the project or stockpiled for future use as directed by the Authority. This material will be incorporated into the following items and approved by the Authority as applicable:

a. Aggregate source for econocrete subbase (FAA P-306)

b. Aggregate source for shoulder base course. (FAA P-209)

Existing econocrete subbase materials will not be incorporated into the crushing operations when creating the FAA P-209 crushed aggregate material.

1.3.D.10 Subbase and Base Course

All full-strength airfield pavements will include econocrete subbase (FAA P-306) as a minimum. A crushed aggregate base course (FAA P-209) will also be included if sufficient crushed concrete materials are available.

1.3.D.11 Portland Cement Concrete (PCC) Pavement

PCC will be designed based on 650 PSI flexural strength at twenty-eight (28) calendar days. Mix design proportions and criteria will meet FAA P-501 (AC 150/5370-10). Longitudinal and transverse construction and contraction joints will be doweled. Keyways are not allowed. Surface texture may be burlap drag or broom finish. Joints will be sealed with Dow Corning 888 or 890-SL silicone as applicable. Preformed joint sealers will be used on all sawed contraction joints.

1.3.D.12 Asphalt Pavement

Asphalt pavement will be used on shoulders and General Aviation Ramps and Taxiways/Taxilanes. Mix design proportions and criteria will be FAA P-401 (AC 150/5370-10, Standards for Specifying Construction of Airports). All concrete-to-asphalt conform joints will be sawed and sealed to retard moisture intrusion and vegetation growth.

1.3.D.13 Pavement Marking

Pavement marking of aprons, taxiways, taxilanes, and paved shoulders will conform to AC 150/5340-1, Standards for Airport Markings, and approved by the Authority. Taxiway centerline markings and apron taxilane marking will be yellow and a minimum of 12 inches wide. All taxiway/taxilane centerline markings (on concrete) will have a 6” black outline applied. Lead-in lines will be yellow, fire lanes will be red, and service roads will be white.

Designers are responsible for verifying the accuracy of existing airfield pavement markings within their area of work. It is not acceptable to include plan notes to re-paint existing markings in their current location. All marking plans must include detailed marking layout data to ensure the final markings are fully compliant with FAA criteria. If proposed

pavement marking will result in a paint dry film thickness greater than 40 mils, then full marking removal must be specified prior to painting.

Taxiway shoulder markings will not be installed.

Thermoplastic pavement markings will be installed on asphalt surfaces on all landside roadways. Temporary roadways and/or roadways that are expected to be modified in the near term may utilize other marking types with the approval of the Authority. Permanent tape pavement markings will be installed on concrete surfaces on all landside roadways.

For surfaces with coatings such as parking decks, traffic paint meeting Federal Specification TT-P-1952F will be used. The design professional will specify the appropriate type specific to project conditions.

1.4 Surface Water Management

1.4.A Related Sections – Reserved

1.4.B Scope – Reserved

1.4.C Applicable Codes and Reference Standards

The drainage requirements of the Authority and the FAA will be met.

The drainage connection permitting requirements of the FDOT, Chapter 14-86, F.A.C., will be met if applicable.

All proposed drainage structures and construction methods will be in accordance with FDOT Roadway and Traffic Design Standards (Latest Version - English Units), and Standard Specifications for Road and Bridge Construction most recent version (English Units). Special design considerations will be applied when drainage structures are located within airfield pavement or safety areas of the airfield.

All dredge and fill activities in wetlands and waters of Florida may require permits. All permits will be obtained for these activities from FDEP, SWFWMD, EPC, and the USCOE (United States Army Corps of Engineers).

The surface water management system design methods will be in accordance with approved SWFWMD, FDOT, City of Tampa, and FAA design methodologies.

All building, parking, and roadway areas will meet SWFWMD, City of Tampa, and other applicable federal, state, or local criteria regarding finish floor or low edge of pavement elevations.

1.4.D Guidelines for Surface Water Management Design

All features of any stormwater management system proposed for the Authority projects are to be conceptually visualized and depicted on preliminary drawings, coordinated with the Authority's existing Master Stormwater Management Plan and approved by the Authority. These documents are to be presented in preliminary meetings with applicable regulatory agencies for comments and conceptual approval prior to final design.

Coordination with regulatory agencies, such as SWFWMD, City of Tampa, FDEP, EPC and so forth, will be conducted prior to the design of the surface water management system to determine the exact regulatory permitting requirements.

Representatives of SWFWMD, FDEP, and EPC should be contacted and arrangements made for a field review. Existing permitting treatment systems should be identified and modifications / mitigation plans coordinated with regulatory agencies.

All permit application documents will be submitted to the Authority for review and comment prior to their submission to any agency.

The surface water management system must be designed to alleviate existing flooding problems to permanent structures within the project area. Any relocated drainage structures or stormwater systems must be able to convey the flows of their initial design. There should be no decrease in peak flow capacity to existing stormwater systems or increases in hydraulic gradients which would cause increased flooding on or off airport property as a result of the proposed surface water management system.

The modifications to the surface water management system will not degrade the existing water quality of the Spruce Street Canal Basin. The co-mingling of treated and untreated stormwater runoff should be prevented.

Off-site areas upstream and downstream will not be adversely affected by the time, stage, volume, or point or manner of discharge from the surface water management system.

Existing pump/irrigation systems will be considered in the surface water management system design. Existing stormwater control structures (i.e., weirs, orifices, and so forth) will be considered in the surface water management system design.

The velocities of flow over grassed areas should be kept low enough to prevent erosion.

Extended periods of ponding in depressed areas should be prevented to decrease the potential of bird activity.

Clearances of ground water levels to the pavement bases should be sufficient to prevent adverse impacts to the pavements and pavement bases.

The net differences in impervious areas (i.e., pavement added, versus pavement removed), will be considered in the surface water management system design and permitting. A zero net difference will be achieved if possible.

If stormwater pond facilities are necessary for quantity and for quality treatment, FAA AC 150/5200-33 Hazardous Wildlife Attractants on or near Airports will be reviewed. Ponds will be designed for dry detention rather than wet detention. Side slopes will be 4:1 (maximum slope) with a ten foot (minimum) maintenance berm. Whenever possible water quality standards will be met by utilizing detention with effluent filtration systems (underdrains). For airfield projects, quality standards will be met by utilizing Best Management Practices (BMPs) design such as vegetative control measures wherever possible. Water quantity standards may or may not be required depending on the drainage basin in which the project is located.

All existing contributing drainage areas including roadways, parking areas, off-site areas, and so forth, will be included in the surface water management system design.

1.4.E Storm Sewers

All Drainage Structures will conform to the FDOT's *Roadway and Traffic Design Standards*, latest version. Special design considerations will be applied when drainage structures are located within airfield pavements or safety areas of the airfield. Advisory Circular 150/5320-6G Airport Pavement Design and Evaluation Appendix B will be considered for these structures.

Except as may be specifically approved by the Authority, all storm drain pipe is to be reinforced concrete, of a minimum diameter of 15 inches, and conform to the FDOT Standard Specifications for Road and Bridge Construction, Concrete Pipe Section 941-1 and 941-2. Other pipe types that may be considered are polyvinyl chloride and corrugated polyethylene as appropriate for the project and approved by the Authority.

For all pipes 36" in diameter and greater to be installed on airfield projects, the contractor must provide the pipe supplier certified D-load test results for any lot of pipe delivered to the site.

Pipe bedding will consist of a bed of granular material having a thickness of at least six inches (6") below the bottom of the pipe and extending up around the pipe for a depth of not less than 30% of its vertical outside diameter. Filter fabric will be placed over the granular material and each pipe joint will be wrapped with a minimum one foot (1') overlap.

All pipes are to be kept clear of debris at all times during construction. After the completions of all earthwork and the placement of all sod and/or seeding and mulching and before final acceptance, all pipes will be cleaned of silt, debris, etc. to the satisfaction of the Engineer. This may require the de-watering of the pipes. Care must be taken during this operation so as not to damage the pipes or the surrounding areas.

The hydraulic gradient elevation in manholes and inlets will be a minimum of 1.0 foot below the throat of inlet or top of manhole unless minor energy losses are considered in the hydraulic calculations. The maximum velocity in open channels should be evaluated and comply with the FDOT Drainage Manual. Energy dissipation measures should be considered to minimize erosion in the drainage system.

The maximum length of pipe between access entry structures will be 300 feet for pipes less than 18 inches, 400 feet for pipes 24-36 inches, and 500 feet for pipes greater than 36 inches.

1.4.F NPDES Construction Generic Permit for Construction Activities

To obtain permit coverage, a NOI for Construction Generic Permit must be submitted by the contractor to FDEP online using FDEP's Interactive NOI, or by submitting a paper copy, on FDEP Form 62-621.300(4)(b), to FDEP's NPDES Stormwater Notices Center. A copy of the contractor's SWPPP must be kept onsite. If an Environmental Resource Permit (ERP) was issued by SWFWMD, the Erosion and Sediment Control Plan prepared as part of the permit requirements can be used in lieu of a SWPPP, provided that all requested information is included in the Erosion and Sediment Control Plan. At the completion of the work, FDEP form 62-621.300(6), Notice of Termination, must be submitted to FDEP.

1.4.G Availability of SLOSH Model Evaluation for TPA

The Authority will make available the Hurricane Surge Analysis Report that evaluated Tropical Storm and various Hurricane Category storm surge elevations using NOAA's SLOSH model for the TPA property.

1.5 Site Utilities

The Authority will make available the Utility Atlas Reference which provides information on site utilities at all facilities owned and operated by the Authority in CAD format. While the information is comprehensive, the Authority doesn't guarantee the accuracy of the information. The design professional is advised to verify any information during design deemed to be critical to the project.

1.5.A Related Sections

1.5.A.1 Section 1.4 - Surface Water Management

1.5.A.2 Section 2.2.A.6 Typical Facility Plumbing

1.5.A.3 Section 3.15

1.5.B Scope – Reserved

1.5.C Sanitary Sewers and Force Mains

Gravity sanitary sewers will be Polyvinyl Chloride for normal use and Ductile Iron for occasions requiring special strength or protection.

Polyvinyl Chloride pipe and fittings will conform to ASTM Specifications D-304 (SDR 35). The bell end of joints and fitting will have a rubber sealing ring to provide a tight, flexible seal in conformance with ASTM D-3212-76. The maximum laying length will be 12.5 feet.

Ductile Iron pipe and fittings for gravity sewers will conform to the specification for Ductile Water pipe (see Section 1.4.E), excepting that Ductile Iron pipe conveying sanitary sewer will have an interior “polylining” per manufacturer’s recommendations.

Sanitary sewer force mains will be either Polyvinyl Chloride or Ductile Iron and will conform to the Polyvinyl Chloride and Ductile Iron specifications for water mains (see Section 1.5.E following), except that Ductile Iron pipe will be provided with an interior polylining in accordance with manufacturer’s recommendation.

1.5.D Water Mains and Appurtenances

Ductile Iron pipe and fittings will be in accordance with ANSI / AWWA C 151 / A21.51-81. Pipe will have an asphalt coated exterior and a cement lined interior in accordance with ANSI / AWWA C104 / A21.4-80.

Pipes larger than 8 inches will be Ductile Iron.

Polyvinyl Chloride pipe (up to and including 8 inch size) will be in accordance with ANSI / AWWA C900-81 and with ASTM-D2241 and D-1784.

PVC pipe must be compatible with Cast and Ductile Iron pipe without the need for special adapters.

The bell of PVC pipe will consist of an integral wall section with an elastomeric ring which meets the requirements of ASTM D-1869.

Gate valve discs will be suitable for operation in any position with respect to the vertical. Valves for interior piping or exposed above grade will be handwheel operated.

Valves three inches and larger buried below grade will be equipped with a two inch square operating nut, valve box, and cover. The direction of opening for all valves will be to the left (counter-clockwise). Unless otherwise specified, valves for pressure service will be rated at not less than 150 psi, cold water, and nonshock.

Fire hydrants will be in accordance with AWWA Specification C-502 with breakable, dry-barrel, in two sections with the breaking flange located approximately 2 inches above the ground line. The main valve opening will not be less than 5 ¼ inches, and the hydrant nozzles will consist of two 2 ½ inch hose nozzles and one 4 ½ inch pump nozzle. The hydrant will be equal to a Mueller Centurion, Catalog Number A-423.

Backflow preventers will be above ground and will be of the double check valve assembly type or the reduced pressure type depending on the degree of hazard associated with the event to be prevented.

1.5.E Sanitary Sewer – Pretreatment Devices and Other Appurtenances

1.5.E.1 Applicable Standards and Regulations

Wastewater discharges are regulated by the City of Tampa for the majority of the areas located within the boundaries of TPA, TPF and VDF. Wastewater discharges from PCM are regulated by Hillsborough County and the City of Plant City.

City Section 26 (Utilities) Article III Sanitary Sewers

Sec. 26-120. Excluded wastes prohibits…"any person to discharge or deposit any waste, waste material, gases, toxic materials or wastewater which contains any pollutants of a type, nature, temperature or concentration not found in normal domestic wastewater to the treatment works."

In addition "The department's Technical Manual of Standards for Industrial and Special Users sets forth the limitations and types of excluded wastes which may be discharged following pretreatment." (Ord. No. 89-253, § 2(58-126), 9-28-89)

All operations that generate wastewater other than sanitary wastewater will be equipped with pretreatment devices or appurtenances that will pretreat the generated wastewater to effluent levels compliant with the City of Tampa Code referenced above. The City of Tampa (or the regulating entity) will be contacted to confirm that the discharge is allowed.

1.5.E.2 Wash Racks

All wash racks built at Tampa International Airport for aircraft washing must meet the requirements of the Aircraft Washing Operating Directive. All other wash racks must meet the following requirements. Regardless of the type of pretreatment provided, all wash rack outlets will be connected to the sanitary sewer system, which is separate from the stormwater drainage (sewer) system. The system can be designed with a bypass that allows the discharge of wastewater to the sanitary system, while diverting stormwater runoff to the stormwater drainage system.

An oil/waster separator will be installed as a pretreatment system before the wastewater is discharged into the sanitary sewer system. A sand trap is also recommended.

1.5.E.3 Floor Drains

All building floor drains will be connected to the sanitary sewer system. Depending on the types of activities conducted inside a building, the following appurtenances may be required in order to comply with the City of Tampa wastewater effluent disposal requirements:

Oil/Water Separator – They are required for all vehicles and equipment washing activities. A sand trap may also be required.

Acid Tank – If there is a potential for acidic wastewater or other similar liquids to be generated inside a building during equipment washing, floor washing, or other operations, an acid tank will be installed.

Grease Traps – Grease traps must be installed for all restaurant generated grease waste as required by local codes.

Dumpsters, waste compactors, and other waste handling equipment will be installed such than any wastewater or leachate generated through contact of water or stormwater with the waste is discharged to the sanitary sewer system. Pretreatment may be required depending on the characteristics of the leachate.

1.5.E.4 Utility Permits

Coordination with regulatory agencies, such as City of Tampa Water Department (water service commitment), City of Tampa Department of Sanitary Server (sanitary sewer service commitment), Hillsborough County Health Department (water distribution system approval), EPC, (sanitary sewer collection system approval), Hillsborough County Water Department (water service commitment), Hillsborough County Sanitary Sewer Department (sanitary sewer service commitment) will be conducted during the design phase to determine the exact regulatory permitting requirements.

All permit application documents will be submitted to the Authority for review and approval prior to their submission to any agency.

1.5.E.5 Easements

If a project requires the abandonment, relocation, extension or installation of utilities, the design professional will include in their scope of services easement coordination services. At a minimum, this will include preparation of developer agreements, legal descriptions and sketches of new or revised utility limits.

1.6 Fueling Systems: Aircraft and Automotive

1.6.A Related Sections – Reserved

1.6.B Scope – Reserved

1.6.C Applicable Codes and Reference Standards

Storage tanks which are regulated by federal, state and local agencies must be registered with the FDEP. As defined by FDEP, a storage tank system includes all tanks, integral piping, dispenser, and release detection equipment. See Chapters 62-761 Florida Administrative Code (FAC) and 62-762, FAC, for complete definitions and rules pertaining to underground storage tanks (UST's) and aboveground storage tanks (AST's), respectively. Regulated systems generally consist of:

1.6.C.1 USTs with capacities of > 110 gallons

1.6.C.2 ASTs with capacities of > 550 gallons that store pollutants or hazardous substances

In addition, if a facility has a single AST with a capacity greater than 1,320 gallons, the facility must also comply with the federal Oil Pollution Prevention regulation (40 CFR 112). Once a container exceeds the 1,320-gallon threshold, all containers with a capacity of 55 gallons or more are regulated under this rule. In compliance with this regulation, A Spill Pollution Control and Countermeasure (SPCC) plan must be prepared and submitted to the owner's representative for implementation.

All tanks, piping, and related equipment must be on the most recent edition of the FDEP Approved Equipment List.

If warranted, all site sample collection, site assessment activities, and all laboratory analyses will be conducted in compliance with the most current FDEP Standard Operating Procedures.

1.6.D Aircraft Hydrant Fueling System

1.6.D.1 New Installation

At Tampa International Airport, jet fuel is delivered via the hydrant fueling system from the Bulk Fuel Farm to all the airsides.

All new piping for the hydrant fuel will be double walled piping in compliance with current FDEP regulations Chapters 62-761 and 62-762, FAC.

All hydrant pits will be listed on the most recent edition of the FDEP Approved Equipment List. If a proposed hydrant pit is not on the list, the design professional or contractor will contact the FDEP and notify Authority staff as early as possible. The process of obtaining approval of a non-listed hydrant pit, or any other equipment, may involve supplemental coordination and approval by the fuel system operator, Tampa Fuel Committee.

Interstitial space will be filled with nitrogen with a pressure of 10 psi (pound per square inch) or more, or will have a vacuum with a pressure of -10 psi or less.

Pressure gauges will be installed to accurately monitor the interstitial space. Valves will be installed to allow visual monitoring for leaks and will be designed such that the proper pressure can be restored after visual testing.

1.6.D.2 Removal & Abandonment of Existing Hydrant Piping

Before the removal and abandonment of any existing hydrant fuel piping or components, the operator of the system Tampa Fuel Committee, will be contacted by the Authority in order to have the fuel removed and valves secured as needed. Once the necessary work has been completed, the Authority will notify the design professional and contractor.

Residual fuel will likely remain on the line and must be appropriately handled by the contractor in charge of the removal or abandonment of the line.

For piping that will be removed, pigging is allowed, provided that the residual fuel and the waste generated are prevented from reaching the surrounding soil and is disposed of in accordance with applicable regulations.

Piping that will permanently be left in place will be grouted once the residual fuel has been removed. In some cases, the Authority will allow some piping be left in place without grouting. However, all residual fuel must be removed and the line must be certified gas free or filled with nitrogen to prevent corrosion.

1.6.E Automotive, Emergency Generator, and Other Tank Fueling Systems

The Authority recommends that fuel tanks used for automotive and emergency generators be stored in aboveground storage tanks instead of underground storage tanks. Emergency Generator tanks will be less than 550 gallons to the extent possible. As indicated above, such tanks are exempt from FDEP regulations.

- All regulated tanks will be double walled tanks or have secondary containment in compliance with Chapters 62-761 and 62-762, FAC.

- Tanks and fuel dispensing equipment will be located as far as practical from stormwater inlets.

- For all systems that fall under the SPCC regulations, the operator of the system must have an SPCC plan prepared in compliance with the Federal regulations and submitted to EPC and the Authority before the system is put in service.

1.6.F Notification and Registration Protocol

Notify and coordinate all activities with the Authority's Maintenance and Planning & Development Departments.

Determine whether the storage tank system is a regulated system. If the system is not regulated, no tank registration is required. However, copies of the design plans will be sent to the EPC for their records and submitted to Authority staff for review.

Submit storage tank system designs and a copy of the completed Storage Tank Registration Form to the EPC for review. If a tank system is being removed, an application for Closure of Pollutant Storage Tank System Form will be submitted to EPC. EPC will review the plans and approve them or return the submittal with comments for revisions. After revisions have been made, re-submit the documents to EPC for approval. A copy of the approved plans will be submitted to the Authority.

As applicable, obtain the appropriate construction permits from the city or county and submit copies to the Authority.

Provide the Authority and EPC with advance written or verbal notices as follows:

- Ten calendar days advance notice for tank installation, replacements, or upgrades.

- 30 calendar days advance notice for tank closures.

- Send the completed Storage Tank Registration Form to FDEP in Tallahassee with copies to EPC.

- Provide the Authority and EPC a 48-hour advance notification prior to commencement of on-site work for all tank removals, installations, replacements or upgrades. If work is to be completed in stages, this 48-hour notice is required prior to each stage of work.

- After completing steps above and approval by the Authority, work may begin. (Note: If an UST system is being installed or removed, an Underground Storage Tank Installation and Removal Form for certified contractors must be completed and submitted to EPC and the Authority after work is complete on the tank system).

- Copies of all applicable forms, plans, reports, and record drawings will be submitted to the Authority's Planning and Development Department.

1.6.G Design and Installation Requirements – Reserved

1.6.H Underground Storage Tank Removal/Abandonment Pre-Tank Removal Requirements

Notification of tank closure (removal) is to be submitted to the appropriate agencies as per the protocol, including the Fire Department, or local Fire Department, as applicable.

Only a State Certified Pollutant Storage Systems Contractor will perform tank removals. A copy of the contractor's certification must be submitted prior to commencement of the Work.

A Work Plan will be prepared and submitted prior to commencement of work.

A Health and Safety Plan will be prepared and submitted prior to commencement of work.

When groundwater monitor wells are present, samples must be obtained prior to tank removal.

Tank removals will be performed in accordance with FDEP's underground storage tank or aboveground storage tank closure guidance documents (latest edition). A copy of these guidance documents can be obtained for the FDEP website at: https://floridadep.gov/waste/permitting-compliance-assistance/content/storage-tank-systems-guidance-and-information

1.6.I Tank and Soil Removal Operations

All interior liquid from the tank and integral piping must be properly removed and disposed of prior to tank removal.

During excavation, soil samples will be continuously screened for organic vapors following the FDEP "headspace" method using an organic vapor analyzer (OVA) equipped with a flame ionization detector (FID) or equivalent.

All contaminated soils excavated during tank removal will be placed on, and covered with, plastic sheeting and secured.

Waste Characterization soil samples will be collected and analyzed for the FDEP "Pre-Burn" constituents prior to removal of contaminated soil from site for disposal.

All contaminated soil disposal manifests will be supplied to the Authority as part of the Closure Assessment Report.

1.6.J Tank Disposal Operations

Tank will be purged for all volatile and explosive vapors prior to entry and/or removal of interior sludge.

Tank will be rendered unsuitable for future use as a storage tank by drilling or cutting holes in the tank before removal of it from the site.

Tank disposal manifests will be included as part of the Closure Assessment Report.

1.6.K Free Product Removal and Groundwater Testing

Should any free product be encountered in tank system excavation, it should be removed by appropriate methods, (i.e., absorbent mats or vacuum suction).

Should groundwater be encountered less than 20 feet below land surface, samples will be obtained from each monitor well before tank removal. If there are no monitor wells present, a temporary well point should be installed in the area of highest OVA reading or in the area of the tank fill port before excavation is backfilled.

If groundwater is more than 20 feet below grade, coordinate with appropriate governmental agency to determine if sample is required.

1.6.L Storage Tank Forms

The following forms, where applicable, should be included in the Closure Assessment Report and also submitted to the appropriate agencies:

- Application for Closure of Pollutant Storage Tank Systems which can be found at the following website:

  https://www.epchc.org/divisions/waste/storage-tank-compliance

- Underground Storage Tank Installation and Removal Form for Certified Contractors, which can be found at the website below.

- Discharge Reporting Form and Incident Reporting Form which can be found at the website below.

- Storage Tank Registration Form and instruction which can be found at the website below.

- Limited Closure Summary Report Form which can be found at the website below.

  https://floridadep.gov/waste/permitting-compliance-assistance/content/storage-tank-system-rules-forms-and-reference

1.6.M Closure Assessment

For sites with documented soil or groundwater contamination that has already been reported to the regulatory agencies, a closure assessment is not required prior to the removal or abandonment of USTs, ASTs, and appurtenances. However, a Limited Closure Summary Report Form must be filled out and submitted to the EPC.

For all other site, a “full” Closure Assessment is required and a Closure Assessment Report must be prepared as described below.

Closure Assessment Report will include all items from the attached checklist.

1.6.N Post-Removal Activities

Return the site to original condition or as otherwise specified.

Remove all debris.

Address contaminated soils and/or groundwater in accordance with pertinent regulatory requirements.

Provide the Authority with a copy of the complete Closure Assessment Report including all pertinent drawings and specifications.

1.7 AGT Guideways - Reserved

1.8 Landscaping and Irrigation

1.8.A Related Sections – Reserved

1.8.B Scope – Reserved

1.8.C Applicable Codes and Reference Standards

Landscape treatment will be provided in accordance with the City of Tampa Municipal Code Chapter 13 (Latest Version), Landscaping, Tree Removal, and Site Clearing, and any other applicable City of Tampa Rules and Regulations.

Plans, specifications, and inspection for landscaping will be accomplished by a professional landscape architect registered in the State of Florida.

All plant materials will be in accordance with Grades and Standards for Nursery Plants, Parts I and II, latest edition, as published by the Florida Department of Agriculture and Consumer Services. All plants not otherwise specified as being "Specimen" will be Florida Grade Number One or better, as determined by the Florida Division of Plant Industry. "Specimen" refers to an exceptionally dense, symmetrical plant, so trained or favored in its development that its appearance is unquestionable and outstandingly superior in form, number of branches, compactness, and symmetry.

Special attention should be paid in landscaping design and coordination to reduce the site's potential wildlife hazard attractants. All landscaping plans, details, and specifications should be independently reviewed by the Authority's Wildlife Biologist general consultant.

1.8.D Planning Objectives

Primary design objectives for the proposed project area will focus on the following areas of concern described below.

Maintaining and Reinforcing the Central Theme of Existing Planting Areas: By using certain varieties of landscape materials that currently exist within the terminal complex, a unity in design will result to enhance and reinforce the existing overall design concept.

Protecting Existing Plant Materials: Existing trees and shrubs will be protected.

Relocating Existing Trees: Existing trees that must be removed due to proposed construction will be relocated to a suitable location within the terminal complex whenever possible, at the direction of Authority. Tree relocation will be accomplished by a qualified and licensed mechanical tree mover and will be coordinated with Authority.

Visual Screening and Aesthetic Effects: Visual screening will be used where service-oriented and mechanical facilities, if any, are visually adjacent to public areas. Screening materials will consist of large trees and shrubs, berm/hedge combinations, or walls. Service facility walls should be softened with ground cover. The transition from parking area to public right-of-way can be made more visually pleasing with partial or intermittent screens of plant materials, which also function as a defining edge for the parking area.

Heat and Glare Reduction: Plant materials will be used wherever possible to reduce the glare and solar radiation in the airport environment created by pavement surfaces and structures. Plant materials effectively prevent the glaring light from reaching a reflective surface, block the glaring light from a reflective surface, and decrease the reflective qualities of a surface.

1.8.E Authority Standards

1.8.E.1 Soil and Planting Beds

Soils: The project site has been subject to considerable soil disturbance in the past. Soils analysis studies should be completed so that all variables are known. Soil testing locations will be designated on the Plans. Tests for soil pH, soluble salts, and organic content, as a minimum, will be conducted for each testing location. Soil testing will be conducted by an approved soil testing laboratory. Results of the analysis and recommendations for any amendments will be provided to the owner and design professional prior to any installations

throughout the project. If soil conditions are insufficient for proper plant growth, compensation for deficiencies can be made as detailed landscape plans are developed.

For the subject site, the following soil preparation will be completed prior to plant material installation. Inspections for soil medium verification will be strict, and must be in adherence with the following specification.

Preparation for tree planting areas will be as follows: Trees will grow in the existing soil, but to promote quick recovery from the transplanting process, backfill will be required that contains 60% high quality, pulverized, local brown peat; 1 cubic foot of manure per 1 cubic yard of peat; and, 40% sand loam. Backfill will be placed around the balls of all new trees. Large shade trees should have pits 2 feet greater in diameter than the size of the ball. Sides and bottoms of the pits should be scarified to increase porosity and to help root penetration into the existing soil. Care should be taken to ensure trees are planted at the proper depth, and to prevent settling of the soil. All trees should be set so that the top of the ball is 1 inch above the finished grade. For trees on sloping areas, the top of the ball should be even with the downhill side.

Shrubs require similar bed preparation. Bed areas require a minimum excavation depth of 6 inches. The excavated soil should be removed from the site and the beds backfilled with a thoroughly mixed and prepared soil containing 1 part sandy loam, 1 part peat moss, and 1 part sharp sand. Shrub areas which occur on compacted fill should have 12 inches of prepared soil. These areas require cultivation to a depth of approximately 6 inches before tilling in a topsoil mixture. Once the bed is prepared, it should be sterilized using an appropriate method to prevent weeds and unwanted growth. Bed areas which occur on slopes greater than 3:1 should be stabilized to prevent erosion until plants are established.

After bed preparation has been accomplished, plants should be spaced according to specifications and set with top of balls even with top of bed. Soil should be compacted carefully around each plant and watered sufficiently to eliminate air pockets around roots. A minimum 3-inch layer of red hardwood mulch, certified by the Florida Mulch Council, will be added after plants have been installed.

Grassed and ground cover areas should have a minimum 4 inches of topsoil over regraded subsoil. Drainage is essential, so it is expedient to cultivate sand or sandy loam into the upper 4 inches of soil to permit fine grading. All areas to be grassed should be fine graded to establish a smooth, even grade, suitable for grass placement. Any undulations that cannot be raked out should be top dressed with sandy loam. Stones 1 inch or larger, sticks, roots, or other debris exposed during this operation should be removed from the site. Areas showing weed growth will be sprayed with Authority-approved herbicides, mowed, and clippings removed from grassed areas prior to final grading.

Grassed areas which receive sod application should have sod placed so edges are touching, top dressed to fill voids with sharp sand, and rolled to eliminate undulations. The ground should be scarified as necessary immediately before sodding to provide a smooth bed. Drainage swales or channels should be protected with solid sod and/or matting as required. During construction, temporary measures should be taken to prevent erosion and sediment build-up of all drainage systems.

Protection and Relocation of Existing Plant Materials: Protection and/or relocation of existing trees will be in accordance with City of Tampa Municipal Code Chapter 13, (10/12/89).

1.8.E.2 Acceptable Plant Materials

For the purpose of unity in design, the plant list provided will form the basis of landscape design. Plant materials permitted have been selected for adaptability to existing conditions, harmony, interest in structure, texture, and ultimate growth habits. Acceptable plant materials for specific uses are shown in Table1. Shade Trees and Other Trees as listed are acceptable for use in open areas, surrounding buildings, buffer areas, and parking areas except as noted. Shrubs as listed are acceptable for use in all landscape areas. Ground Covers as listed are acceptable for mass plantings. Vines as listed are acceptable for upright growth against buildings or other structures. Any deviation from this list will require the approval of Authority's Director of Maintenance.

Table 1 – Acceptable Plan Material

Shade Trees Live Oak Jacaranda Oriental Sweet Gum Red Maple **Shrubs** Cast –Iron Plan Rigid Bottlebrush Dwarf Yaupon Holly Giant Liriope African Iris Indian Hawthorn Crinum Lily Florida Anise Dwarf Bufford Holly Nandina Oleander Calypso Split-leaf Philodendron Coontie Dwarf Wax Myrtle **Vines** Confederate Jasmine Coral Honeysuckle	**Other Trees** Dahoon Holly Crape Myrtle Southern Magnolia Paurotis Palm Senegal Date Palm Canary Island Date Palm Ligustrum Tree Cabbage Palm Drake Elm Chickasaw Plum (open areas only) **Grassed Areas** St. Augustine – Bitter Blue or Floratam Argentina Bahia **Ground Cover** Day Lily Lily-turf Mondo grass Confederate Jasmine Dwarf Confederate Jasmine Society garlic English Ivy Holly Fern Boston Fern

1.8.E.3 Irrigation

Depending on location, different sources of irrigation water are utilized including reclaimed, well and municipal potable. The irrigation water supply must be site specifically verified prior to plant selection to ensure proper plant selection compatible to water type.

Sleeving: All irrigation-related sleeving will be PVC Schedule 40 and installed for the proposed project area so that sprinkler systems can be installed without the disruption of transportation systems. All piping used in planting areas will be PVC Schedule 40.

Control Valves: The control valves will be electric automatic remote control valves. All electric valves will be enclosed in plastic valve boxes. Backflow preventers will only be

used when tied to a potable system. Reclaimed water valve boxes should consist of purple polyolefin material and clearly marked “Reclaimed water – do not drink”.

a. Small grassed areas which occur adjacent to roadway paving will be watered with small diameter pop-up heads so that close control can be maintained on wind spray.

b. Flush lawn quick coupler valves will be provided in all landscape planted areas. They should be located so that all trees and planting areas can be reached by a 100-foot hose.

c. Irrigation piping will not be installed on top of roadway slopes or along retaining wall toes unless cut-off valves are positioned at lower levels and away from structure.

1.8.F Erosion Control During Construction

Where slopes are equal to or greater than 3:1, jute matting or fiberglass matting should be considered to protect against erosion of the topsoil or prepared soil. Drainage systems should be protected with solid sod and/or matting, as required. During construction, temporary measures should be taken to prevent erosion and sediment build-up of all drainage systems.

1.8.G Specified Turf Varieties

Turf and grass types specified should be desirable for wildlife hazard management and, along with all Landscaping plans, should be independently reviewed by the Authority’s Wildlife Biologist general consultant.

Select grass species will not be included due to the potential to create a wildlife hazard attractant: Millet or Large-seed producing grasses.

The following turf varieties are preferred at the specified locations:

a. Airfield – Argentine Bahia; 6-12” tall
b. Parkway – St. Augustine*; with irrigation
c. Terminal Facilities – St. Augustine*; with irrigation
d. SkyCenter and Rental Car Center Facilities
   [in public view] St. Augustine*; with irrigation
   [back-of-house, service center areas] Bahia

* Heavily shaded areas with St. Augustine grass should be cultivar type Seville/Bitter Blue

1.8.H Anti-Perching Devices

Anti-perching devices should be utilized as needed on tall structures (light poles, signage, etc.) to deter Osprey and other large birds from perching on the facility.

1.9 Site Signage and Graphics – Reserved

1.10 Access Control

All access control equipment must comply with the following standards and must be compliant with the current version of the Software House C-Cure Access Control Headend system.

1.10.A Equipment

Card Reader:	Software House TST-100-V
Door/Gate Controller:	iStar Ultra SE
I/O Module:	IP-ACM v2 Ethernet Door Module

1/10/B Configuration Requirements

No power over ethernet is permitted, all power shall be furnished via power supply with a maximum of one gate or two doors served by the same power supply. A battery backup system shall be specified to provide power for up to 4 hours in the event of power interruption.

No more than 16 card readers may be connected to any one iStar Ultra SE controller.

1.11 Fencing and Gates

1.11.A AOA Fence Requirements

All fence and gates that secure the AOA must conform to the following requirements and the requirements of FAA Advisory Circular 150-5370-10G, Standards for Specifying Construction of Airports.

- Fence Height: 8’ chain link fence fabric with 3 strands barb wire (barb) wire not included in 8’ dimension.

- Wildlife Exclusion Barrier: A subterranean wildlife barrier is required at all locations the fence is located over non-paved areas. The wildlife barrier will be constructed of 4’ chain link fence fabric buried horizontally 6” underground and attached to the vertical fence fabric every 12”. The fence fabric may also be installed at a downward angle such that the deepest portion of the 4’ barrier is 1’ 6” underground. Where necessary to avoid existing underground objects, the wildlife barrier may also be installed vertically.

- Any gate not located over pavement will have a concrete apron constructed under the gate to serve as a wildlife barrier.

- Gate Height: Gates will be constructed with a frame height 8’ tall with straight coil razor wire installed on top of the gate.

1.11.B Non-AOA Fence Requirements

All fence and gates that do not secure the AOA will comply with all requirements of 1.11.A with the exception that a wildlife exclusion barrier will not be required.

1.11.C Temporary AOA Fence

Temporary AOA fences are fences securing the AOA that will not be in place 60 days or longer. Temporary fencing material is not required to be new material but shall provide a like-new appearance and condition. Temporary AOA fence must meet all requirements of Section 1.11.A with the exception that a wildlife exclusion barrier will not be required and fence posts may be driven into the ground without concrete foundations.

Temporary fence lines must resist wind loads and remain plumb and in a straight alignment. Any temporary fence that is expected to be required longer than 60 days must be removed and reconstructed to meet all requirements of Section 1.11.A

1.11.D Razor Wire

Razor wire is required over all gates and over any fence deemed by Authority Operations or TPA

PD as a high-risk area. Short and medium razor wire types are acceptable. Razor wire will be installed in a double coil configuration over high-risk fences and in a straight coil configuration over gates so as not to interfere with gate movements.

1.11.E Concrete Barricades

In areas identified by Authority Operations or TPA PD as a high risk for vehicle collisions all fence will be installed on top of or behind FDOT compliant concrete barrier walls.

1.12 FAA Systems – Reserved

Section 2 - Architecture – Building Engineering

2.1 Applicable Codes and Reference Standards

The design professional is responsible for identifying and complying with all applicable local, state and federal codes, regulations and standards.

2.2 Building Objectives - Planning Criteria

2.2.A Typical Facility Objectives

2.2.A.1 Geotechnical

2.2.A.1.1 Building Area

Previous Foundation History: A variety of structural foundation types have been used at TPA, including the following:

a. Landside Terminal Building (1971): This building is supported on both steel pipe piles and spread footings, bearing on rock at willow rock locations. A boring was drilled at each column location. At one column location, excessive settlement was experienced, resulting from solution activity in the limestone bedrock under a spread footing at that location. The settlement initiated when three levels of the garage were added in 1982. About two inches of settlement occurred and large quantities of grout had to be pumped into the solution void to stabilize the foundation. Grouting quantity could not be predicted in advance.

b. The foundation systems utilized for the original four airsides (1971) vary. Airsides B and C were built on pile foundations; Airsides D and E were constructed on willow spread footings. The foundations of the shuttle (AGT) system hammerhead pier and maintenance area/platforms for all four original airsides were constructed with pile foundations.

c. Taxiway "J" Overpass (1971): Spread footings on limestone were used.

d. Airside F (1987): Spread footings, in combination with a grouting program, were used. A boring was drilled at each column location. Grouting quantities were substantial and could not be accurately predicted in advance.

e. Airside F AGT System Guideway Piers (1987): Drilled shafts were used. Final lengths were determined by a boring taken at each drilled shaft, plus observations during the shaft drilling operations.

f. Quad Deck Expansion on East and West Sides of Terminal Building (1987): Drilled shafts were used. Final lengths were determined by a boring taken at each drilled shaft, plus observations during the shaft drilling operations.

g. Long Term Parking Garage (1991): Drilled shafts were used. Final lengths were determined by a boring taken at each drilled shaft, plus observations during the shaft drilling operations.

h. Airside A (1993) was constructed utilizing 30”, 36”, 42” and 48” diameter drilled piers as the foundation system. The AGT maintenance platforms and the passenger loading bridge pedestals were constructed on 48” diameter drilled shafts.

i. Airside E (2002) was constructed utilizing spread footings. The AGT maintenance platforms and the passenger loading bridge pedestals were constructed on 48” diameter drilled shafts.

j. Airside A Outbound Baggage Sortation Facility (2003) was constructed utilizing 48” diamante caissons under all columns and strip footings under the exterior masonry walls.

k. Airside C (2005) was constructed utilizing spread footings. The AGT maintenance platforms and the passenger loading bridge pedestals were constructed on 48” diameter drilled shafts.

l. Remote Parking Garage (2005) was constructed utilizing 30”, 48” and 60” diameter drilled piers (caissons). The administration building was built on spread footings.

2.2.A.1.2 New Foundations

Because of the uncertainty of the limestone bedrock consistency, drilled shafts or piers have been the most prevalent foundation system in recent years. Airside E was, however, a notable exception; it was constructed on willow spread footings.

The foundation system options must be considered on a site by site basis after an extensive geotechnical investigation.

If a deep system is required, the choices include drilled shafts, piers, or caissons and auger cast piles. Mechanically driven pile systems are not allowed with close proximity of the Landside Terminal Complex.

2.2.A.1.3 Geotechnical Investigation

As a minimum, the following guidelines will be observed in the design investigation.

a. Minimum boring grid will be 200 feet on center.

b. Borings and testing locations will carry airport grid coordinate locations and ground surface NGVD elevations.

c. Minimum boring depth will be 50 feet, including 20 total feet into refusal (N=50+ blows/ft) limestone material.

d. Testing locations, procedures, and times of testing will be established well in advance of testing, and must be coordinated with the Authority. Test locations will be cleared for utilities by the Design Consultant, the Authority, and affected utility companies. All areas disturbed by testing must be restored to the satisfaction of the Authority.

e. Sufficient field and laboratory testing will be performed to establish classifications and properties for the various strata encountered. This will include determination of Unified Soil Classifications, plasticity/consolidation properties of compressible materials, bearing values, strength properties, and groundwater conditions.

f. Design phase load test programs will only be considered after completion of a preliminary geotechnical program, a preliminary foundation analysis, and a cost study justifying the load test program.

g. Foundation selection will address vibration and disturbance to adjacent structures, noise, and annoyance levels, cost, risk, and constructability.

2.2.A.1.4 Earthwork

Specific recommendations will be made for the project needs in the areas of clearing and grubbing, undercutting, proof rolling, embankment construction, suitable materials, compaction, stabilization, subgrade preparation, and any special procedures that may be proposed.

2.2.A.1.5 Code Requirements

a. Geotechnical testing will conform to applicable sections or ASTM Volume 04.08, “Soil and Rock; Building Stones; Geotextiles.”

b. Geotechnical testing and engineering will be conducted by corporations and experienced individuals licensed to practice this specialty by the State of Florida.

2.2.A.2 Structural

2.2.A.2.1 Coring, Drilling, and Anchoring into Existing Structure

Non-Destructive Testing (NDT), scanning, should be performed by a qualified professional prior to any coring, drilling, or anchoring into existing structure (slabs, beams, columns, etc.) to minimize clashes with reinforcing steel, conduits, and other subsurface conflicts. The contractor and design professional should determine the best testing method for each application, but the preferred methods are as follows:

- Elevated Slabs and other applications where plastic conduits may be present - X-Ray
- Slab-On-Grade – Ground Penetrating Radar (GPR)

2.2.A.2.2 2014 Main Terminal Building Structural Evaluation Report

Walker Consultants performed an investigation of Tampa International Airport’s Main Terminal Structure: Main Terminal Structural Investigation, dated July 16, 2014. Any structural modification proposed for the Main Terminal Building or Short Term Parking Garage requires the design professional review the report noted above. Following the review, the design professional must provide a memorandum to the Authority stating what impact the report’s conclusions have on the proposed modifications.

2.2.A.2.3 Designated / Delegated Design

Delegated design is the act of the design professionals leaving design responsibility to the constructor for one or more specialty scopes of the work for the construction of a project. The design professional is responsible for all design work and may not delegate design of any system without the approval of the owner of each systems design desired to potentially be delegated.

2.2.A.3 Architectural

2.2.A.3.1 Glare Control or Prevention

- Use roof overhangs, tinted glass, coated glass, fritted glass or applied films to control glare and reduce heat gain from the sun.

- Exterior sunscreens are generally not allowed because they provide a roosting area for birds. Reflective-type glasses are generally not considered because of the possibility of creating high intensity reflections that might temporarily cause blindness to pilots during aircraft operations.

- Consider glare patterns in the placement of light fixtures. High contrast "scallops" can be created on walls or sign faces as a result of poor fixture placement. When preparing reflected ceiling plans, show all ceiling-hung signage elements so that lighting patterns and glare potential may be reviewed. Avoid placing lighting adjacent to ceramic tile walls; the "wash" of light accentuates irregularities that are common with such a finish.

- Avoid products or conditions that can create navigation hazards. Finishes such as metallic paints can cause visual reflections and even radar interference. Sloped glass areas can cause reflection problems.

- High intensity exterior lighting fixtures will be selected that include appropriate shielding or cut off provisions to eliminate glare to roadway and walkway areas.

2.2.A.3.2 Noise and Vibration Control

- Provide for isolation joints between slab areas and between slabs and columns. This isolation will be designed to prevent the transmission of low frequency vibrations from main mechanical rooms that contain chillers, compressors, and pumps.

- Provide localized isolation for pumps, air handlers, and so forth. Consider inertia pads.

- Install sound attenuation devices on ductwork and provide acoustic treatment in air plenum areas.

- At baggage sortation areas, provide vibration isolators at all conveyor system suspension elements. Consider a sprayed-on insulation product on the bottom side of all elevated slabs for thermal and sound absorption purposes.

2.2.A.3.3 Passenger Circulation and Travel Distance

- Endeavor to maintain a maximum 700-foot walking distance from the passenger's parked car to the door of the aircraft.

- Understand the influences of the types of passenger flow as follows:

Enplaning passengers: "Trickle flow" describes the arrival rate for departing passengers. The earliest passengers arrive an hour or more before departure, and the arrivals continue a few at a time every few minutes until departure.

Deplaning passengers: "Slug flow" describes the 200-300 passengers arriving through a single doorway within a five- to ten-minute time period.

- Maintain a 30-foot minimum clear width for a double loaded concourse walkway.

- Position passenger check-in counters so they are set back a minimum of 16 feet from the edge of the concourse walkway to accommodate the passenger queue. By setting the check-in counter at a ±60 degree angle relative to the concourse walkway, the available queuing area can be increased. The angular placement of the counter also provides improved sight lines for the gate number signage on the check-in counter back wall. (See 2.2.B.1.6, 2.2.B.2.2, and 2.2.B.2.3 for notes regarding ticket counter and back wall design.)

- Arrange seating and check-in counters to create separate enplaning and deplaning aisles within each holding area. Provide a direct gate to walkway alignment for deplaning aisle. Locate the enplaning aisle parallel and adjacent to the outside wall.

- Provide stairs adjacent to up and down escalators as a backup system when the escalator(s) may be out of service. Minimum escalator tread width will be a nominal 40 inches to accommodate a single passenger with carry-on baggage.

2.2.A.3.4 Building Occupant Load and Miscellaneous Code Issues

With the 1991 edition, the Life Safety Code, NFPA 101, began to recognize the unique occupancy conditions associated with airport terminal buildings. Table A.7.3.1.2 provides airport terminal load factors to assist in calculating the occupant load.

Table A.7.3.1.2 (NFPA 101-2000) Airport Terminal Occupant Load Factors	
Airport Terminal Area	Area/Person
Concourse (circulation area)	100 sf / person
Waiting areas (seating areas	15 sf / person
Baggage Claim	20 sf / person
Baggage Handling	300 sf / person

Other terminal space occupant loads that have been generally agreed to by the City of Tampa Building Department and Fire Marshal includes:

Gift shop (mercantile)	60 sf / person
Lounge / restaurant (small assembly)	15 sf / person
Airline operations (business)	100 sf / person
Storage	300 sf / person
Mechanical / Electrical (storage)	300 sf / person
AGT Maintenance (storage)	No occupant load
Toilet Rooms	No occupant load

Elevators, escalators, and stairs	No occupant load

Section 12.2.3.3 includes Exception No. 2 which allows exits to be distributed around the perimeter of the building. Exiting distances become more workable, but most of the exit doors must now be equipped with special delayed release locking hardware to maintain aircraft operations area (AOA) security. In Airsides F, A, E, and C, exterior exit stairs are provided at frequent intervals around the building perimeter. These stairs are served by exit doors with delayed release exit hardware that is interfaced with an access control system based on a computer/identification badge program. Section 7-2.1.6, provides the guidelines for this operation (refer to subsections 2.2.A.3.5 and 2.2.A.3.6 for the functional features of the access control system and the delayed action fire alarm system).

In addition to the interior and exterior exit stairs, the elevated emergency walkway between the AGT guideways has been recognized as an acceptable exit, or area of refuge. Other potentially applicable NFPA fire codes include (but are not limited to) the following: NFPA 1, Uniform Fire Code, NFPA 10, Standard for Portable Fire Extinguishers; NFPA 13, Standard for the Installation of Sprinkler Systems; NFPA 20, Standard for the Installation of Stationary Pumps; NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages; NFPA 70, National Electric Code; NFPA 72, National Fire Alarm Code; NFPA 80, Standard for Fire Doors and Fire Windows; NFPA 88A, Standard for Parking Structures; NFPA 92B, Standard for Smoke Management Systems in Malls, Atria, Large Areas; NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; NFPA 105, Standard for the Installation of Smoke Door Assemblies; NFPA 110, Standard for Emergency and Standby Power Systems; NFPA 111, Standard for Stored Electrical Energy Emergency and Standby Power Systems; NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems; NFPA 221, Standard for Fire Walls and Fire Barrier Walls; NFPA 241, Standard for Safeguarding Construction, Alternation, and Demolition Operations; NFPA 407, Standard for Aircraft Fuel Servicing; NFPA 409, Standard for Aircraft Hangars; NFPA 415, Standard for Airport Terminal Buildings, Fueling Ramp Drainage, Loading Walkways; and NFPA 780, Standard for the Installation of Lightning Protection Systems.

NFPA 415, Section 2-1.5, addresses architectural features that may be required if potential fuel spill points (such as fuel hydrant boxes) are located less than 100 feet horizontally from glazed building walls. Section 3-1.1 addresses minimum ramp slopes away from terminal buildings.

Relatively obscure code provisions can create difficulties for design professionals if they are not considered in the early schematic phase of a project. NFPA 415, Section 2-2.2, restricts the placement of exhaust outlets, or air intakes, on the aircraft ramp side of the building. Openings will not be less than ten feet above grade level of the ramp." This provision has required several creative solutions to accommodate kitchen makeup air and exhaust, and tenant area toilet exhausts.

2.2.A.3.5 Access Control System (ACS)

In compliance with Transportation Security Administration (TSA) Part 1542, the Authority has an Airport Security Program incorporating the use of a computerized Access Control System (ACS). The ACS software (CCure800) and processing panels are manufactured by Software House. This ACS controls select doors and gates throughout the airport terminal complex and airfield.

The system has the capability to:

- Ensure that only those persons authorized to have access to secured areas are able to obtain that access.
- Deny access immediately at the access point(s) to individuals whose authority to have access changes.
- Differentiate between persons authorized to have access only to a particular portion of the secured area or to the entire secured area(s).
- Restrict an individual's access by time and date.

Upon authorization, security training, and an FBI background check, employees of the airport, tenants, or contractors may be issued an Airport Identification Badge that incorporates a uniquely identifiable electronic code. When the proximity badge is presented to the badge reader at either side of the door or gate, the system confirms access authorization according to the particulars previously entered into the individual's computer record.

In addition, select components of the Access Control System have been installed in other non-secure access points (i.e., Authority Offices). For these doors, exit activation of the door release mechanism is usually controlled by a motion sensor and/or panic hardware.

The ACS host computer is located in the Communications (Comm.) Center. The access status of each employee is programmed into the system by way of a terminal located in the Operations Department. Comm. Center personnel monitor the system's operation and report alarm conditions to the Airport Police Department. At many portals, an alarm condition initiates a video scan of the location that can be recorded and reviewed.

The ACS host computer is networked with processors which are located at each airside building through a fiber optic conductor network. From these processors, the network is distributed to local processors, which generally are located in nearby mechanical or electrical spaces that can support four door openings. At doors, power supplies and timer modules interface with either electromagnetic locks or electronic panic devices to provide controllable access through the portal. At gates and turnstiles, the card reader interfaces with contacts to start a gate operator or release a turnstile.

Access-controlled building doors are also interfaced with the fire alarm system to allow a complete release of all doors in the event of general building alarm activation.

2.2.A.3.6 Closed Circuit Television (CCTV) System

The Airport utilizes CCTV for various security and operational purposes. The system transmits video via coaxial and fiber optic cable. The CCTV cameras consist of pan/tilt/zoom and fixed mount lens type that redesigned for both interior and exterior environments. Video is transmitted back to the Airport Communications Center where by the cameras can be controlled through video switchers located in Airport Operations, the Airport Police Department, and the Communications Center Many cameras and associated video signals are linked to the access Control System that displays video upon a generated alarm. All CCTV cameras are digitally recorded on a 24-hour basis.

Typical areas with CCTV monitoring include:

- Passenger screening areas at the airsides
- Airside concourses and exit doors.
- AOA turnstiles from the truck court (at the airsides)
- AOA vehicle gates (at the truck courts and around the airfield)
- At the monorail and shuttle stations (at the airsides, at landside, and in the Long Term Garage)
- At entry/exit doors at baggage makeup areas (AOA)
- And at many other selected areas
- The CCTV system continues to expand. A design professional must meet with the Operations and Police Departments to establish and confirm the definitive needs for a particular project

2.2.A.3.7 Federal Inspection Services (FIS) Security

In Airside F, a second door security system is installed to maintain a sterile accessway for arriving international passengers. At each of the international arrival ramps, a door interlock has been created with a pair of doors above and a pair of doors below the loading bridge entry/exit door. An electromagnetic lock system allows for only one pair of doors to be open at one time. The locking arrangement is controlled by key switches operated by an airline gate agent. In the most frequently used condition, the domestic mode, doors above the loading bridge door (located between the holdroom and the loading bridge door) are held open by energized electromagnetic door holders (their electromagnetic locks are de-energized). The second pair of doors below the loading bridge door is locked with electromagnetic locks preventing access to the lower level FIS processing area.

When an international flight is due to arrive, the gate agent resets the key switch reversing the locking arrangement. The electromagnetic holders on the upper doors are de-energized which allows the doors to close against an energized electromagnetic lock. The upper doors are then secure. As a result of the same key switch operation, the magnetic locks on the lower doors are de-energized which allows them to open. As the passengers move down the ramp, the doors can be opened and then held open by the electromagnetic holders which are now energized. When the last passenger passes through the lower door opening into the FIS screening area, the gate agent activates another key switch which resets the interlock to the domestic operation mode

2.2.A.3.8 Fire Alarm Pre-Signal System

With the activation of a pull station, smoke detector, heat detector, or sprinkler flow switch, an audible signal and visual display are indicated at the local building annunciator and at the Comm. Center. An alphanumeric display is illuminated on the fire alarm control panel, a graphic representation appears at the “satellite” annunciator at the airside, security office, and the fire control rooms, and a user-defined English language description is transmitted to the Comm. Center CRT displays and line printers. Activation of a duct detector on an air handling unit will

immediately shut that unit down. Additional HVAC control sequences may occur as a result of building control system programming. A local indicating lamp will light at locations of the area detector or duct detector initiating the alarm.

Upon activation of any elevator lobby, elevator machine room, or elevator hoistway smoke detector, Phase I recall will be initiated at that elevator (or bank of elevators), and the elevator car will return nonstop to its designated service level where the doors will open and remain open. The “Do Not Use Elevator” lamp will illuminate at the designated level.

Upon activation of an elevator machine room or elevator hoistway heat detector, the system will shunt trip the elevator controller operating power after the above recall event has successfully landed the elevator at the appropriate level and opened the doors.

Once the alarm is displayed, the Comm. Center notifies the airport police dispatcher of the alarm and an officer is dispatched to assess the alarm condition. If within a five-minute time period, the alarm is determined to be false, the system will reset and all functions will return to normal. If the alarm is verified as valid, the officer immediately advises the Comm. Center of the details and a general alarm is initiated.

At a general alarm, the City of Tampa Fire Department is notified (apparatus will be dispatched), a contact closure is made with the access control system, and all delayed-action door operators are immediately released. One of several prerecorded messages is broadcast over the annunciator speaker system, and the strobes begin to flash.

In the event the police officer is unable to complete alarm verification within the five-minute pre-signal period, a general alarm is initiated and all operations previously mentioned will occur.

2.2.A.3.9 Shunt-Trip Operation, Building Power, and AGT Power

Power feeds for both the airside building and its AGT system generally occur on the airside end of the AGT route. Typically, each system has its own switchgear room with dedicated transformers and switchgear. The buildings use 277V/480V, and 120V/208V systems, and the AGT system is typically 600V.

As a life safety precaution, the Fire Marshal has required the capability of de-energizing both power systems from either switchgear room. Typically, the local switchgear can be de-energized with a few disconnect pulls. In order to de-energize the entire building and the guideway, shunt trips for the other system will be located on the switchgear room wall, within steps of the main gear disconnects.

2.2.A.3.10 Tempered Glass

Shortly after opening in November 1987, Airside F experienced a large amount of spontaneous tempered glass breakage that was essentially due to nickel sulfide intrusion. The problem became so severe that the facility was ultimately completely re-glazed with laminated glass. Apparently, the quality level of tempered glass in the mid-1980s deteriorated to such a degree that the industry as a whole began to discourage its use.

As a result of the Airside F difficulties, the Authority now specifies that all areas requiring safety glass (per Florida Building Code, Chapter 24) will be finished with

laminated glass. The only exception might be the use of 1/4-inch clear tempered glass for infill in “normally-sized” storefront entrance doors.

For exterior purposes, Airside A used a 1-foot, 8-inch-high curb to eliminate the safety glass requirement, and 9/16” thick laminated heat-strengthened glass to achieve the strength necessary to achieve the opening sizes desired.

Airside E: (All Viracon Products)

Type 1: 9/16” laminated VH 13075, HS/HS
¼” clr with VE-1-85 coating, #2
.060” PVB interlayer
¼” gry

Type 2: 9/16” laminated VH 13-75 HS/HS spandrel
¼” clr with VE-1-85 coating, #2
.060” PVB interlayer
¼” gry with V907LF blk, #4

Type 3: 9/16” laminated VH 13-75 HS/HS
¼” clr with VE-1-85 coating, #2
.60” PVB interlayer
¼” gry with V907LF blk, pattern 5006, #4

Type 4: 1” insulated glass, Low E, HS/HS
¼” gry with VE-3-2M coating, #2
½” air space
¼” clr

Type 6: 1” insulated glass, Low E, HS/HS
¼” gry with VE-3-2M coating, #2
½” air space
¼” clr with V907LF blk, pattern 5006, #4

Curtain wall and storefront systems:

Kawneer 1600, nominal 2 ½” x 7”
Kawneer Tri-fab 450, nominal 1 ¾” x 4 ½”

Specialty long span truss curtain wall system:
Advanced Structures, Inc. Marina del Rey, CA.

Airside C: (All Viracon Products)

Main glass: 1” insulated glass, Low E, HS/HS
¼” Evergreen with VE-8-2M coating, #2
½” air space
¼” clr

“A” glass: 1” insulated glass, Low E, HS/HS (appears “frosted”)
¼” Evergreen with VE-8-2M coating, #2
½” air space
¼” clr SK/P V1086 S1M SANDBLAST #3
SCRN/P1 3058 #3

“B” glass: 1” insulated glass, Low #, HS/HS (appears “frosted”)

¼” Evergreen with VE-8-2M coating, #2
½” air space
¼” clr SLK/P1 V185 S11M ACID ETCN #3 SCRN/P1 3058 #3

“C” glass: 1” insulated glass, Low E, HS/HS (fritted)
¼” Evergreen with VE-8-2M coating, #2
½” airspace
¼” clr SLK/P1 v175 lf opaque white #3 SCRN/P1 5006 #3

“D” glass: 1” insulated glass, Low E, HS/HS
¼” gry with VE-3-52 coating, #2
½” air space
¼” clr

“5D” glass: 1” insulated glass, Low E, HS/HS (spandrel)
¼” gry with VE-3-52 coating, #2
½” air space
¼” clr APD/P1 V175 LF (opaque wht) #4

“E” glass: 1” insulated glass, Low E, HS/HS (spandrel)
¼” Evergreen with VE-8-2M coating, #2
½” air space
¼” clr

“G” glass: 1” insulated glass, Low E, HS/HS
¼” clr with VE-1-2M coating, #2
½” air space
¼” clr

Curtain wall System:

Vistawall: Several frame configurations, 2 ½” wide X 6 ½”, 71/4”, 8 ½, and 12 ¼” deep
Interior Tempered Glass System:
RDM Glass Systems (Inkan Limited), Ontario, Canada:
½” and ¾” glass panel system with 14” fins.

2.2.A.3.11 Maintenance Contracts

For nearly 30 years, the Authority Maintenance Department has maintained exclusive service contracts with various equipment and system manufacturers. Over the years, these contracts have resulted in competent regularly scheduled preventative maintenance, and in several cases, full-time, on-site representation for emergency maintenance. Current service contracts include:

Bombardier	for airside to landside AGT systems for monorail system at the Long Term Garage
ASIG	for hydrant fuel system
Bombardier	for monorail system at the Long Term Garage
Carrier	for chillers (building/preconditioned air) and chilled water systems
Com-Net	for EVIDS System
Johnson Controls	for building control system (Metasys - EMCS)
Schindler	for elevators, escalators, and dumbwaiters

Simplex	for fire alarm system

2.2.A.3.12 Toilet Room Design

Restroom design in public areas of the main terminal will comply with the requirements of the Main Terminal Interior Design Criterial Manual.

Fixture Counts: With the construction of Airsides F, A, E, and C, the CAA has exceeded the minimum standards for fixture counts as listed in the Florida Building Code-Plumbing (FBC-P). The increased fixture quantities have been developed in response to estimated slug load passenger counts at the terminal's peak load condition. The design professional will review any updates to the passenger loading forecasts before finalizing any toilet facility modifications. The design professional will also refer to the FBC-P, Paragraph 403.1.1, for special male/female fixture ratios associated with assembly occupancies. (potty parity)

Entry Detailing: Typically, a semi-circular maze arrangement is used, with carpeted wall for acoustical control (without doors). The minimum clear width will be 5 feet. The maze floor is typically carpeted, and a marble threshold transitions to ceramic tile upon entering the toilet room.

Finishes: Walls, within the toilet room, are typically clad full height with ceramic tile (minimum size is 4 inches by 4 inches), with 1/8 inch maximum joints, and gray grout. Floors are also ceramic tile (minimum size is 8 inches by 8 inches), with 1/4 inch or smaller joints, and gray grout. Ceilings will be painted gypsum wallboard. Refer to section 3.9B.

Minimum Circulation Clearances: Toilet stall to front face of lavatory will be 5 feet, 6 inches; toilet stall door to toilet stall door will be 6 feet; front face of lavatory to front edge of urinal will be 6 feet, and a minimum walkway clearance will measure 5 feet.

Toilet Partitions, Toilet Accessories, and Toilet Fixtures/Fittings: The Authority maintains strict and well-defined standards for these components. Refer to Sections 3.10.A, 3.10.E, and 3.15.F, for a detailed listing of the respective Authority standards.

Trash Receptacles (in toilet rooms): A trash receptacle (R) must be placed adjacent to one edge of each lavatory (L). A typical configuration at a lavatory wall would be: L-R-L-L-R-L. In addition, a receptacle is to be placed on each side of the entrance/exit doorway.

Diaper Changing Facilities: Each toilet room (both men and women) will be equipped with a diaper changing area. A counter with an integral sink will be fabricated of Corian (or equal) and will have a raised front edge. The counter will have a minimum length of 6 feet, and the sink will be placed at one end, leaving a 4-foot clear shelf width. The counter depth will be 2 feet. Counter detailing will make ADA compliant accommodations for individuals with disabilities. Adjacent toilet accessories will include a towel dispenser, a soap dispenser and a waste receptacle.

Women's Vanities: Each woman’s toilet room will be provided with a “makeup” vanity counter, fabricated from Corian (or equal). Length can vary from 8 feet to 16 feet, depending on toilet room capacity. Counter depth will be 1 foot. A full width stainless steel-framed mirror will be installed above the counter to a height

of 6 feet, 6 inches, approximately. A duplex outlet will be provided for every 6 feet of counter length.

Mirrors: All mirrors will be framed in stainless steel. Each women's toilet must be equipped with a 24-inch by 60-inch-high, full length mirror, mounted 1 foot above the floor.

Companion/Family Toilets: At each large toilet room grouping, provide a separate private toilet room that is accessible by an individual with disabilities (of either sex), who requires assistance from a spouse, nurse, or companion. The room should be at least 80 square feet in area. Corian (or equal) shelves will be provided for baggage and diaper changing. All plumbing fixtures installations will be ADA compliant. A junction box for an emergency call system will be roughed in, between the toilet and lavatory, at a height of 1 foot, 4 inches above the floor. All finishes and accessories will be consistent with standard toilet room construction.

Plumbing Chase Design: All plumbing chases will be designed to provide a minimum clear access walkway, 2 feet, 6 inches wide by 6 feet, 6 inches high, between the fixture carriers. Such a space is necessary to access and service the electronic flush valves, the electronic faucets, all fixture traps, waste line cleanouts, and water service branch isolation valves. Chases will be accessible from outside the toilet room such that a female plumber can service a men's room fixture, or vice versa. A 3’-0” wide door will be provided for access. Floor drains must be provided at each lateral cleanout location. A waterproofing membrane will be installed on all chase floors. The membrane will be turned up the perimeter wall a minimum of 2” to create a “mini-sump”. Appropriate linear fluorescent fixtures will be provided to effectively illuminate any serviceable area. The light will be switchable at the chase door. Duplex outlets must be provided at 20 feet on center. All piping penetrations through elevated floors will be waterproofed. All valves within the chase will be located at or beneath 7 feet above the floor.

Floor Drains: Floor drains will be located frequently within the toilet room; allow one drain for each 500 square feet of floor area. Drains will be located near the wall and between fixtures, or under toilet partition sidewalls. The drain placement will be away from any traffic areas (refer to chase requirements listed previously)

Cleanouts: Waste cleanouts will be placed at the end of each fixture bank lateral.

Janitors Closet: All closets will include a floor sink and a mop holder. Walls abutting the sink will be clad with ceramic tile (4" x 4" minimum size) to a height of 6' - 0" and a width of 1' - 4" beyond the sink edge. The mop holder will be installed in a position that will allow the mop to drip into the floor sink.

Walls beyond the tile areas will be painted gypsum wallboard to a height of 8’– 0”. All plumbing lines and electrical conduit and junction boxes must be concealed behind the wallboard. The remainder of the space, above 8' - 0" can remain unfinished with exposed studs, conduit, piping, valves, etc.

Art Glass: All new and/or remodeled multi-person restrooms at TPA will include an “art glass” wall panel system, utilizing images from the Authority’s existing catalog of approved photographs. Designer will evaluate similar installations in existing campus restrooms for reference on preferred locations, size, design intent, etc. Refer to section 3.9C.

2.2.A.3.13 Housekeeping Facilities

Vacuum cleaner outlets, 20 amp/120v, hospital-grade, will be located in carpeted areas within 100' of any point within that area. Breakroom facilities will be provided for the housekeeping staff that includes a counter with a sink, a microwave oven, a refrigerator; other furnishings within the space may include a rectangular table (seating 6) and a desk and chair. Thirty-to-forty half lockers, 12" wide x 36" high x 16" deep, will be provided for storage of personal items. Lockers will have a padlock hasp.

2.2.A.3.14 Bird Control

Building designs will discourage the roosting of pigeons and other nesting birds by minimizing the amount of ledges and protected surfaces where nesting might occur. The building envelope will be sealed as necessary with grilles, screens, etc., to prevent bird entry. In areas where the design may create a roosting area, a proven means of discouraging birds will be used; such as low-voltage wiring strips along parapet walls, low-visibility nylon lines crossing the areas, nylon netting around cooling towers, etc.

2.2.A.4 Equipment/Furnishings

2.2.A.4.1 Ash/Trash Receptacles

The construction of Airside A prompted the development of new receptacle that has been repeated on many subsequent renovations. The stainless steel unit can be fabricated with a sloped top or a sand tray (smoking areas). Typically, it is fabricated with a wall-mounting bracket. The piano-hinged access door has a concealed latch and an integral raised lip receptacle shelf. A removable cylindrical galvanized receptacle sits on the shelf.

2.2.A.4.2 Landside Ticket Counters

During 1999-2000, a project was initiated to replace the airline ticket counters on the Ticket Level. The resulting shell configuration consists of stainless steel clad end pylons bridged by a solid surface cowling to conceal the computer monitors. Two solid surfaces are overlaid on stainless steel clad front panel. This has an overall width of 6' - 0".

Stainless steel clad bag wells are placed on each side of a ticket counter module. The "floating" top design for the bag well allows for the installation of electronic scales on an as-needed basis. Digital readouts are provided on the cowling ends on each side of the bag well. The typical width of a bag well is 3' - 0". On the agent side of the counter line, the shell is filled with an insert cabinet that is generally designed and built to the particular airlines specifications. Typically, the insert design and detailing reflect the functional needs of the airline including the after hour security of ticket and bag tag stock. The design has generally evolved from work flow and ergonomic studies.

Shortly after the ticket counter replacement project was completed, the airlines began replacing many of the manned ticket counters with customized self-service E-ticket units. Many airlines installed a “corporate-standard” full height pedestal units, while others have chosen to install a small drop-in CRT module into a modified Authority counter shell. To date, the airlines have been generally receptive to making minor material adjustments to ensure visual compatibility with the Authority standard counter design. Most units are utilizing stainless steel and solid surface cabinetry.

2.2.A.5 Conveying Systems

Elevator entrance design has become a somewhat complex problem. The arrangement of up to ten distinct elements that may be necessary at an elevator entrance requires research and coordination with the elevator vendor, and numerous other contractors. The six items typically installed by the elevator installer include the call button unit (with or without the key switch), the hall lantern (indicating direction of travel), the current floor indicator (above the door), the fireman's phone outlet, the emergency sign explaining firefighter's operation, and the "Do not use elevator when flashing" signal light. In addition, other signage elements are required: a directory sign (that indicates the spaces accessed on the other floors via this elevator), an "In case of fir" sign, possibly a wall bumper (in a service corridor) and possibly a tenant requested sign (intended to provide instructions to flight crew members).

At airside buildings, it is frequently necessary to equip an elevator with special access-control control components to prevent the unauthorized access to a secure level of the building by the general public. The most frequently used controls are proximity cards (which require an interface with the airport's access control computer) or a digital keypad. A reprogrammable digital keypad can be programmed to a "corporate" code that will allow out-of-town flight crew members to access the airline's operations areas.

2.2.A.6 Miscellaneous Structural Considerations - Reserved

2.2.A.7 Miscellaneous Plumbing Requirements

Provide ½-inch water stub up and 2-inch sewer stub up for electric water coolers (typically a tenant provided item). The design professional should consult with each tenant regarding the desire and need for water coolers.

Prepare waterproofing details for all piping penetrations through elevated floor slabs. Coordinate with fire safety system.

All public toilet rooms will have 24 volt electronic flush valves on water closets and urinals and electronic faucets with blended water at lavatories.

Provide access panels when it is necessary to conceal a valve or other device that may require service or adjustment. Generally, it is preferred to locate such devices within service spaces, such as janitor closets, or plumbing chase, where they can be directly accessible. The components should be located within 7 feet of the floor (accessible without a stepladder). If an access panel is required in a tiled wall, it will be fabricated in stainless steel.

Provide frequent placement of cleanouts (particularly at changes of direction) in all underground storm, sanitary, grease, and specialty waste lines.

Provide tenant sub-meters on each tenant water service line. Meters must be accessible for monthly readings (accessible without a stepladder).

Provide a separate city water meter for cooling tower makeup water and cooling tower blow down. Meters must be purchased from the City of Tampa.

All "P" traps, shutoff valves, and faucet electronics will be located inside the plumbing chase.

All watercloset and urinal flush valves will be located in the plumbing chases.

Electric water heaters (EWH) will be roughed-in (plumbing and electrical) so that they can be easily removed and replaced without unsoldering or cutting piping. Locate adjacent to a floor drain.

Install gate valves immediately adjacent on either side of any pressure-reducing valve. Install pressure reducing valves in an accessible area below 7' - 0" above finished floor.

Install domestic water isolation valves on branch lines 2” and larger.

Coordinate floor drain locations with structural framing.

Do not install storm, sanitary piping, drainage piping, or HVAC pans or piping directly over electrical equipment, including panels. Do not run pressurized liquid (domestic water, chilled water, etc.) piping through electrical rooms.

Design water supply system for toilet rooms with valve zones so that only a small portion of the room must be shut down to service a particular component.

Install floor drains with trap primers and hose bibbs in all mechanical rooms.

All piping and conduit will be concealed in all finished interior spaces and on the exterior of the building.

Design domestic water pumps, so that one pump can be mechanically and electrically isolated to enable the other pump to remain operational (100% redundant and alternating function). Provide a full size bypass line on the domestic water system downstream of the booster pump package.

Provide a duplex in-line filter/strainer on the inlet to the domestic water pump.

Provide conductivity monitoring sensor on incoming city water and interface with BCS (METASYS).

Install gate valves immediately adjacent on either side of an air separator or a pressure reducing valve.

Provide cleanouts at the top of all sanitary risers. Provide cleanouts at the ends of all laterals and at all sanitary drops. Provide cleanouts at the end of all branch lines. Install floor drains beneath all cleanouts.

Coordinate the location of all storm and sanitary cleanouts with Authority maintenance prior to installing any piping.

2.2.A.8 Miscellaneous Fire Protection Requirements

A standpipe system will be an automatic wet system, class 1, 100 psi residual pressure at the most remote hose connection.

All fire sprinkler valves will be located in accessible areas. Access must be possible without a stepladder. If the valves must be concealed, appropriately sized access panels must be provided to allow inspection and/or servicing.

Fire sprinkler zone drain lines will be located at non-traffic locations and will terminate at a floor drain.

Utilize only UL-Listed hot-dipped galvanized hangers and threaded rods to support sprinkler system components in non-conditioned spaces such as: tug tunnels, bag make up areas, shuttle maintenance areas, and sheltered areas (exterior, but under cover.)

Utilize only UL Listed pipes and fittings for wet pipe and dry pipe systems. Pipe and fittings in non-conditioned spaces such as: tug tunnels, bag make up areas, shuttle maintenance area, sheltered areas (exterior, but under cover.) will be factory hot dipped galvanized.

All fire protection equipment and devices will be UL Listed and FM approved.

The design professional will carefully consider the potential impact of an accidental discharge or leak from a wet pipe system in rooms housing significant electrical equipment or electronic systems. Increased fire separation provisions may eliminate the sprinkler requirement or negate the need for a dry pipe or pre-action system.

2.2.A.9 Miscellaneous Mechanical Requirements

Provide air conditioning for all mechanical equipment rooms, electrical distribution rooms, systems rooms, the sound rooms.

Install large mechanical system components (chillers, pumps, etc.) on isolated sections of floor slab to reduce vibration transmission throughout the structure.

Provide access panels when it is necessary to conceal a valve, damper, or other device that may require service or adjustment. Generally, it is preferred to locate such devices in mechanical equipment rooms, janitor closets, or plumbing chases. If an access panel cannot be avoided, coordinate location with the Architect.

Air handling unit condensate will drain to the storm sewer system. Chillers will be painted.

Specify a three-to-five year full service extended warranty on any new chillers in addition to a renewable maintenance contract. The warranty documents will list the monthly cost to the owner for term of the warranty.

Provide sensors to monitor condenser water conductivity and pH, and interface with BCS (METASYS).

Provide vibration isolators on pipe hangers for the preconditioned air system (glycol) piping.

Cooling tower water piping and flange connections exposed to water spray should be constructed of PVC or coated steel.

Provide isolation valves in main glycol piping loop and branch line connections to main header.

All air handling unit equipment condensate drains will be piped to the nearest storm drain line. All air handling unit equipment on large scale “green field” projects, install a condensate collection system to recycle condensate “waste” as make up to replace evaporated condenser water. See system installed at Airside C.

2.2.A.10 Miscellaneous Power Requirements

No exposed conduit will be allowed in janitor closets beneath 8 feet above the floor.

All electrical distribution rooms will be air-conditioned.

Provide GFI (ground fault interruption) at vanities and between lavatories; an outlet must be adjacent to each lavatory.

Install gray 20 amp/120 volt hospital-grade outlets in carpeted areas (100 feet maximum spacing) for carpet cleaning equipment.

Provide power to irrigation system components such as pumps, controllers, and solenoid valves.

Provide power to all parking gates and electrical sliding gates.

Provide power stub-ups for FIDS system.

Extend normal and emergency power to subpanels in each tenant area.

Provide power source for low voltage 24VDC valves or lavatories, urinals, and water closets. Connect no more than three sensors to each transformer.

Rough-in empty conduit for an intercom system at each tenant's access-controlled security door. Rough-in power to master station location and rough-in system conduit between master station and substation. Typically, the substation will be located on the non-secured side of the access-controlled door hardware for the system will be provided by the tenant).

Rough-in empty systems conduit (for an emergency call system) to a location 1 foot, 4 inches off the floor, between the watercloset and the lavatory in all companion toilets. Extend conduit to near systems room to allow interface with a future master station that may be installed in the security office or the Communications Center.

Provide separate electrical meters, located in satellite electrical rooms, for each tenant space.

Provide emergency power to the waterproof duplex outlets in the elevator and escalator pits.

Provide GFI receptacles in the elevator machine rooms and central plant spaces.

Construction documents will outline all work to be performed. Drawings will show new branch or feeder circuits and identify panel and breaker numbers where originating, size of conduit, size of wire, number of conductors and full load current.

Provide a complete riser diagram if any electrical panels are added. (Having an accurate and complete riser diagram is a necessary tool to support the ongoing maintenance operation as well as provide for future development of the power network.)

Office Design: Provide a clean power receptacle in addition to a normal power outlet at each computer network data outlet. Provide separate transformer, dedicated panel and surge suppression when practical.

2.2.A.11 Miscellaneous Lighting Requirements

All HID downlights will be specified to have a protective glass lens to prevent hot glass from falling in the event of a lamp explosion.

Lighting at all exit stairs will be on emergency power.

Avoid using “shear” light along the walls; it accentuates all imperfections.

Do not install light fixtures (or speakers) above areas inaccessible to a lift device. Lower height construction such as bar/food service and preparation areas, planters, and escalators and stairs can make lamp maintenance impossible.

Provide appropriate lighting to enable nighttime servicing of the cooling tower.

Do not provide switches for toilet room lighting. They are always turned on. The only control is the breaker at the panel.

Provide emergency power to the light fixture in the elevator and escalator pits.

Minimize the use of fluorescent light fixtures. Lamp cost is high and replacement frequency is often.

2.2.A.12 Miscellaneous Systems Requirements

Provide raceways and conductors to monitor and control all elevators from the Communications Center.

The fire alarm system will be the pre-signal system operated through the Communications Center.

Provide data stub-ups for FIDS system.

Provide data raceway system and stub-ups for FIDS system.

Route systems cable tray (data, phone, fire alarm, CCTV, and so forth) to each tenant space.

Provide Gaitronic 280 series telephone in all elevator cabs.

Provide heat detectors in elevator pits.

Provide fire alarm speaker "strobe" devices in all enclosed rooms.

System vendors will provide source codes to allow local software adjustments. Systems include access control, fire alarm, and building management.

Provide fire alarm system annunciator in the fire control room (off the truck court) and in the security office. The system will also provide alarm notification to the Comm. Center in the Service Building.

When possible, expand existing fire alarm and building control systems instead of introducing new systems. Simplex and Johnson Controls are the manufacturers of the existing systems.

2.2.B Airside Terminals and Truck Courts

2.2.B.1 General Planning Criteria

2.2.B.1.1 Building Envelope Limitations

Provide raceways and conductors to monitor and control all elevators from the Communications Center.

The fire alarm system will be the pre-signal system operated through the Communications Center.

Provide data stub-ups for FIDS system.

Provide data raceway system and stub-ups for FIDS system.

Route systems cable tray (data, phone, fire alarm, CCTV, and so forth) to each tenant space.

Provide Gaitronic 280 series telephone in all elevator cabs.

Provide heat detectors in elevator pits.

Provide fire alarm speaker "strobe" devices in all enclosed rooms.

System vendors will provide source codes to allow local software adjustments. Systems include access control, fire alarm, and building management.

Provide fire alarm system annunciator in the fire control room (off the truck court) and in the security office. The system will also provide alarm notification to the Comm. Center in the Service Building.

When possible, expand existing fire alarm and building control systems instead of introducing new systems. Simplex and Johnson Controls are the manufacturers of the existing systems.

2.2.B.1.2 Shuttle System Design Issues

Provide a 2° angular splay from station centerline for the shuttle station tunnels. The widened exit lobby "throat" allows for better queuing distribution at all entry doors along the boarding area. The minimum lobby width dimension should be 27' - 0".

When designing the tunnel envelope, provide emergency egress doors for any possible vehicle stop location. Misalignment of doors is extremely rare, but all scenarios of misalignment must be planned for, including the worst case of striking and collapsing the buffer. Typically, the emergency egress doors have been concealed by the panel systems between the doors. The existing airside buildings present various approaches to the detailing of these doors.

The maintenance area for the shuttle system is typically constructed at the airside end of the system. The area required for a typical maintenance area is approximately 9,000 square feet. This space includes:

AGT Switchgear	850 SF
UPS Room	160 SF
ATC (automatic train control)	60 SF
Parts storage	1,100 SF
Toilet/lockers	64 SF
Maintenance area	6,666 SF
(Includes two elevated work platforms 20' x 95')	

These areas are for reference only. Consult with the system manufacturer / maintenance contractor for confirmation or current needs.

With the current Bombardier C-100 car system, the running surface (where the vehicle tires roll) is 3' - 6" below the lobby floor and vehicle floor level. The maintenance platform is 5' - 0" below the running surface and in Airside A the maintenance area is 8' - 4" below the work platform. The elevation difference between the maintenance platform and the maintenance area floor varies from airside to airside. With only 8' - 6" from the lobby floor to the maintenance platform, headroom for the mechanic becomes an issue. As a result, the lobby floor structure cantilevers approximately 5' - 0" on each side thus eliminating deep edge beams. (At Airside A the slab thickness is 10", which allows approximately 7' - 8" of headroom.)

The airside end of the system has also been constructed with wash platforms to allow regular cleaning of the vehicles. At Airsides A, C, E, and F, the 50' platform cantilevers from the outside face the guideway structure. The platform is approximately 5' - 0" wide and is constructed with a metal grating walking surface and enclosed by a perimeter guardrail. Each platform is equipped with a hose bibb and a power outlet to allow the use of a pressure washer. The platform is connected by ships ladder to the interior maintenance platform.

2.2.B.1.3 Special Access Provisions

At Airside A, C, and E three distinct features were included to accommodate the movement of large items in or out of the building.

Near the loading dock, a 10,000 lb. capacity elevator was provided with an 8' x 10'(±) platform and a 6' wide door.

In addition, double wide exit doors have been provided at each airside onto the emergency walkway of the shuttle system to allow the movement of hydraulic boom or scissors lifts to and from the airsides and the landside terminal.

On the apron side of the Airside A, a pair of exit doors and an exit stair was detailed to facilitate the movement of large furniture, equipment, or landscape features. The exit doors are equipped with a removable center mullion and the stair landing is detailed to allow the removal of a portion of the guardrail.

At Airside E, a removable section of curtain wall was detailed, without a concrete curb, into the east wall near Gate 75, just south of the outdoor patio.

2.2.B.1.4 Passenger Loading Bridges

The standard passenger loading bridge configuration utilized at this airport is an apron drive unit. Airside A has Stearns units throughout, with the exception of Gate 16 which is a Jetway unit. Jetway units are in place at Airsides C and E. Thyssen-Krup units are in place at Airside F. Bridges are manufactured in two tunnel and three tunnel configuration depending on the operational needs of the particular gate.

With the closure of Airside D, all airsides are now “second generation” airsides which have 400Hz power systems and pre-conditioned air systems on all loading bridges. The 400Hz power system consists of a power converter (that hangs beneath the loading bridge tunnel) that converts the standard 48 or 3-phase 60Hz AC power to 90KVA, 200/115V, 400Hz, 3-phase AC power. The pre-conditioned air system consists of a series of air handling units (hung beneath the cab of the loading bridge) with flexible duct connecting to the aircraft utilizing a glycol-based

refrigerant system that is processed within the building through a system of chillers, pumps, and ice storage tanks.

In selecting a bridge configuration, the design professional must analyze the relationship of aircraft threshold heights, ramp slope, rotunda height, and bridge length to meet the loading door. Bridge floor slope maximums will not exceed 8.33% or 12 to 1.

In analyzing bridge slope, avoid operations within five feet of full extension or five feet of full retraction. Within these limits, the bridges typically operate at half speed.

With many airlines downsizing their fleets to regional jets, they may very soon be a need to reconfigure a number of our current loading bridges to allow them to "stoop" to a lower to a 7'-2" threshold height (M0-80). Several regional jets require the bridge to lower to a 5-'0" threshold height. Rework kits are currently available from several sources.

In developing the apron layout, avoid placing manholes or fuel hydrant pits within expected operating zones for the loading bridge.

Maintain adequate clearance between bridge tunnels and fixed items such as columns and apron lighting poles.

Locate hurricane tie down positions with the bridge in a fully retracted condition as tight to the face of the building as possible. The tie down receptacles will not project above the apron surface and they will not present a tripping hazard.

An appropriate raceway system will be installed in the loading bridge to allow the installation of a telephone at the operator's console.

An appropriate raceway system will be installed in the loading bridge to allow the installation of an illuminated gate identification sign on the aircraft approach side of the cab. (See Airside A and E bridges.)

Boarding bridge interior air conditioning will be specified for all new boarding bridges.

2.2.B.1.5 Specialized Storage Areas

Provide a storage space for the Maintenance Department to high lift unit. Provide appropriate doors and power outlet to recharge batteries. Doors throughout the facility should be sized to allow necessary movement. Doors to the AGT system emergency walkway will be sized to accommodate the lift.

Provide a storage space for the interior plant maintenance cart.
Provide appropriate doors and power outlet to recharge batteries.

Wheelchair storage spaces will be provided near all holdroom areas.

2.2.B.1.6 Holdroom Layout

In recent years, security concerns have prompted many airlines to relocate their check-in counter/backwall" packages" to a location very near the exterior concourse wall directly adjacent to the loading bridge door. With the closure of the gap behind the backwall, the possibility of an unticketed passenger sneaking onto a flight is significantly reduced.

The close proximity of the check-in counter to the loading bridge has allowed many airlines to reduce the number of personnel required to service a boarding operation. An agent at the counter can now oversee the door in the event that the podium or pass reader agent is required to assist a special needs passenger down the loading bridge.

Orient the check-in counter and backwall at angle (60 ±) facing toward the passengers as they approach the area from the shuttle lobby. The angled orientation increases the visibility of the gate numeral on the top of the backwall.

"Quick-turnaround" airlines such as Southwest require the creation of distinct deplaning and enplaning aisles. The deplaning aisle is usually a well-defined straight "chute" that directs the passenger out into the wider concourse walkway. With Southwest, the boarding queues are separated into four groups; preboards, and the A, B, and C groups. These groups must be separated from the deplaning aisles.

2.2.B.2 Equipment/Furnishings

2.2.B.2.1 Holdroom Seating

Holdrooms at Airside A, E, F, and C are all furnished with Herman Miller Eames Tandem Sling seating units. These seating units are also used throughout the Landside Terminal.

The tandem seating groupings are assembled in either single gang or back to back configurations with three to ten seat long groupings. Groupings that are too long prove to be difficult to move to allow carpet cleaning or overhead maintenance or housekeeping work.

2.2.B.2.2 Airside Check-in Counters (Airsides A and D)

With the development of Airside A, a prototype check-in counter shell was developed. The shell consists of two stainless steel clad end pylons which support a front-projecting transaction surface/cowling fabricated from solid surface material. The front panel consists of two solid surface panels set on a stainless steel-clad backpanel.

The top of the cowling is routed to accept a recessed signage panel containing required FAA notices.

As with ticket counters, an airline specific insert cabinet has been fabricated to accommodate the specific functional needs of their check-in operation. Utility interfaces include: emergency power, telephone, PA system, and data lines (connected to airline's network). Airline standard check-in counters were utilized by Delta and United at Airside E and by Southwest at Airside C.

2.2.B.2.3 Airside Back Wall Units (Airside A)

The back wall unit somewhat mimics the detailing of the check-in counter. Stainless steel clad rounded ends and corners surround a plastic laminate wall and storage cabinet.

Storage modules are provided in the lower portion of the front area and full height in two compartments on the back.

The upper portion of the front is allocated for airline signage and flight information displays (gate number, flight number, destination, and departure time).

A fire extinguisher cabinet and a waste receptacle are located on the backsides of the unit.

A sign box is mounted on the top of the storage unit and includes an illuminated gate number sign and a clock on the front and gate number signs on each side. Utility interfaces include: emergency power and data lines (connected to airline's network).

Airline standard back walls were utilized by Delta at Airside E and by Southwest at Airside C.

2.2.B.2.4 Airside Gate Podiums (Airsides A and D)

Typically, the airlines have established a final boarding pass checkpoint at the doorway to the lading bridge. These checkpoints vary in configuration with each airline. Some have a podium component with both a computer terminal and an electronic boarding pass scanner; another scanning console; a third may utilize an airport standard podium with an attached proprietary electronic scanning module; and smaller airline may simply have a podium from which the gate agent checks off a paper boarding pass.

2.2.B.3 Conveying Systems

2.2.B.4 Miscellaneous Structural Considerations

At security screening areas, provide adequate loading bearing capacity to support the latest generation of X-ray machines.

During the design of floor systems, consider weights and load distribution of the high lift equipment that will be utilized during construction as well as during the ongoing maintenance operations throughout the life of the structure.

Consult early with the Authority staff and tenant design professionals to establish special loading requirements for planters, aquariums, and any other concentrated load elements that may be associated with a concession buildout (i.e., signage pylons or "umbrella" canopies).

Consult early with signage and FIDS system design professionals to establish locations of ceiling/roof structure supported elements. The design professional will survey other similar terminal areas to develop a sense of the typical signage locations.

Provide 2" floor depression for tile placement at all toilet room areas.

With the construction of baggage sortation facilities at the airsides, elevated floor slab design should address the extensive vibration introduced into the structure by the conveyors and pushers suspended beneath.

2.2.B.5 Miscellaneous Plumbing Requirements

At Airside buildings, provide 1½-inch water stub-outs at the building wall for potable water cabinets (a tenant provided item). Potable water cabinets are generally located on the pilot's right side of the aircraft parking position.

2.2.B.6 Miscellaneous Mechanical Requirements

Provide an aboveground fuel tank for the emergency generator. Locate in close proximity of truck court. Verify tank truck accessibility and path for filler hose. The fuel tank construction and installation will comply with all NFPA, EPA, and DEP regulations.

Consult NFPA 415 for height restrictions for exhaust outlets or air intakes located in walls adjacent to the apron/aircraft parking areas.

2.2.B.7 Miscellaneous Power Requirements

Provide disconnects/breakers for the pre-conditioned air system (PCA), the 400 Hz system, and the loading bridge at the building wall beneath the bridge's rotunda.

Provide electric meters on the service to the loading bridges, including the PCA air handler and the 400 Hz equipment. Locate meters in the satellite electrical rooms.

Provide emergency power to all check-in counters, backwalls, and gate podium scanners.

Provide emergency power for the AGT system control system.

Provide appropriate conduit and junction box rough-in to accommodate the power/phone/PA/data systems that serve subsequent bid packages, such as millwork (check-in counters, back wall cabinets, podiums, phone kiosks), and loading bridges.

Provide shunt trips for building and AGT power systems. Provide signage in each switchgear room with instructions indicating how to de-energize both power systems.

Provide electrical rough-in at the transom of the loading bridge door to accommodate the gate identification sign and a future digital flight information signage system.

Provide power rough-in for a future aircraft guide/approach system at each gate position. Locate junction box at 14 (fourteen) to 16 (sixteen) feet above apron elevation at the intersection point of the apron lead-in line and the building wall. Confirm exact placement of rough-in with manufacturer of equipment.

Provide power rough-in for security screening equipment (X-ray machines, magnetometers, etc.) Confirm detailed electrical characteristics for all equipment. At Airside E, it was discovered that all magnetometers must be connected to the same electrical phase in order to operate without electrical interference problems.

Extend power distribution panels to mezzanine levels to accommodate the future development of offices or airline lounge space.

Emergency power requirements: Typically, the following components require emergency power to maintain the basic operational capabilities during a power outage.

- operational lighting for all public spaces
- toilet room lighting
- soffit lighting above exterior stairs
- lighting for interior stairs
- signage lighting
- apron lighting
- truck court lighting

- gate operators
- elevators (provide capacity for only a percentage of the unit, which is switchable to any selected unit)
- passenger loading bridges (provide capacity for only a percentage of the unit, this is switchable to any selected unit)
- sewage lift stations
- jockey pump
- security equipment - magnetometers and X-ray machines
- automatic doors
- turnstiles
- blast fence lights
- generator fuel pump and battery charger
- coolers and freezers (tenant facilities)
- irrigation controllers
- U.P.S. systems for various computer controlled systems
- toilet room devices - electronic flush valves and lavatory faucets
- check-in counters and gate podiums
- telephone kiosks
- sound and fire control room receptacles
- systems equipment - access control and CCTV
- FIDS monitors and EVIDS information boards

Provide power rough-in for potable water cabinets (the unit is generally equipped with a motorized hose reel and a duplex outlet.)

2.2.B.8 Miscellaneous Lighting Requirements

Design apron lighting with light sources aimed at the cargo loading side of the aircraft (pilot's right side).

Apron lighting will be high pressure sodium, with double arc tubes, quartz restrike and remote ballasts. Do not provide any dimming capability; it should either be “fully on” or “completely off.”

Consider supplemental task-oriented lighting at ticket check-in counters and podiums. Carefully consider the impact of glare on computer screens.

Prepare a point-by-point photometric analysis of apron lighting prior to finalizing design.

2.2.B.9 Miscellaneous Systems Requirements

Provide rough-ins for public address (microphone station), data and phone at all check-in counters and gate podiums.

Design PA system with zones at each gate area. Do not provide local amplifiers that can be adjusted by gate agents. Locate all amplifiers in a common air-conditioned sound room. Provide conduit/junction box for telephone installation on a loading bridge.

Provide separate cable trays or conduit for power and systems under and between each check-in counter.

Provide interface with terminal master clock system. Extend to all check-in counters and other clock locations.

Provide data conduit from the check-in counter to the transom of the loading bridge door to accommodate a future digital flight information signage system.

Provide raceways, conductors, and push, buttons for the passenger screening area phone and "trouble" alarm systems. The alarm will be interfaced with police department dispatch computer system.

Develop decentralized “satellite” system rooms to provide localized connection/distribution points for phone, access control, fire alarm, data, and so forth. Locate systems room within the 100 meter maximum copper cable length.

Locate fire annunciator panels in the fire control room (accessible directly from the truck court) and the security office.

Extend the conduit or cable trays for phone, data, and other systems to the mezzanine level to accommodate the future development of offices or airline lounge space.

Provide appropriate raceways, conductors, and the necessary support equipment to provide monitoring at the Comm. Center of the following equipment and/or systems: fire alarm (typically Simplex); building management system (typically Johnson Control Metasys), elevator/escalator (typically Schindler), and access control. A trouble alarm will also be installed at each security screening area that is connected to the police department dispatch computer.

Require a five-year warranty on the public address system.

2.2.B.10 Building System Rough-in Provisions for Tenant Provided Equipment

Provide electrical junction boxes for aircraft parking "guide/approach system." Locate at approximate boarding level beam line at the projected intersection of parking lead-in lines.

Provide concealed empty conduits from the base of apron lighting poles to the apron level ceiling space to accommodate ground radio antennas that may be required by tenant airlines. Detail lighting poles to allow attachment points for these antennas. Confirm conductor size for antenna. Many airlines specify cabling that requires a 2” diameter conduit system.

Provide electrical junction boxes for hose reel power at locations appropriate for potable water cabinets. Typically, cabinets are placed to the pilot's right side of the projection of the lead-in line extended to the building wall. Water source will be a valved 1 ½" line.

Provide electrical junction boxes for electric water coolers. Coordinate placement with a valved water line and sanitary drain.

Provide separate signal and power conduits to the locations planned for communication antennas and satellite dishes.

2.2.B.11 Truck Court Elements

An airside terminal truck court typically includes the following components:

2.2.B.11.1 Guardhouse between Gate-Controlled Entry & Exit Roadways

Truck court entry and exit gates are controlled from the guardhouse. All vehicles entering the truck court must display proper identification. A guardhouse will be located adjacent to the service road and between the entry and exit gates. The guardhouse will have a clear view of AOA entry gates that are nearby. The guardhouse will be equipped with 120 volt power, an air conditioning/heating unit,

telephone service, and be interfaced with the access control system to allow gate control.

2.2.B.11.2 AOA Entrance Gate(s)

The AOA gates will be electrically operated horizontal sliding cantilevered gates with sensitive edges that reverse the operation in the event of contact with a vehicle. The gate operator is to be interfaced with the access control system. Valid security identification must be presented to a card reader when passing through in either direction. Typically, an entry and an exit gate are provided at each AOA entry point. The drive lanes are separated by a raised curb. On the curb are two card readers and numerous pipe bollards to protect the equipment.

Inductive loop detectors are placed in both drive lanes to ensure the vehicles pass through the gates in a prescribed sequence. The loops on the existing side, of either approach direction, serve to monitor the position of the vehicle during the closing cycle of the gate operation.

By requiring the vehicle to maintain a nearby parking position until the gate closes, the vehicle operator becomes responsible for supervising the gate operation during both the opening and closing cycles. This operation also prevents two vehicles from passing through on a single access card swipe (piggybacking).

2.2.B.11.3 Transformer Enclosure (Building & Shuttle System Equip)

At Airside A, a transformer enclosure was constructed adjacent to compactor enclosure. The concrete and masonry structure has a removable metal grating top that screens the electrical gear from view from above. The yard area enclosed is topped with course stone except at the concrete equipment pads. An underground drainage system is required to relieve any significant water accumulation. At Airside C, the generator building and transformer yard were combined into single enclosure. At Airside E, the generator building, the transformer yard the cooling tower and the compactor/dumpster enclosure were combined into a single concrete and masonry structure.

2.2.B.11.4 Trash Compactor Enclosure

A trash compactor is generally placed in a concrete/masonry enclosure. The compactor is generally integral with a 30 cubic yard trash container. When the compactor/container is removed for dumping, the compactor must be disconnected from a stationary hydraulic pump unit. The combined compactor/container assembly reduces the spillage that may result from a two component installation.

Electrical service will be in accordance with the container/compactor manufacturer's specifications.

The concrete slab should slope outward toward a trench drain and should be poured with steel guide channels to serve as the bearing surface for the container rollers as it is being removed or reset in place. The interior of the concrete enclosure should be constructed of poured-in-place concrete.

A pressure wash unit should be installed to allow periodic clean ups.

2.2.B.11.5 Loading Dock

At an airside, a loading dock will be constructed with minimum two berth width, 30'-0"±. The dock should be constructed with a minimum 10'-0" clear overhang to allow unloading during rain. The dock height is typically 4'-0".

2.2.B.11.6 Access Doors to Shuttle Maintenance Spaces

At the airside, exterior access doors are required for the following maintenance area spaces:

AGT Maintenance Space	- man door and overhead door
AGT Switchgear Room	- man door and overhead door
UPS Room	- overhead door
ATC Room	- man door

(See the Airside E and C construction documents for most recent configurations of shuttle maintenance areas)

2.2.B.11.7 Access Doors to Maintenance Areas and Central Plant

At the airside, exterior access doors are required for the following spaces:

Mechanical Equipment Room	double man door
Electrical Room	double man door
Fire Pump Room	double man door
Central Plant	man door and overhead door
Communications Room	man door

2.2.B.11.8 Access to Fire Control Room

At Airsides A, E and C, the fire control room is located at or adjacent to the loading dock.

2.2.B.11.9 Emergency Generator Enclosure and Cooling Tower

At Airside A and E, the cooling tower and the emergency generators are housed in adjacent concrete and masonry structures. The emergency generator area includes the generator unit, with control console, and an above ground fuel tank. The design professional will consider the normal length of fueling hose and available tanker truck parking positions when siting this enclosure. All exhaust pipe exposed to view will be fabricated from stainless steel. Consult with DEP for special fuel facility regulations.

2.B.11.10 Flight Crew Loading/Unloading Area (Hotel Courtesy Vans)

At Airsides A, E, and C, flight crew entrances routes have been created to allow for non-Tampa badged airline personnel to enter the building and gain access to the Boarding Level passenger screening area. (Consult construction documents for Airsides A, E, or C.)

2.2.B.11.11 Ramp to Loading Dock

At Airsides A, E, and C, a ramp has been constructed to connect the loading dock to the truck court driveway to facilitate trash removal, handicapped access, and maintenance access.

2.2.B.11.12 Truck Court Lighting

2.2.B.11.13 Staff Parking Area

Every attempt should be made to maximize the amount of staff parking spaces in the truck court area. At least two spaces will be provided for Authority maintenance vehicles adjacent to the Central Plant overhead door.

2.2.B.11.14 Access-Controlled Pedestrian Turnstile

Pedestrian access to the AOA area is provided from the truck court via an electronic turnstile within the fence line. The turnstile operator is actuated by an airport employee ID/proximity card badge.

2.2.B.11.15 Maneuvering and Turn Around Area in Truck Court

Typical vehicles accessing the truck court can include large semi-trailer units, large roll-off container trucks (to haul the 30 cubic yard trash container/compactor unit), fuel trucks, and various fire department apparatus. Adequate maneuvering space must be provided for all vehicles.

2.2.B.11.16 Miscellaneous Site Utility Elements

Double detector check valve for fire and domestic water service (with landscape screening); lift station for sanitary sewer (if required); irrigation system valves and controllers; manholes; fire department valves/standpipe connections

Provide water and power sources for irrigation system. Locate controllers and all solenoid valves in boxes below grade. (Investigate the possibility of utilizing nearby retention pond water for irrigation.)

Locate fire department connection (FDC) with 1000 GPM flow rate, maximum 6' from curb in an appropriate and accessible location. Verify position with the Fire Department.

Utilize landscaping elements to screen truck court from the service road and/or the shuttle system vehicles.

2.3 Attic Stock / Spare Equipment / Spare Parts

The design professional will coordinate with the Authority and establish and specify, as part of the project requirements, a list of all systems that require attic stock, spare equipment and or spare parts. Some specific items are listed in Section 3 however, other items are often required and not listed. The design profession will coordinate and specify a project specific list meeting the needs of the Authority.

Section 3 – Building Sections and Components

3.1 Division 1 – General Requirements - Reserved

3.2 Division 2 – Site work – Reserved

3.2.A Section 02221 – Building Decommissioning and Demolition

Prior to the demolition of a building or structure, all hazardous waste and materials must be disposed of in accordance with all applicable federal, state, and local regulations including but not limited to OSHA, EPA, DOT, FDEP, and EPC regulations. Waste disposal transporters must maintain continuous compliance with FDEP Rule 62-730.170, FAC, Standards Applicable to Transporters of Hazardous Waste . Copies of all waste disposal manifests must be provided to the Authority at the completion of the waste disposal task.

Asbestos survey, abatement, and disposal activities must be conducted in compliance with all applicable federal, state, and local regulations including but not limited to OSHA, EPA, FDEP HRS, and EPC regulations. Air quality monitoring (personal or ambient) during the asbestos abatement activities must be conducted by the contractor independently of other entities providing oversight.

Applicable Codes and Reference Standards

Applicable regulations include but are not limited to:

29 CFR 1910 Sections 2, 134, 145
29 CRR171 and 172
Chapter 99-469.001 99-469.015 of the Florida Statutes
40 CFR 61, Subpart M, and Section 61.145

3.3 Division 3 - Concrete

3.3.A Section 03200 - Concrete Reinforcement

In architectural concrete, only stainless steel tie wire will be used.

3.3.B Section 03300 - Cast-in-Place Concrete

The typical concrete for airport construction will have standard gray cement and normal weight limestone aggregate in accordance with ANSI/ASTM C 33.

All architectural concrete surfaces will be finished with a water-repellant.

The typical concrete floor slab finish, for a floor to receive VCT or carpet, will be steel-troweled with a liquid membrane forming, curing, and sealing compound.

The typical finish for a floor slab that is to be left exposed will be a “lightly broomed” finish with a liquid membrane forming, curing, and sealing compound.

Typically, slab hardener products are not used.

Typically, all slabs will be installed over compacted fill and a vapor retarder membrane (normally asphalt impregnated felts). At Airsides C and E, a heavy Stego-Wrap barrier (Stego Industries, (877/464-7834) was installed beneath the ground floor slab to prevent the upward flow of fuel vapors that exist in the building subgrade. This barrier has taped seams and is detailed to fit tightly around all vertical slab penetrations.

3.4 Division 4 - Masonry

3.4.A Section 04200 - Unit Masonry

Glazed brick for Landside Terminal renovations will be as follows:

Red face brick: “TIA - Red Glazed” by Belden Brick Co.
Blue face brick: “WG-90-3368" by Glen-Gery Corp.
White face brick: custom beige” to match existing by Endicott Clay Products, Co.
Sources: Clay paving bricks for Bag Claim and Ticketing Level paving bands:
Precast concrete pavers: 2'-0" x 2'-0" x 1-1/4” for Bag Claim, Ticketing and Plaza Level areas.

3.5 Division 5 – Metals

3.5.A Section 05511 - Metal Stairs

Exterior stairs and ladders will be left unpainted with a galvanized finish. Large assemblies will be detailed using “bolt-together” components or sub-assemblies. The weakest point in the integrity of a galvanized coating is in the area of a field weld that has only a thin, sprayed-on cold-galvanizing coating. Extensive preassembly by welding, before galvanizing, can be counter-productive because the high heat associated with the galvanizing process will warp a competently prepared assembly to the point that it may not be usable. The design professional will verify the limits on component or subassembly size dictated by capabilities of local processors

When field-welding is necessary, cold-galvanizing must be used to complete the corrosion protection. Careful research and sample procurement are necessary to find a matching cold-applied product.

Avoid products that tend to be a flat gray (either too light or too dark) without the “metallic” look.

3.6 Division 6 – Wood and Plastics

3.6.A Section 06100 - Rough Carpentry

In recent years, it has been discovered that the structural integrity of fire-treated wood framing and plywood can deteriorate significantly when exposed to the radiant heat of light fixtures (including fluorescents). Research the products carefully before specifying or using fire-treated wood. Do not use in a loadbearing condition. Backing boards for telephone terminal boards are acceptable. The painting of backing boards will be performed outdoors away from conditioned spaces.

3.7 Division 7 – Thermal and Moisture Protection

3.7.A Section 07190 - Water Repellants

Exterior exposed concrete surfaces will be coated with water repellant.

3.7.B Section 07411 – Metal Roof Panels

Six aluminum standing roofing systems have been installed at the airport. The north Pemco Hangar and Airside F are built with the Merchant and Evans, “Zip-Rib” system; the U.S. Airways Hangar (steel) and Airside A are built with a Centria (formerly H.H. Robertson/Smith Steelite) SRS-3 system; and Airside E and C and the Airside A baggage sortation building are built with a BemoUSA Corp. 305 system. All systems are field-formed from Kynar-coated aluminum coil stock, 0.40-inch thick. Panel lengths on the hangars approach 125 feet; Airside E has panels in excess of 250 feet long; and Airside C has panels exceeding 370 feet in length. Special detailing considerations are required to accommodate the thermal expansion of the very long roof panels. All systems have

nominal 3-inch-high standing seams that are sealed with sealant and an electric sealing tool. All systems use a stainless steel clip system which attaches to a heavy gauge metal purlin system.

The curved panels on Airside A and F were formed in the field by running the panels through a second roll-forming machine to create the desired radius. Gutters for the standing seam roofs are formed from 18 or 16 gauge stainless steel that is fully welded and water tested.

Gutter expansion joints are typically spaced 30 to 40 feet on center. Downspout drops are formed from the same gauge stainless steel (18 or 16), and are welded to the gutter box. Transitions are then made to connect to the building's downspout system (steel or PVC, depending on conditions).

Warranty requirements for Metal Roof Panels will be as follows:

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

   1. Failures include, but are not limited to, the following:

      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.

   2. Warranty Period: Ten years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

   2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panels, roof specialties, roof accessories and built-in gutter assemblies that fail to remain weathertight, including leaks, within specified warranty period.

   1. Warranty Period: 20 years from date of Substantial Completion.

Exposed fasteners are prohibited where visible. If fasteners penetrate the roof decking where the fasteners are visible, provide an acceptable exterior soffit system to visually conceal all areas.

3.8 Division 8 – Doors and Windows

3.8.A Section 08110 - Steel Doors and Frames

Do not specify of doors fabricated with vertical galvanized sheet steel channel-shaped sections or interlocking Z-shaped sections. The doors on Airside A exhibit significant spot weld dimples on the face panel at each of these reinforcement members. Care should be taken in considering acceptable manufacturers. Consider requiring a door and frame sample to assess quality of hardware preparations and finish. Galvanize all exterior doors and frames.

On frames with access control hardware, require the inclusion of a tightly sealed mud box with a flexible conduit connection at each attachment point for electronic hardware. A continuous raceway must be provided from the face of the door from e to a system junction box located near the door. With a definitive conduit route, a new conductor can be re-pulled into the hardware location whenever necessary.

Airside F had significant wiring difficulties because of improperly constructed wiring raceways.

Each exterior door will be equipped with a small permanently affixed sign numbering the door in accordance with the Authority door numbering system. The sign will be placed in the upper hinge side corner of the door.

3.8.B Section 08211 - Flush Wood Doors

Typically, interior wood doors in airport buildings are solid core assemblies with plastic laminate faces.

3.8.C Section 08411 – Aluminum-framed Entrances and Storefronts

Use only “wide-style” sections for aluminum and glass entrance doors. The construction is more durable and the wide face dimension provides enough surface to accommodate all hardware components.

3.8.D Section 08461 – Sliding Automatic Entrance Doors

Fabricate entrance doors and side lights with “wide-style” sections to match manual doors.

Provide a minimum opening width of 5 feet, 0 inches, clear.

Detail assemblies with both inside and outside side light elements. The outside piece will require breakaway hardware to maximize egress width.

The inside fixed panel must be installed so as to protect any unsuspecting individual from the suddenly moving edge of the operable door.

3.8.E Section 08710 - Door Hardware

Locks will be Corbin/Russwin ML 2000 Series (no substitution) with removable core cylinders.

All permanent cores are to be great grand master keyed into existing or Authority approved Russwin removable cores, H Keyway 6-pin system, in accordance with Authority’s key control requirements and instructions. Owner is the Authority. Individual door keying requirements are to be established in a meeting with the contractor, user, design professional, Authority, key control staff, Operations and others as deemed appropriate by the Authority. Key bittings will be per Authority requirements and provide upon project completion to the Authority.

Unless otherwise agreed, permanent keys are to be delivered to the Authority key Authority will direct installation and establish key control over the permanent key set. The Authority reserves the right to order and install the cores for any project. If this occurs, the contractor will install a construction set as directed by the Authority and they will be returned to the contractor when the final set is installed.

For factory ordered cores, the order must be received by the factory a minimum of 90 calendar days prior to occupation. If delivery is not by space use date, the contractor must provide a construction set with all keys that mimics how the final key set will operate and that set must be

available for installation a minimum of 10 calendar days prior to space use or sooner if so directed by the Authority.

Panic devices will be Von Duprin 99 - Series touchbar devices. No exposed vertical rod devices are allowed.

Hinges will be Hager, McKinney, or Stanley. Units installed on exterior doors will be stainless steel. Units installed with door closers will have ball bearings.

Door closers will be Corbin/Russwin 2200 series. Valve body will be located on the non-public face of the door whenever possible.

Stainless steel kickplates will be provided at all high-traffic doors (push side). Armor plates will be installed at all doors where carts or equipment will be pushed against the door while it is being opened.

Access control: Designers will coordinate door hardware and access control electronic device installation to verify that all operational objectives are met. Refer to Section 16730 for narrative on access control operations.

3.9 Division 9 - Finishes

3.9.A Section 09220 - Portland Cement Plaster

Exterior stucco areas will use only zinc alloy or PVC accessories: corner beads, casing beads, control joints, and so forth.

Framing for exterior soffit areas will use “stiff-leg” framing that is engineered for both positive and negative uplift loading.

3.9.B Section 09310 - Ceramic Tile

Floor and wall tile will be 4 inches by 4 inches minimum size (larger sizes are preferred).

Wall tile in restrooms will have a gloss or semi-gloss finish; no matte finish.

Grout for floor applications will complement the tile color selection and will be darker in color as to minimize staining and an overall uncleanly appearance from normal wear and tear. Grout for wall applications will complement the tile color selection but is not required to be a darker hue. Grout will have a maximum joint width of 1/8 inch.

Backing for tile on fixture or “wet” walls will be a glass fiber-reinforced cement board, such as “Durock” or “Wonderboard.”

Transitions from ceramic tile to another floor finish (carpet, vinyl composition tiles, and so forth) will use a tapered marble strip that provides an ADA-compliant transition between the varied finish thicknesses.

3.9.C Section 09770 – Wall Panel Systems: Art Glass

Basis-of-Design Product: Forms+Surfaces; LEVELe Wall System.

Image to be back-printed on minimum ½” thick, impact rated glazing.

3.10 Division 10 - Specialties

3.10.A Section 10155 - Toilet Compartments

The partition system will be manufactured by the American Sanitary Partition Corporation (no substitution).

The installation will be a ceiling-hung configuration, except at large handicapped stalls, where a full height pilaster may be necessary to achieve proper lateral stability for the compartment front. In Airside A, a removable floor connection was designed to allow periodic disassembly to facilitate a thorough cleaning of the floor in the area of the pilaster footprint.

Doors will be reinforced to prevent racking and twisting.

The panels will be furnished with the manufacturer's standard powder-coated finish.

All hardware will be consistent with the parts inventory maintained by the Authority Maintenance Department.

Accessory and partition installers will coordinate placement of accessories to prevent damaging contact between components.

Coat hooks will not be placed on the inside face of an outward swinging door. At the normal placement height, the hook can become a dangerous projection. Locate on a side wall near the back of the compartment, safely out of the way. In the larger handicapped stall, the hook can be located on the front panel opposite the water closet.

Coordinate wall framing to provide solid wall reinforcement or backing between studs to provide a competent anchoring substrate.

3.10.B Section 10265 – Impact-resistant Wall Protection

In public area service corridors and at high traffic corners within the Authority offices, install corner guards to protect the wall. Typical corner guards are SM-20 units (surface-mounted) and FS-20 or 20R units (flush-mounted in gypsum board partitions), by Construction Specialties, Inc. or approved equal. At non-gypsum board partitions (masonry or concrete us 6 gauge stainless steel corner guards, with ½" hemmed edge on 3 ½: wide flanges.

In service areas, where carts or rolling equipment circulate frequently, it is appropriate to install both crash rails and corner guards. At Airsides E and C, dual cash rails were used to protect the walls, one just above the base and another at about 4'-0" above the floor. The crash rails are SCR-64 units by Construction Specialties, Inc., or approved equal. Corner guards are SM-20 units for surface mounted conditions and FS-20 units for flush-mounted conditions, by Construction Specialties, Inc. or approved equal.

3.10.C Section 10450 - Pedestrian Control Devices

At AOA pedestrian access points, a full-height turnstile (Model MSTX by Alvarado Manufacturing Company, Inc.) will be used. Controlled access is required in both directions. Allow a maximum 120-degree rotation with each card activation.

Refer to Section 16730 for narrative on access control operations.

3.10.D Section 10801 - Toilet Accessories

Toilet accessories will be by Bobrick Washroom Equipment, Inc. (no substitution) typical units are as follows:

B-224: Surface-mounted utility shelf, with mop/broom holders and rag hooks.

B-2621: Surface-mounted paper towel dispenser (typically used only in non-public service areas).

B-274: Toilet tissue dispenser, double roll (typically used only in non-public service areas).

B-290: Mirror with stainless steel angle frame (used above makeup vanities, and in full-height dressing configurations).

B-347: Partition-mounted toilet seat cover and toilet tissue dispenser (for installation between two toilet compartments, without grabbars in a men's restroom).

B-3471: Partition-mounted toilet seat cover and toilet tissue dispenser (for installation between two toilet compartments, one with grabbars, in a men's restroom).

B-3474: Recessed toilet seat cover and toilet tissue dispenser (for installation in a handicapped stall, with grabbars, in a men's restroom).

B-3500: Recessed napkin/tampon vendor, single coin mechanism, 25-cent operation.

B-357: Partition-mounted toilet seat cover dispenser, sanitary napkin disposal, and toilet tissue dispenser (for installation between two toilet compartments without grab bars in a women's restroom).

B-3571: Partition-mounted toilet seat cover dispenser, sanitary napkin disposal, and toilet tissue dispenser (for installation between two toilet compartments, one with grab bars, in a women's restroom).

B-3574: Recessed toilet seat cover dispenser, sanitary napkin disposal and toilet tissue dispenser (for installation in a handicapped stall, with grab bars, in a women's restroom).

B-3644: Recessed waste receptacle for 4-inch wall.

B-3900: Recessed paper towel dispenser and waste receptacle (for 8-inch wall or chase).

B-3944: Recessed paper towel dispenser and waste receptacle (for 4-inch wall).

B-6717: Surface-mounted robe hooks.

B-6806: 1½-inch (38mm) diameter stainless steel grab bars, with snap-flange cover.

In 2004, Bobrick discontinued the production of two multi-purpose soap dispenser/towel dispenser units (Items B-317 and B-330) that had been specific extensively for the larger terminal toilet rooms. As result, a Bradley Corporation product has been selected as a replacement unit: Model 130, a recessed multi-purpose towel dispenser/soap dispenser/mirror/shelf unit. As with the Bobrick unit, the soap dispenser valve must be specified offset to the right to prevent soap from dripping on the faucet spout.

3.11 Division 11 – Equipment - Reserved

3.12 Division 12 – Furnishings - Reserved

3.13 Division 13 – Special Construction

3.13.A Section 13900 - Fire-Suppression System

All exposed sprinkler and standpipe piping will be painted red.

3.14 Division 14 – Conveying Systems

3.14.A Section 14200 - Elevator General Requirements

The controller must provide for future tie-ins to a vertical transportation monitoring system.

Initial maintenance service will include: fully paid, full service maintenance warranty service by skilled, competent employees of the elevator installer for a period of 12 months following the Date of Final Acceptance by the owner on a daily-surveillance basis. Include repair or replacement of worn or defective parts or components and lubrication, cleaning and adjusting as required for proper elevator operation in conformance with specified requirements. Include 24 hours-per-calendar day, 7 calendar days-per-week emergency callback service. Exclude only repair or replacement due to misuse, abuse, accidents, or neglect caused by persons other than installer's personnel. Installer will have maintenance personnel at Airport property 24 hours-per-calendar day, Monday through Friday, 0600 hours until 1830 hours Saturday, and 0700 hours until 2130 hours Sunday and holidays. This work will not be subcontracted. Only parts and supplies as used in manufacture and installation of the original installation will be provided.

System maintenance service will include: contractor, at contractor's own cost, agrees to furnish to owner an executed Amendment with the current contractor specified in this Design Criteria under Section 2.2.A.3.9 Maintenance Contracts. This amendment to the existing "Maintenance Contract Elevators, Escalators, and Dumbwaiters, Tampa International Airport" will expand the Scope of Work of the existing contract to include the Work of this Section, "Section 14240 - Hydraulic Passenger Elevator," of the Contract between owner and contractor. All Work under this Section will be added, by said Amendment and at no direct cost to the owner, to the existing "Maintenance Contract Elevators, Escalators, and Dumbwaiters, Tampa International Airport." Said Amendment will be automatically effective on the date of Substantial Completion of the whole Work. All other terms and conditions of the existing "Maintenance Contract Elevators, Escalators, and Dumbwaiters, Tampa International Airport" will remain unchanged.

The design will include TriTronics safety edges.

Doors will be finished in #4 stainless steel.

ADA compliant elevator telephones, such as the Micro Tech Emergency telephones, will be integral with the car station.

No elevator hoistways will have sump pumps or drains.

The key lock cylinder in the restricted-access keyed switch in the elevator car operation panel will match the owner's standard.

Cars will have a 1.5" x 4" cutout adjacent to each floor level pushbutton for installation of graphics by the owner.

Work on existing elevators will include modifications as necessary to meet applicable fire safety code requirements.

All work in existing elevator machine rooms and hoistways will be accomplished with the Elevator Maintenance Contractor mechanic present.

Elevators will not be used for construction purposes even on a temporary basis.

For additional notes, see the general hydraulic elevator specifications on file at the Authority.

3.14.B Section 14215 – Electric Traction Elevators

No traction-type elevators will have sprinkling systems installed in the elevator machinery rooms or hoistways.

For additional notes, see the traction elevator specifications on file at the Authority.

3.14.C Section 14240 - Hydraulic Elevators

The design will include Lifejacket hydraulic elevator safety brakes. For additional notes, see the hydraulic elevator specifications on file at the Authority.

3.14.D Section 14310 - Escalators

No Low-E (energy) Glass Permitted. Black Treads only. For addition requirements, See the escalator specifications on file at the Authority.

3.14.E Section 14410 - Dumbwaiters

See the dumbwaiter specifications on file at the Authority.

3.14.F Section 14600 - Outbound Baggage Conveyors

The design professional will use the Authority's latest standard technical specification for outbound baggage conveyors and related systems. The technical specification will be provided by the Authority's Maintenance Department upon request and justification of project related need.

3.14.G Section 14630 - Sloped-Plate Sorting Carousels - Reserved

3.14.H Section 14650 - Inbound Baggage Conveyors (Flat-Plate)

Transitreads will be normally started from the Bag Make-up side of the belt by depressing a green "Start" button. They may additionally be started by turning a keyed start switch on the Bag Claim side.

All components of security doors will be removable for maintenance.

Transitreads will have emergency-stop buttons located on each side of the transitread on the Bag Claim side and at the Bag Make-up Control Panel, which illuminate when depressed and stop all power to the system, including a security doors. Upon pulling out the E-stop, the security doors will close. Keyed start switches will be located adjacent to each E-stop on the Bag Claim side to restart the system.

Each transitread will have the capability of accepting a remote control cable operating station for use by maintenance personnel.

Each transitread will have an adjustable section to allow for expansion and contraction of the system linkage.

All grease fittings will be connected to a remote manifold allowing greasing of the linkage without the need for disassembly.

3.14.I Section 14800 - Apron-Drive Passenger Loading Bridges

Mirrors will be installed allowing the bridge operator to view the drive wheels from the operator station.

An audible alarm and visual beacon will warn ground personnel that a bridge is energized and about to move.

The auto-leveler will have an audible and visual alarm at the console and under the bridge to alert personnel of a malfunction.

Floodlights will be installed at locations to illuminate the drive wheels and nose wheel of the aircraft.

A cab-floor light will be installed to illuminate the vestibule area between the aircraft and the bridge cab.

Each ramp area between tunnel sections will be equipped with ADA safety handrails.

Bridges will be constructed in accordance with NFPA guidelines for fire-retardant materials.

Side-mounted vertical maintenance ladders accessing the top of the bridge will have a safety cage surrounding the ladder.

If installed, bridge-mounted baggage slides will be of stainless steel construction with bracing mounted to the structural portion of the bridge and not cantilevered solely from the bridge stairs.

3.15 Division 15 - Mechanical

3.15.A Section 15030 - Electrical Requirements for Mechanical Equipment

3.15.A.1 Basic Motor Construction (15055)

General: Provide motors for continuous duty conditions in which they will be required to perform (i.e., general purpose, splash proof, explosion proof, standard load, high torque, or any other special type) as required by the equipment motor manufacturer's recommendations. Unless otherwise indicated or required, motors will be open drip-proof.

Motors installed outdoors will be totally enclosed and fan-cooled (TEFC).

Motor enclosures will be as recommended by the equipment manufacturer for the specific application.

All motors will be furnished for starting in accordance with the electric utility company's requirements, and will be compatible with the motor starter and driven load. Motors will not exceed full-rated nameplate load when operated at any point along the driven equipment's characteristic performance curve. The motor service factor will not be used to justify exceeding nameplate amperage.

Unless otherwise indicated, motors of 1/2 horsepower or less, will be single-phase. Motors of 3/4 horsepower and larger, will be three-phase, squirrel-cage induction.

Sound power levels for motors will be no greater than the guidelines as recommended by NEMA, MG 1-12.49. A motor which, in the opinion of the Architect, generates excessive noise within the occupied area of the building, will be replaced with a quieter operating motor at no additional cost to the owner.

Motors designed to operate with a variable frequency drive will be approved by the manufacturer of the variable frequency drive equipment, and the manufacturer of the motor for inverter duty to insure quiet and stable continuous operation over the entire speed range.

Verify the circuit voltage and phase being furnished to the motor. All motors will be 1750 rpm, unless noted otherwise. Motors will operate with electrical input voltage variations of plus or minus 1 % of nameplate rating, or frequency variations of plus or minus 5 % of nameplate rating.

Design: Provide NEMA Design B for normal starting torque, with Standard MG1 12.42 Class F insulation, unless noted otherwise, or required by the equipment on which the motor is being used. Motors will be designed for operation in 104 degrees Fahrenheit (40 degrees Celsius), ambient temperature at 1.15 service factor on sine wave power at the base voltage and frequency, and will have all copper windings. Motors will meet or exceed the locked-rotor (starting) and breakdown (maximum) torques for the NEMA rating. Locked rotor current will not exceed six times full-load current. Motor current density and heating characteristics will be such that the motor insulation will not fail if subjected to locked-rotor current for 20 seconds.

Acceptable manufacturers for motors are General Electric, Westinghouse, Baldor Electric Company, Emerson, and Lincoln.

Efficiency: Motors 1 horsepower and larger will be high efficiency design.

3.15.A.2 Variable Frequency Drives (For Air Handling Units & Pumps)

Variable Frequency Drive: Specify variable torque Variable Frequency Drives (VFD) variable speed operation where suitable for controlling NEMA Design B motors on continuous duty in variable speed applications. The VFD will be listed by Underwriter's Laboratories and will comply with the latest standards of ANSI, IEEE, and the NEC.

Manufacturer: Refer to paragraph entitled "Manufacturers" in Section 15010. Acceptable manufacturers are as follows:

a. Asea Brown Boveri (ABB)

b. Cutler-Hammer, Eaton Corporation

c. Allen-Bradley

Control Requirements: The following control interfaces will be provided at a terminal strip in the VFD as a minimum to assure control system integrity:

a. Speed Control Input: A 4-20mA, or 0-5 vdc signal proportional to speed will be input for directly controlling the speed of the VFD when in automatic mode.

b. Start/Stop Control: The VFD will be capable of being started and stopped remotely by a maintained-contact start/stop relay.

c. Control Interlock: The VFD will provide an auxiliary control interlock output of 115 VAC whenever the VFD is enabled, to provide inter-locking with the control system. The VFD will be provided with a 115 VAC control transformer so that no external 115 VAC power source is required.

d. Speed Signal Reference: The VFD will furnish a 0-5 VDC, or $-20mA signal directly proportional to the output frequency of the VFD for remote monitoring of the VFD speed.

e. Hand-Off-Auto Switch: The VFD will be furnished with a door-mounted Hand-Off-Auto switch to allow switching of the speed control signal from the "Automatic" signal to a manually adjustable digital speed control on the VFD when in the "Hand" position. The VFD will be disabled when in the "Off" position.

f. VFD Trip Contacts: The VFD will be furnished with a set of Form C (NO/NC) contacts for remote annunciation to the building automation system under Section 15950.

g. Speed Control: A digital manual speed control will be door-mounted to select the speed when the H-O-A switch is in the "Hand" position.

h. Speed Meter: The VFD will be furnished with a digital door-mounted speed meter (0-100 %) to indicate the rpm of the motor or the percent of full-load frequency of the VFD.

i. The VFD manufacturer will provide "N2 bus interface card" for direct interface with Johnson Controls METASYS System.

j. The VFD will be furnished with bypass contractors that will allow manual operation of the unit.

3.15.B Section 15050 - Basic Mechanical Materials and Methods

3.15.B.1 Housekeeping Pads and Equipment Supports

General: Pads and supports will extend a minimum of 4 inches and a maximum of 8 inches beyond the base or supporting member in all directions. It is the intent to have the pad not extend under the entire piece of equipment unless that equipment is located on the exterior of the building on the ground, or the weight of the pad is required for vibration control. Pads will have ½ inch chamfered on all exposed edges and will be poured and finished smooth and level to insure proper and continuous support for the bearing surfaces of the equipment. There will be no deviation in excess of 1/8 inch when tested with a 10-foot straightedge.

Size: Coordinate length and width of pads and penetrations necessary for piping or conduit with the actual equipment approved for use on the project.

Height: Pads will be a minimum of four inches high, or as required to maintain proper condensate drainage characteristics for the air handling unit.

3.15.B.2 Identification of Piping and Equipment

General: Comply with ANSI A13.1-1981, Scheme for Identification of Piping Systems, and OSHA requirements, or as otherwise indicated.

Markers and Bands: Use to identify contents of pipe and direction of flow. Required for all visible or accessible piping systems.

Valve Tags: Each tag will designate appropriate service and valve number. Used in association with the valve tag list to confirm operational data and other pertinent information.

Labels: Establishes identity for mechanical system components. Labels on access panels advise of item that is accessible through the panel.

Equipment Access: Provide access doors and panels at all locations where concealed equipment, fixtures, devices, and similar items require accessibility for service, inspection, maintenance, repair, or replacement.

3.15.C Section 15060 - Pipes and Pipe Fittings

Domestic Water Piping (Above Ground): Copper piping will be annealed seamless hard temper type “K” and will comply with ASTM B-88. Copper is allowed for pipe sizes up to an including 4 inch diameter. The name or trademark of the manufacturer and the type of pipe will be permanently marked on each section of pipe at intervals not exceeding 4-1/2 feet. Fittings used in copper alloy piping will be streamlined pattern, wrought or cast brass conforming to ANSI B16.22 or wrought bronze conforming to ANSI B16.15.

2-1/2 inches and smaller will be solder-type. Fittings for piping 3 inches and larger will be brazed fittings and will be braced or silver-soldered. Exposed piping in finished areas will be brass pipe or tube, chrome-plated.

Domestic Water Piping (Below Ground): Copper piping will be annealed seamless soft drawn type “K” copper tubing. Copper is allowed for pipe sizes up to an including 4 inch diameter. The name or trademark of the manufacturer and the type of pipe will be permanently marked on each section of pipe at intervals not exceeding 4-1/2 feet. Fittings used in copper alloy piping will be streamlined pattern, wrought or cast brass conforming to ANSI B16.22 or wrought bronze conforming to ANSI B16.15. Class 52 cement lined ductile iron for pipe 6 inches and larger with Rigid mechanical joint piping connections.

Sanitary Waste and Vent Piping (Above Ground): Cast-iron soil pipe, service weight, no-hub piping. Piping will comply with the requirements of CISPI 30 and ASTM A-888. Hubless joints will be “No-hub” type coupling consisting of a 24 gauge 304 stainless steel compression clamp with gasket guides, 304 stainless steel screw clamp and matching full neoprene gasket that interlocks with the housing. Coupling will comply with the requirements of CISPI 310 and ASTM C-564. Maximum size allowed for no-hub piping is 8 inches. Alternative materials will be considered on a case by case basis and will be approved prior to procurement or installation.

Sanitary Waste (Below Ground): Cast-iron soil pipe, service weight, hub and spigot piping. Piping will comply with the requirements of CISPI 301 and ASTM A-74. Joints for hub and spigot pipe will be installed with compression gaskets conforming to the requirements of ASTM C-564. Alternative materials will be considered on a case by case basis and will be approved prior to procurement or installation.

Stormwater Piping: Same as Sanitary Waste. Piping for encasement in concrete walls or columns will be Schedule 40 PVC. Alternative materials will be considered on a case by case basis and will be approved prior to procurement or installation.

Cooling Tower Make-up Water Piping (Above Ground): Copper pipe, Type L or K.

Cooling Tower Make-up Water Piping (Below Ground): Galvanized steel pipe, Schedule 40, with galvanized threaded fittings.

Subsoil Drainage: Perforated PVC.

Steam Piping: Steel.

Condensate Piping (Steam): Copper Type DWV with soldered joints or Schedule 80 steel.

Chilled Water Piping (Inside): Type K copper or steel.

Heating Water Piping (Inside): Type K copper or steel.

Chilled Water Piping (Underground): Pre-insulated steel.

Hot Water Piping (Underground): Pre-insulated steel.

Thermal Insulation (Hydronic Piping):

Chillers and chilled water piping will be insulated with cellular glass insulation: Owens Corning Foamglas, 1 ½" minimum thickness with bore coating, joint sealant, finish fabric, and finish mastic.

Condensate drain piping will be insulated with elastomeric insulation: Rubatex or Armstrong AP Armaflex.

Sprinkler Piping (Above Ground): Pipes 2 inch and smaller will be schedule 40 black steel, ASTM A-53 and UL Listed, Fittings will be malleable iron, 150 psi banded, threaded, black, ANSI B-16.3; Pipes 2 ½ inches and larger roll and grooved schedule 10 black steel pipe, ASTM A-135 and UL Listed. Fittings will be mechanical grooved coupling system, UL Listed.

Sprinkler Piping (Below Ground): Ductile cast iron class 52, UL Listed and FM Approve. Fittings will be mechanical joint cast iron, class 250.

3.15.D Section 15110 – Valves

Domestic Water System: All valves in the domestic water system will be gate valves as manufactured by Crane, Milwaukee, Stockham, Nibco, and Powell. Valves 2 inch and smaller will be gate valves with bronze body and bronze trim, threaded or soldered connections. Valves 2 ½ inch and larger above ground will be butterfly valves with flanged, welded or mechanical joint connections, cast iron body with bronze trim. Valves underground will be butterfly (or ball – 2 inch or smaller) type with cast iron body and bronze trim, flanged or welded connections, and non-rising stem with square wrench nut head.

Hydronic Piping System: Gate, gate and angle gate valves can be appropriate for hydronic piping. Acceptable manufacturers are Crane, Milwaukee, Stockham, Nibco, and Powell. Other valve options include butterfly valves by Milwaukee (2 inches and smaller), and Crane, Centerline, DeZurik, and Nibco (2-1/2 inches and larger), and ball valves (2 inches and smaller) by Crane, Milwaukee, Nibco, Jamesbury and Stockham.

Double Detector Check Valves: Reduced Pressure Detector Assembly Backflow Preventor of, ASSE, FM Approved, UL Listed, with OS&Y gate valves on inlet and outlet, and strainer on inlet. Include 2 positive-seating check valves and test cocks, bypass with displacement-type water meter, valves and double-check backflow preventor for continuous pressure application.

Pressure Reducing Valves: Pressure reducing valves will have a means of externally adjusting the outlet pressure. All internal parts subject to wear will be replaceable without removing the valve from the piping. Valves will have an integral low inlet pressure check valve, and will maintain. Acceptable manufacturer: Golden Anderson (no substitutions).

3.15.E Section 15185 - Pumps

3.15.E.1 Basic Pump Construction

General: All pumps will comply with the following requirements unless otherwise indicated.

Casing: The casing will be designed for 175 psi working pressure and will be hydrostatically tested at 150% of the maximum working pressure. Suction and discharge flanges will be provided and drilled to ANSI Standards. Provide cast lifting lugs in pump casing. Casing will be horizontally split unless otherwise noted.

Pump Volute: Plugged drain, vent, and gauge tappings will be cast into the pump volute. The volute will be designed such that the motor and pump can be disconnected and removed, leaving the volute and piping in place.

Casing Rings: The pump case will have two replaceable bronze case wear rings (impeller wear rings), located at each impeller skirt. Each ring will be pinned or press-fit into grooved shoulders to lock the ring in place.

Mechanical Seals: Mechanical seals will be designed for operation in 225 Degrees Fahrenheit liquid. Seals will have a carbon seal ring and ceramic seat, or Ni resist seal, installed on both sides of the shaft, and will have provisions for venting and lubrication. The shaft will be steel, with a replaceable bronze shaft sleeve or collar. All pumps will be provided with mechanical seals unless specifically indicated otherwise.

Bearings: Radial and thrust bearings will be single row ball, re-grease lubricated, self-aligning type mounted in cast-iron cartridges, with 100,000 hours average life. Bearings will be removable without disconnecting the pump volute. Provide grease seals and neoprene water slingers to protect the bearings.

Base: Provide a cast-iron or steel drip rim base for each pump unit. Pump and drive unit will be aligned and bolted or welded in place on a common base plate prior to factory shipment.

Gasket: Provide cellulose fiber gaskets for the suction and discharge flanges.

3.15.E.2 Double Suction Pump

Certified Pump Curve: A certified pump curve for each double suction pump is required.

General: Pump will be single-stage centrifugal type with horizontal axially-split cast-iron casing.

Impeller: the impeller will be double suction type, made of cast bronze, balanced hydraulically and dynamically, keyed to the shaft and securely retained in an axial position by positive mechanical means.

Piping Connections: Suction and discharge connections will be located on opposite sides of the lower half casing, allowing removal of the rotating element without disturbing the system piping connections.

Manufacturer: Acceptable manufacturers are: Aurora, Bell & Gossett/ITT, or approved equal.

3.15.E.3 Domestic Water Booster Pump

The domestic water booster pump will be a UL Listed Variable Speed packaged system with 100% redundancy and alternating sequence of operation.

3.15.F Section 15410 - Plumbing Fixtures

Plumbing fixtures within public areas of the Main Terminal will comply with the requirements of the Main Terminal Interior Design Criteria Manual.

Water closet, Wall Hung: American Standard No. 2258.125 (1.6 GPF) (or approved equal by Kohler Co.) white vitreous china, wall-mounted, elongated bowl, siphon jet, 1-1/2 inch back spud. Provide Sloan "Royal" Model No. 152-1.6 ES-S (1.6 GPF) water saver, automatic flush, valve system, with 24V. sensor and solenoid operator, with vandal resistant screws for the sensor cover plate, vacuum breaker, 1-1/2 inch flush connection for concealed back spud, angle stop valve and override push button. Provide each valve with a factory supplied transformer model EL-154 (no substitutions on flush valve assembly).

Provide a Zurn Series Z-1203, or approved equal, hub and spigot adjustable horizontal carrier system for siphon jet water closet. Provide a Sperzel No. 150-EEWSSCH, or approved equal, white heavy duty, open front, and extended back, toilet seat, with four bumpers.

Water closet, Handicapped, Wall-hung: Use all of the components as described in the previous paragraph, entitled, "Water closet, wall-hung." Set at raised handicapped height.

Urinal, Wall-hung: American Standard No. 6605.027 (or approved equal by Kohler Co.) white vitreous china, blowout flush action, 1-1/4 inch back inlet spud. Provide Sloan "Royal" Model No. 195-1.0 ES-S (1.0 GPF) water saver flush valve system, with 24V sensor and solenoid operator, with tamper-proof screws for the sensor cover plate, vacuum breaker, 1-1/4 inch flush connection for concealed back spud and angle valve. Provide each valve with a factory supplied transformer model EL-154 (no substitutions on flush valve assembly). Provide a Zurn Series Z-1222 or approved equal plate type carrier system.

Urinal, Handicapped Wall-hung: Use all of the components as described in the previous paragraph, entitled, "Urinal, wall-hung." Set at lowered handicapped height.

Lavatory, Wall-hung: American Standard No. 0355.012 (or approved equal by Kohler Co.), white vitreous china, front overflow, and 4-inch centered faucet holes. Provide a Speakman Sensor-Flo, Model S-8810-BO-HTS-VRS, electronic faucet with 4-inch deck plate (with double studs), complete with transformer, 12 VDC solenoid valve, waterproof connectors, filters, braded steel flex hose, 0.5 GPM reduced flow device and spout locking device (no substitutions on faucet assembly). Provide a Zurn Series Z1231 or acceptable equal, concealed arm carrier system. Provide one piece escutcheon with rubber grommet at wall for control wire and braided tube. Provide 17 GA.C.P.P-trap, supplies and stops (no substitutions for fittings).

Lavatory, Handicapped, Wall-hung: Use all of the components as described in the previous paragraph, entitled, "Lavatory, wall-hung." Set at handicapped accessible height.

Mop Sink: Fiat Model No. TSB 100, or approved equivalent, precast terrazzo, 24-inch by 124-inch by 2-inch high, with 2-inch wide shoulders and 1/2-inch pitch towards inside, and stainless steel integral drain. Provide Fiat Model 889-CC, 24 inches long by 3 feet wide stainless steel mop hanger with three rubber grips. Provide Speakman Model No. SC-5811-RCP chrome-plated cast brass, complete with 3/4-inch hose coupling discharge, pail hook, and top brace (no substitutions for fittings).

Lavatory, Fittings for solid-surface countertop with integral bowl (Corian or similar): Provide a Speakman Sensor-Flo, Model S-8810-BO-HTS-VRS, electronic faucet, with 4-inch deck plate, complete with transformer, 12 VDC solenoid valve, waterproof connectors, filters, braded steel flex hose, auto-flo 0.5 GPM reduced flow device, and spout locking device. Provide 17 GA. C.P. P-trap supplies and stops (no substitutions for fittings). This sink configuration would be typical at a diaper changing station.

Hydrants, Wall- or Floor-Mounted:

Interior: Recessed, wall-mounted, with hinged cover, 3/4-inch male hose thread nozzle, vacuum breaker-backflow preventer, chrome finish brass casting, with loose key-operated stem and door. Woodford Model B74, or approved equal.

Exterior: Recessed, wall-mounted, with hinged cover, 3/4-inch male hose thread nozzle, non-freeze, automatic draining, chrome finish all bronze construction, vacuum breaker-backflow preventer, with loose key-operated stem and door, Woodford Model B65, or approved equal.

3.15.G Section 15485 - Plumbing Equipment

3.15.G.1 Electric Water Heaters

Tank: Heater will be constructed with steel tank constructed to 125 psi working pressure, 300 psi test pressure and lined with borosilicate glass bonded to tank. Glass lining to be baked at 1600 Degrees F., to assure a molecular-interchange between tank and lining. Tank to be protected against electrolytic activity with replaceable factory installed anode rod and factory installed dielectric nipples.

Temperature Control: Water heater to be provided with fully adjustable temperature controls and automatic high limit control. Unit will have ASME-approved temperature and pressure relief valve properly sized for BTU capacity of the unit installed.

Insulation: Water heater will be insulated to ASHRAE 90.1-1989 standards and jacketed with manufacturer's standard heavy steel jacket.

Heating Element: Water heater will also feature 90% efficient immersion type heating elements. Incoloy sheathed elements will be provided. All units will be constructed with factory-installed heat traps to increase efficiency and reduce standby loss by a minimum of 10%.

Relief Valve: Provide ASME-rated and UL-listed temperature and pressure relief valve. Temperature setting will be 210 Degrees F., and the pressure setting will be 125 psig, unless otherwise indicated.

Drain: Provide storage tank drain and drain pan fabricated of minimum 18-gauge galvanized steel, with a minimum lip of 1-1/2 inches, and provided with a drain connection piped to the nearest floor drain unless otherwise indicated.

Testing: Each unit is to be UL-tested, and UL-listed, for service as a domestic water heater for voltage inputs as indicated on the drawings.

Warranty: Water heater will carry a limited factory warranty of 5 years. Acceptable manufacturers are as follows:

a. Rheem
b. Lochinvar
c. A. O. Smith

Thermostatic Mixing Valve: Provide a thermostatic mixing valve with bronze body construction and corrosion-resistant components for each water heater serving the public toilets. Valve will be equipped with a removable union and stop and check valve, and stainless steel strainer. Unit will be a Lawler No. 66-50, with dialed thermometer and solenoid valve. The mixing valve will be enclosed within a lockable metal box.

3.15.H Section 15710 - Cooling Tower

Enclosure: The Landside Terminal, Airside F and Airside A have custom-designed concrete and masonry structures that form the basin, the tower walls, the fan deck, and the fan stacks.

Product: The cooling tower design is to be based on a regularly catalogued product assembly of the manufacturers.

Lintels: The tile fill will be supported by pultruded fiberglass reinforced vinyl ester resin tee section lintels capable of withstanding imposed loadings with a safety factor of 3.

Tile Fill: The tile fill will be of multi-cell design, set without mortar, in a pattern, and of sufficient height to meet the necessary design performance level. The tile fill will be of hard burned clay, with a low absorption such that it will pass a freeze-thaw test conducted in accordance with ASTM C 67. The tile fill will have a minimum crushing strength of 2000 psi over the gross area with the load is applied parallel to the cells as tested in accordance with ASTM F 67.

Mist Eliminators: The eliminators will be of the 3 pass cellular type, assembled in sections. Free water carryover will not exceed 0.05 % of the total water flow. The eliminator will be constructed of PVC conforming to ASTM D 1784, Type I, Grade 2. The mist eliminators will have a flame spread rating of 25 or less when tested in accordance with ASTM Procedures E-84.

Speed Reducer: The speed reducer gears will be rated with a service factor of 2 and designed for cooling tower service. The alarms for both the vibration switch and the oil lever switch will be transmitted to the BCS.

Fan Assembly: The complete fan assembly will provide maximum efficiency and long life while handling saturated air at high velocities. The fan will be a multi-blade design and constructed of fiberglass reinforced resin.

Drive Connection: The motor will be located outside the airstream. The stainless steel drive shaft will be full floating type with flexible couplings at both ends. Each coupling will be provided with a galvanized steel guard.

Distribution System: The distribution system for each cell will consist of two central headers, side laterals and nozzles. The header capacities will be as indicated in the cooling tower schedule on the drawings. All piping will be fiberglass or PVC. Fittings and nozzles will be PVC or ABS. The distribution system will terminate in a flange face located 6 inches below the top of the fill support beams.

Ladders: Provide stainless steel ladders that comply with OSHA requirements. Two ladders, located at opposite faces, will be provided for tower installations with more than two cells. Ladders will extend from the ground or walking surface to the top of the cooling tower working surface, unless otherwise indicated. Provide a stainless steel OSHA cage if the height of the top of the tower is more than 20 feet above the ground.

Water Level Control: Provide plastic or bronze mechanical float with adjustable linkage, unless otherwise indicated. The water level control will be provided with a still well and will be accessible without entering the tower basin.

Fan Motor: Provide totally enclosed, air over type motor located outside the air stream. Motor will be two-speed motor rated at 1800/900 rpm. Fan motor will have 1.5 service factor.

Vibration Cutout Switch: Provide switch to de-energize fan motors if excessive vibration occurs due to fan imbalance.

Maximum Permissible Sound Pressure Level: Use 0.0002 microbar as reference. Measure at 50 feet in several directions, uniformly covering 360 degrees. Do not exceed maximum permissible dB level in each of the following octave bands:

63 HZ - 73 dB 1000 HZ - 63 dB
125 HZ - 71 dB 2000 HZ - 60 dB
250 HZ - 69 dB 4000 HZ - 55 dB
500 HZ - 69 dB 8000 HZ - 50 dB

3.15.I Section 15800 - Air Handling Units

Solid Double Wall Construction: Units will be double wall construction with 2 inch thickness, 1-1/2 pound density fiberglass insulation. The insulation will be sandwiched between a minimum 18 gauge galvanized steel solid interior wall and the exterior wall. Removable or hinged access panels will provide access to both sides of cooling coil, drain pan, internal fan drive, electric heating coil, and filter section.

Condensate Drain Pan: Each unit will have an insulated, 20 gauge stainless steel double wall drain pan for condensate drainage. The insulation will be a minimum of 1 inch thick fiberglass and the inner pan will be coated with corrosion-resistant elastomeric-based material. Threaded pipe drain connections will be provided on one side only and the pan will slope toward the connection, allowing no standing water. The drain connection will be on the side of the unit that has the condensate drain plumbing connection. If the selected air handling units have more than one drain connection, each connection will be provided with a trap and an individual drain line piped to discharge at the nearest condensate floor drain. The discharge of the individual condensate traps will not be connected together.

Fans: Fans will be double width, double inlet, multiblade type constructed in accordance with the American Fan Manufacturers Association Standards. Fan wheels will be forward curve or backward inclined air foil type. Fan blades will be bonderized or galvanized steel and will be finished with baked enamel for corrosion protection. Fan shafts will not pass through their first critical speed at any cataloged rpm.

Bearings: Fans will be equipped with self-aligning, anti-friction pillow block ball type bearings with a minimum life of 100,000 hours.

Fan motors will be an open drip-proof when located outside the discharge air stream from the cooling coil and totally enclosed air-over type when located in the cooling coil discharge.

Water Coils: Coils will be leak tested to 200 psig air pressure underwater and designed for 300 psig working pressure. The coils will be continuous seamless copper tube with aluminum plate fins bonded by mechanical expansion of the tubes, unless otherwise indicated. Fin spacing will not exceed 12 per inch. Frames will be constructed of 16 gauge galvanized steel casing with copper headers brazed to tubes and threaded connections. Both supply and return headers will be provided with 1/8 inch NPT vent connection at top and bottom for venting and draining coil. The coils will be arranged for the water to counterflow in the direction of the air flow. Tube sheets will be 16 gauge stainless steel, located on each end and at a maximum of 80 inch intermediate spans with drain collars to support tubes. Return bends will be die-formed, brazed to tubes and header and will be seamless hard-drawn copper tubing. Casing channels will be free-draining, without depressions to collect moisture and contaminants or to block fin area, and with an air bypass/water carryover arrester between the casing bottom channel and the fins.

Electric Coils: Electric heating coils will be UL, ETL, or ARL listing for installation in a section of the air handling unit. Coils less than 5 kW will be single stage; above 5 kW will have a minimum of two stages. Electric heater element will be constructed of heavy-duty nickel chromium. 480 volt, three phase elements will be internally wye connected with automatic line break high limit control.

Each heater will be provided with single point electric power connection and terminal strip connection for control wiring.

Whenever possible, fan coil units, necessary for the odd situation, will be installed in a vertical configuration and within a nearby mechanical room.

3.15.J Section 15845 – Variable Air Volume Terminal Units

VAV units will be double wall construction with no insulation exposed to the air stream.

VAV unit controls will be Johnson Controls “Metasys” type and be factory installed.

VAV units will be located as close to the finished ceiling as possible. Units will be accessible by using a ladder no taller than eight feet.

3.15.K Section 15855 - Diffusers, Registers, and Grilles

Supply diffusers, return air grilles, and exhaust grilles mounted in ceilings will have a painted perforated metal face. Round, square, or rectangular devices with exposed directional blades are not allowable. Linear devices are allowable and generally preferred by design professionals.

3.15.L Section 15890 – Ductwork

Sheet Metal Ductwork:

Material: Prime quality 48 inch wide resquare tight coat cold-rolled hot-dipped galvanized steel capable of double seaming without fracture. Conform to the requirements of ASTM A-525 and ASTM-G90 for a minimum galvanizing coat of 1.25 ounces per square foot total for both sides.

Construction: Provide corner closures. Longitudinal seams and transverse joints will be flat and smooth inside. Make slip joints in direction of air flow. Transverse joints will be Pittsburgh lock or double corner seam. Button punch snaplock construction is not acceptable. All welds will be continuous and corrosion-resistant.

Fittings: Fabricate offsets, turns, and elbows with centerline radius equal to 1-1/2 times diameter when possible. No mitered offsets will be allowed.

Insulation: All supply return, and outside air ducts will be externally insulated. Unless detailed system design dictates otherwise, external insulation will be minimum 2" thick fiberglass duct wrap where concealed and 1 ½" thick duct board where exposed. Continuity of the vapor barrier on the exterior insulation will be maintained in accordance with the manufacturer's instructions. Duct insulation within equipment rooms will be fully coated with mastic or painted in its entirety.
Double Wall Manufactured Ductwork:

Material: Duct will be double wall, machine formed round or flat oval spiral lock seam duct constructed of galvanized steel sheets. The inner wall will be perforated and the annular space will be filled with minimum 1" glass fiber insulation with a maximum "k" value of 0.27 BTU per square foot per hour. Insulation will be covered with a minimum 1.5 mil film so that no fibrous material is exposed to the airstream.
Flexible Ducts:

Insulated Flexible Ducts, Fiberglass: Flexible duct will be factory-fabricated pre-insulated type with seamless vapor barrier. Fiberglass insulation will be nominal 1 inch thickness with maximum thermal conductance of 0.23 BTU/hr-sq. ft.-degrees at 75 degree F mean temperature. Flexible duct will have an operating pressure range of minus 0.5 inch w.g. to plus 2 inch w.g., maximum

working velocity to 4000 fpm and temperature range to 250 degree F. Core will be continuous and consist of aluminized mylar laminated to a corrosion resistant steel wire helix.

Vapor retardant rating will be 0.17 perm maximum per ASTM E96-A.

Flexible duct will be a maximum of 8 feet in length unless otherwise indicated and will be fully extended to smooth out internal corrugations, and will be installed without kinks, compression, or obstructions so that pressure drop is minimized. Install with a maximum equivalent of two 90-degree bends. No bend will be made with centerline radius of less than one duct diameter for fiberglass ductwork, or four and one-half diameters for metal ductwork. No additional flexible duct will be provided for future relocation unless otherwise indicated; cut and remove excess length.

Flexible duct will be supported at ends and at each 90-degree bend. Maximum permissible sag is ½ inch per foot of spacing between supports.

Hanger and saddle material in contact with the flexible duct will be of sufficient width to prevent any restriction of the internal diameter of the duct when the weight of the supported section rests on the hanger or saddle material. In no case will the material contacting the flexible duct be less than 1 inch wide. Hanger will be used in conjunction with a sheet metal saddle formed to cover one-half the circumference of the outside diameter of the flexible duct and will be rolled to fit neatly around the lower half of the duct's outer circumference.

Coordinate ductwork and piping to allow clear access to and around equipment.

3.15.M Section 15900 – HVAC Instrumentation and Controls Airside E

For the Landside Terminal complex, Airside F, Airside A, Airside E, and the new Airside C, the Building Control System is, and will be the Johnson Controls "Metasys" system installed by the manufacturer.

With a Johnson Controls system, all AHU and chiller plant control valves and dampers will be pneumatically actuated. In addition, all VAV control dampers will be electronically actuated.

All new and revised control drawings will be laminated and inserted in the master set in the HVAC Control Room (Service Building at the Central Plant).

3.16 Division 16 - Electrical

3.16.A Section 16050 - Basic Electrical Materials and Methods

A City of Tampa Electrical Permit must be obtained and displayed at the work location.

All work must conform to the National Electrical Code, the City of Tampa Code, the Authority Tenant Work Permit General Construction Standards (Special Provision No. 4) and the applicable Authority Design Criteria Manual.

All relays, contactors, starters, motor control centers, switchboards, panelboards, dry-type transformers and so forth, will be supplied and manufactured by the same manufacturer. Panelboards, switchboards, breakers, etc., will match the existing building equipment.

All screws, bolts, washers, and other fasteners used in supporting fixtures, conduit, or outlets will be fabricated from rust-resisting metal and will be of a common replacement type design. No rivets or other non-replaceable type fasteners will be permitted. Use of tie wire is not acceptable. Powder actuated anchors are not permitted.

Provide reinforced concrete “housekeeping pads” for switchgear, motor control centers, transformers, etc. Pads should be a minimum of 4 inches high and project at least 6 inches beyond the footprint perimeter of the cabinet. Pads should match existing pads within the same room. Chamfer top edges 1/2 inch.

Testing of cables 600V or less and size No. 2 or larger will be meggered using an industry-approved “megger” with a minimum of 500V internal generating voltage. All inspection, cleaning and testing procedures will be in compliance with the recommendations and standards outlined in the “Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems,” latest edition, published by International Electrical Testing Association (NETA). Readings will be recorded in the presence of the design professional or an owner’s Representative. Provide a schedule of testing to the Engineer and the Authority construction project manager a minimum of three calendar days prior to testing. Insulation resistance test values will be no less than 50 megaohms.

3.16.B Section 16060 - Grounding and Bonding

All branch circuit and feeder raceways will have a copper system ground conductor within the conduit throughout the entire length of the circuit and bonded to portions of the conduit that are metal by listed grounding bushings.

3.16.C Section 16075 - Electrical Identification

Equipment identification using phenolic plastic laminate nameplates will be as follows:

a. Normal system will be 1/2-inch high white lettering on a black field

b. Emergency system will be 1/2-inch high white lettering on a red field

c. Uninterruptible power supply system will be 1/2 inch high white lettering on an orange field

3.16.D Section 16110 – Raceways

The entire installation will be in hot-dipped rigid galvanized conduit, intermediate metal conduit, heavy wall Schedule 40-PVC plastic conduit (in slab or underground only), or electric metallic tubing, unless specifically noted otherwise. Only heavy wall PVC (Schedule 40) will be used for all raceways trapped underground and in or under concrete slab on grade. Minimum conduit size for lighting, power, data, phone and fire alarm systems will be 3/4-inch C. All conduit will be UL-listed and labeled.

Conduit expansion fittings will be malleable iron, and will be hot-dipped galvanized inside and outside.

All raceways will be run in a neat and workmanlike manner, and will be properly supported from structural members (beams, joists, or slabs) in accordance with the latest edition of NEC using approved conduit clamps, hanger rods, and structural fasteners. Supporting conduit and boxes with wire is not approved. All raceways except those from surface-mounted switches, outlet boxes or panels, will be run concealed from view. Exposed raceways will be supported with clamp fasteners, with toggle bolt on hollow walls, and with lead expansion shields on masonry. Where PVC penetrates a floor from underground or in slab, a black mastic coated steel conduit elbow will be used. No PVC will be allowed anywhere except underground or in slab. Conduits will be run parallel and perpendicular to building beams wherever possible, exposed or concealed, and will be grouped in workmanlike fashion. Crisscrossing of conduits will be minimized. Multiple runs of raceways will be routed together. Raceways will not be located within six inches of other system components (HVAC ducts, chilled water lines, sprinkler lines, domestic water lines, bus ducts, etc.).

The contractor will prepare and submit coordination review drawings to Authority prior to installation of all multiple raceway conditions illustrating layout, elevations, and coordination with other building system components. All raceways will be installed as close as possible to the structure and at the highest elevation possible.

All raceways will have an insulated copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC.

Insulated bushings will be used on all rigid steel conduits terminating in panels, wire gutters, or cabinets.

All connections to motors or other vibrating equipment (except dry type transformers) or at other locations where required will be made with not less than 12 inches of flexible liquid-tight steel conduits, using special type of connectors with strain relief fittings at both terminations of conduit.

Expansion fittings will be installed in the following cases: In each conduit run wherever it crosses an expansion joint in the concrete structure; on one side of joint with its sliding sleeve end flush with joint, and with a length of bonding jumper in expansion equal to at least three times the normal width of joints; in each conduit run which mechanically attaches to separate structures to relieve strain caused by shift on one structure in relation to the other; in straight conduit run above ground which exceeds one hundred feet in length. Interval between expansion fittings in such a run will not be greater than 100 feet.

Electric metallic tubing (thin wall) may be installed inside buildings above ground floor where not subject to mechanical injury. All electrical metallic tubing will be joined using compression type steel fittings. All connectors will have insulated throats.

Rigid metallic conduit installed underground will be coated with waterproofing black mastic before installation, and all joints will be recoated after installation.

All temporary and permanent conductors (power, lighting, control, communications, lightning protection, etc.) must be placed in conduit or approved cable trays.

The contractor will furnish coordination drawings prior to installation which show layout and elevations of all multiple raceways.

Bus ducts will be separately supported using the manufacturer's standard recommended equipment allowing for removal of bus duct sections and inspection of all cover plates.

The minimum conduit size for power and lighting systems will be 3/4 inch conduit for all circuitry homeruns from the panelboard. Conduits branching off of the homerun conduit to devices may be 1/2 inch conduit, if it contains no more than 4 conductors per conduit (excluding the equipment grounding conductors), and phase conductors no larger than No. 12 AWG.

All systems (fire alarm, sound system, controls, etc.) conduits will be a minimum of 3/4 inch.

Catwalks and handrails will not be used to support raceways of any type.

All raceways crossing building expansion joints will be equipped with expansion-type fittings.

Sleeves will be used when conduits pass through walls, floors, and roofs, and will be of galvanized steel, sized to allow for a minimum 1/4 inch clearance. Fire rating integrity will be restored after penetration.

Flexible steel conduit will be limited to final connections to motors and transformers and will be restricted to 36 inches in length. Flexible steel conduit may also be used to connect light fixtures

to junction boxes in lengths not to exceed 4-6 feet. All flexible steel installations will be a continuous length with threadless hinged clamp-type fittings and a male end provided with a locknut.

All conduit must have steel compression-type connectors and couplings with non-removable insulated throats.

All conduit exposed to the weather will be rigid galvanized conduit.

All raceways (conduits, wireways, busways, etc.) and boxes will be independently supported from the building structure. Attachment to ceiling support system or the use of tie wire for raceway support is prohibited.

All raceways and boxes will be installed as close as possible to the structure and at the highest elevation possible. The contractor will prepare "coordination drawings" that establish MEP systems layering to ensure proper functioning and maintenance access for all ceiling cavity components.

All raceways will be installed parallel with the structural framing members.

Raceways and boxes will not be located within six inches of other systems (HVAC ducts, chilled water lines, sprinkler lines, water lines, bus ducts, etc.).

Multiple runs of raceways (two or more) will be routed together and supported by trapeze hangers consisting of all-thread rod and unistrut cross members. All multiple raceways will be installed horizontally. Conduit supports will be one-hole malleable straps, clamp-backs, or other accepted devices with suitable bolts. Caddy batwing-style straps, which clip to wire without the use of bolts, are not allowed.

Floor Boxes: Design type will allow for continuous raceway into the floor boxes without a junction box. Floor box raceways will be installed to allow for the first junction box to be located within the same room and floor level.

Maximum allowable wire or cable fill in a raceway will be 40%. This applies to all systems (fire alarm, low voltage controls, fiber optic, telephone, etc.).

Spare parts will be provided at the completion of the work as follows:

a. Lamps: Provide a minimum of one case or six lamps, whichever is greater, for every type of lamp installed. Quantity may be increased with large-scale projects.

b. Fuses: Provide a fuse cabinet with 3 spare fuses of each size and type used.

3.16.E Section 16120 - Conductors and Cables

Branch circuit and feeder conductors for electric power will be copper type THW or THWN. No aluminum wiring will be permitted. Wire in vicinity of heat-producing equipment will be type XHHW/L-S insulation. All wiring will be manufactured in the USA.

All copper taps and splices in No. 8 or smaller wire will be fastened together by means of "wirenut" connectors. All taps and splices in wire larger than No. 8 will be made with solderless type lugs and taped to provide insulation equal to wire. Stranded conductors #2 and larger should have compression type connectors.

All power feeders and branch circuits No. 8 and smaller will be wired using color-coded wire having the same color used for a system throughout the building. Power feeders above No. 8 will be either fully color-coded or black insulated and be similarly color-coded with tape in all junction boxes and panels. Tape will completely cover 1/3 of the length of conductor insulation within the box or panel.

Modular connectors, MC, AC, or any similar type cable wiring are prohibited. The intent is to allow removal of conductors without conduit replacement. All electrical wiring will be performed by conventional, industry standard methods with the use of conduit, wire, and wire nuts.

All electrical feeders will be run in continuous pieces without joints or splices.

All conductors will be copper. Branch circuit and feeder conductors No. 12 AWG and smaller will be solid. No. 8 AWG and larger will be stranded.

Cable extensions from raceway terminations will not exceed 5 feet.

Connections: Conductors No. 10 and smaller will be connected with pre-insulated twist-on spring connectors encased in a plastic shell and rated at not less than 105 degrees C. No exceptions. Wire nut manufacturers will be Ideal or accepted substitution. A minimum of 3/8-inch skirt will cover all bare wires. Self-stripping or stab-in type electrical wire connectors are prohibited. This includes connectors within lighting fixtures, signs, and equipment.

3.16.F Section 16130 – Raceways and Boxes

At all concealed boxes for electric lights, switches, wall receptacles, telephone outlets, etc., standard galvanized one-piece steel boxes will be provided. Surface outlet boxes and conduit bodies will be made of heavy cast aluminum or iron with external raised hubs. Trim rings will be of one-piece construction.

Boxes will be of such form and dimensions as to be adapted to the specific use, location, type of device or fixtures to be used, as well as number and size of conductors and arrangement, and size and number of conduits connecting thereto.

All flush boxes will be mounted so that covers and plates will be flush with finished surfaces without the use of shims, mats, or other devices. Plates will not support wiring devices. Where two or more switches are installed in the same location, gang switches together using one-piece boxes with common plate. Wall-mounted devices of different systems (switches, thermostats, etc.) will be coordinated for symmetry when located near each other on the same wall. Trim rings will be extended to within 1/8 inch of finish wall surface.

Installation of outlet or junction box will be limited to one extension box. Flush outlets will be mounted so that covers and plates will finish flush with finished surfaces without the use of shims, mats, or other devices not submitted for this purpose. Add-a-Depth rings or switch box extension rings (Steel City #SBEX) are not acceptable. Plates will not support wiring devices. Arrange switches together with a common plate where two or more are indicated in the same location. Wall-mounted devices of different systems (switches, thermostats, etc.) will be coordinated for symmetry when located near each other on the same wall. Through-wall type boxes will not be permitted.

3.16.G Section 16140 - Wiring Devices

Wiring devices will be specification grade. Switches will be silent type. Receptacles will be duplex grounding type, and will be provided at a maximum spacing of twenty-five feet in public areas.

Coverplates for all devices will be stainless steel. All outside receptacles (weatherproof) will be duplex grounding type with stainless steel hinged covers.

Voltage and ampere rating of switches will be marked on switch, and will conform to voltage of system to which applied.

Use 20 AMP premium specification grade receptacles. Provide hospital-grade receptacles in all areas used by housekeeping (corridors, public areas, etc.). All devices (switches, receptacles, etc.) will be terminated with side-wired screw terminals only. Stab-in wire connections held by spring tension are not permitted.

Color of devices will be ivory with stainless steel coverplates.

3.16.H Section 16190 - Supporting Devices

All supports, hangers, and inserts required to mount fixtures; conduit, cables, and pullboxes will be furnished and installed. All items will be supported from the structural portion of the building. Boxes and conduits will not be supported or fastened to ceiling suspension wires or to ceiling channels.

All conduits will be securely fastened in place at intervals of 10 feet maximum. Hangers, supports, or fastenings will be provided at each elbow and at the end of each straight run terminating at a box or cabinet. The use of perforated iron for supporting conduits will not be permitted. The required strength of the supporting equipment and size and type of anchors will be based on the combined weight of conduit, hanger, and cables.

Hangers will be made of durable materials suitable for the application involved.

With concrete or masonry construction, insert anchors will be installed with round head machine screws. An electric or hand drill will be used for drilling holes for all inserts in brick, concrete, or similar construction. CAUTION: No anchors or holes will be made in the structure without first consulting with the Structural Engineer of Record.

3.16.I Section 16289 - Transient Voltage Suppression

Provide external Transient Voltage Surge Suppression (TVSS) on the following conditions:

a. Service entrance equipment

b. Panelboards (with circuits serving known electronic equipment)

c. Systems panels (fire alarm, security access control, computer clean power, etc.) on both the power feed and any wiring (signaling circuit, initiating device circuit, etc., shields), which extend beyond the building by either underground, aerial, or other methods such as walkways, bridges, etc. Also, device wiring located at high locations such as penthouses, parking garage roof levels, etc., should be included.

d. Spark gap devices or devices incorporated in or installed within the panel in lieu of the external TVSS are not acceptable.

3.16.J Section 16415 - Automatic Transfer Switch (ATS)

Automatic Transfer Switch (ATS) will have a manual bypass isolation operating handle with transfer speed equal to automatic operation. Provide automatic and manual transfer switches manufactured by one of the following:

a. Russelectric, Inc.

b. Automatic Switch Company

c. Zenith Company

3.16.K Section 16425 - Distribution Switchboards

Factory-assembled, metal-enclosed switchboard for distribution and control of power from incoming line terminals to outgoing feeder terminals, installed and tested in place.

Switchboard will include all protective devices and equipment as listed on drawings or as included in these specifications, with necessary interconnections, instrumentation, and control wiring.

3.16.K.1 Products – General

Switchboards with circuit breaker, fusible switch, or integrally fused circuit breaker branch protective devices will comply with NEMA PB2 as a minimum requirement. Switchboard will meet Underwriters' Laboratories enclosure requirements for service conditions.

Each cubicle will have UL label affixed, unless special construction prohibits and no labeling or listing is available.

The sides and tops will be covered with removable screw-on code gauge steel plates.

Switchboards will be completely self-supporting structures, 90 inches high.

3.16.K.2 Finish

All steel surfaces will be chemically cleaned and treated to provide a bond between paint and metal surfaces to help prevent the entrance of moisture and formation of rust under the paint film.

The switchboard exterior will be finished indoor light grey No. 61, ANSI Z55.1.

Apply corrosion-protective undercoating to undersurface.

3.16.K.3 Bussing and Terminations

Bus bars:

a. Buses will be tin-plated copper sized on the basis of not more than

b. The bus structure will be braced to withstand mechanical forces exerted during short circuit conditions as required to limit the system fault current.

c. A copper ground bus will be furnished secured to each vertical section structure.

Bus connections will be front accessible.

When spaces for future devises are noted on the drawings, all necessary buses except for the device connecting straps will be furnished.

Where provisions for future sections are called for on drawings, all buses will be extended to last section, and be adaptable for extension.

Through bus that feeds additional sections to main section will have continuous current rating of 100% of rating of main device frame size.

Line and load terminations will be provided suitable for the size, number of conductors, and conductor material. Terminations will be accessible from the rear.

Provide full-height wiring gutter doors for quick access to wiring terminals.

All hardware will have high tensile strength, and have a suitably protective finish.

When called for on drawings, a bus duct stub will be suitable for a direct connection to the bus duct without cabling.

3.16.K.4 Accessories

A switchboard will be provided with adequate lifting provisions, and will be capable of being rolled or moved into installation position and bolted directly to the floor without the use of floor sills.

3.16.K.5 Control Wiring

Each control wiring conductor will have heat shrink identification labels on each end of termination. Terminations will be made to screw terminal strips using approved conductor terminals. All points of terminal strips are to be labeled to match conductor labeling.

3.16.K.6 Main Section

The following instruments and associated equipment will be provided when called for by the design professional or the Authority

a. Ammeter

b. Voltmeter

c. Ammeter and voltmeter transfer switches

d. Current and potential transformers required

e. Fuses

f. All interconnecting wiring required

Instruments to be 4-1/2 square with +1 % accuracy, panel mount type.

Ground fault protection system will be provided.

a. System will consist of a ground sensor on line side of main switch or on load side of branch breaker encircling all phase conductors, including neutral connected to a solids ate ground relay switch which initiates shunt tripping of the main or branch circuit interrupting device.

b. System on main incoming service will be adjustable from 200 to 1200 primary amperes, system on branch breakers will be adjustable from 50 to 200 primary amperes, and time current characteristics should provide 6 cycle operation at about ten times setting.

c. Relay output will operate from 120v AC fused sources from main bus.

d. Submit coordination diagram relays and demonstrate coordination.

3.16.K.7 Distribution Sections

Circuit breaker, fusible switch, or integrally fused circuit breaker branch protective devices will be group-mounted with necessary bar connections accessible from the front, and have a minimum interrupting rating as required to limit the system fault current.

3.16.L Section 16430 - Switchgear

All switchgear will be equipped with the following:

a. Current carrying parts of the bus structure will be copper

b. The neutral will be fully rated

c. Provide a copper equipment grounding bus of the set screw type

Circuit breakers for applications other than panel boards will be bolt-on type.

Electrical distribution will be similar to Airsides A, E, and C with two TECO transformers and the main building switchgear in two sections with an open tie breaker.

Provide spare switchgear breaker for the largest size breaker and a space within the switchgear to house. Provide spare capacity for future.

3.16.M Section 16440 - Disconnect Switches

All disconnect switches will be heavy-duty type, unless specifically noted otherwise. Switches will be fusible or non-fusible and sized as noted on drawings.

Switches will be 240 volt rated on systems up to and including 120/208V and 600V rated on higher voltage system with NEMA 1 enclosure, unless otherwise noted. All switches for motors will be dual horsepower rated. All switches mounted outdoors will be NEMA type 4X (stainless steel).

Provide and install lugs on disconnect switches as required to accept conductors.

3.16.N Section 16442 - Panelboards

Panelboard branch circuit breakers will be bolt-on, thermal-magnetic, molded case type.

Panelboards will be equipped with a minimum of 3 spare breakers and 25 % spare capacity.

All panelboards will be equipped with the following:

a. Current carrying parts of the bus structure will be copper.

b. The neutral will be fully rated.

c. Provide a copper equipment grounding bus of the set screw type.

3.16.O Section 16450 - Grounding

In general, all electrical equipment (metallic conduit, motor frames, panel board, etc.) will be bonded together with a green insulated or bare copper system grounding conductor in accordance with the specific requirements of Article 250 of the NEC. Insulating bonding conductor through the raceway system will be continuous from main switch ground bus to panel ground bar of each panel board, and from panel grounding bar of each panel board to branch circuit equipment and devices.

A main ground, bare copper conductor, NEC sized but in no case less than No. 2/0, will be run in conduit from the main switchgear to a driven ground field outside the building. The main building service grounds will have resistance to ground at no more than 5 OHMS.

Grounding conductors will be so installed as to permit shortest and most direct path from equipment to ground; be installed in metal conduit with both conductor and conduit bonded at each end; have connections accessible for inspections and made with approved solderless connectors brazed (or bolted) to the equipment or structure to be grounded; in no case be a current carrying conductor; have a green jacket unless it is bare copper; and be run in conduit with power and branch circuit conductors. The main grounding electrode conductor will be exothermically welded to ground rods.

All contact surfaces will be thoroughly cleaned before connections are made to ensure good metal-to-metal contact.

Mechanical lugs or wire terminals will be used to bond ground wires together or to junction boxes and panel cabinets and will be manufactured by Anderson, Buchanan, Thomas and Betts Company, or Burndy.

All exterior grade mounted equipment will have their enclosures grounded directly to a separate driven ground at the equipment in addition to the building ground connection.

3.16.P Section 16461 - Transformers

Dry type transformers will be factory assembled, metal enclosed, provided, and installed in place.

Dry type transformers will be UL-listed and certified to meet NEMA ST-1 with convection cooling. Transformers will be tested and rated for sound level in accordance with ASA-C89. 1-1961.

Class H insulation will be employed for transformers above 30 KVA with maximum temperature rise of 150 degrees C. over 40 degrees C ambient. Class F insulation will be employed for transformers up to and including 30 KVA with a maximum temperature rise of 115 degrees C. over 40 degrees C ambient. Transformers will be copper wound.

Three phase units will be wound delta-wye. Minimum impulse level will be 10 KV. Each three phase transformers will have three separate sets of coils. No Scott T connections, open delta, or two coil arrangements will be permitted.

Transformers will be mounted where accessible. No units may be mounted behind partitions, above ceilings, etc. Each transformer will be mounted on 3-inch concrete base extending 3 inches beyond all sides.

3.16.Q Section 16442 - Panelboards

Panelboards will be of dead front design, equipped with bolt-on, quick-make, circuit breakers of the thermal magnetic type and mains with lugs or main breakers are required. Panel bus will be tin-plated copper. Bus will be braced for a capacity equal to or greater than the available symmetrical fault current. Double and triple pole breakers will be of common trip, single handle type.

Typical cabinets will be surface-mounted (concrete or masonry walls) or flush-mounted (gypsum board/stud walls) and will be fabricated from galvanized steel with a standard baked enamel finish.

Panels and breakers will be rated for voltage and class of service to which applied. All panels will have locks and all will be keyed alike. Panels will be supplied with standard baked enamel finish, both back box and front, except flush panels will have galvanized backbones. All panel board cabinets will have a system grounding bar bonded to the panel board cabinet for connection of system grounding conductors system. This bar will be mechanically and electrically isolated from

the neutral bar. Panel fronts on flush panels will have completely concealed trim clamps and door hinges. A typewritten circuit direction listing the actual circuit numbers, type of load and room names will be mounted on inside of door.

3.16.R Section 16475 - Overcurrent Protective Devices

3.16.R.1 Description of System

Provide overcurrent protection for all wiring and equipment in accordance with the NEC, all federal, state and local codes as required and/or as shown on the drawings.

3.16.R.2 Circuit Breakers

Circuit breakers for lighting and appliance panelboards will be bolt-on type. Circuit breakers for power panelboards will be bolt-on.

All circuit breakers will be molded-case, quick-make, quick-break, thermal magnetic type, and will be UL-listed and rated for voltage and class of service to which applied.

Double and triple pole breakers will be of the common trip, single handle type.

Circuit breakers will have minimum rating of 10,000 amp interrupting capacity, unless required otherwise by the design professional.

3.16.R.3 Fuses

No fuses will be installed until equipment is ready to be energized and after tightening of all electrical connections, inspection of all ground conductors and a meggar test of adequate insulation to ground of all circuits.

Fuses rated 601 amperes and larger will be UL Class L and have a minimum time-delay of 45 seconds at 300% rating and have O-ring gas seals at the end bells.

Fuses rated 600 amperes or less, installed ahead of circuit breaker or circuit breaker panels, will be UL Class RK-1.
Fuses rated 600 amperes or less for all general power circuits will be dual-element, UL Class RK-5-time delay type. They will be self-protected from extraneous heat.

3.16.R.4 Spare Fuse Cabinet

10% (or a minimum of three) of each size and type of fuse will be placed in a spare fuse cabinet, wall-mounted near the electric service.

Cabinet will be sized as required to store all fuses neatly. Cabinet will contain shelves and /or slots as required to separate types of fuses. Cabinet door will be hinged with latch.

3.16.R.5 Identification Label

A fuse identification label, showing type and size, will be placed inside the door of each fused switch.

Labeling for rejection type fused switches will read:

WARNING!
USE ONLY CURRENT LIMITING FUSES
CLASS _____, TYPE _____, MFR _____

Label will be engraved in red laminated plastic.

3.16.S Section 16511 - Interior Lighting

All fixtures will be designed and installed with consideration for maintenance accessibility. Stairwell fixtures will be located so they are accessible from a ladder at each landing.

All public restroom fixtures will have battery backup in addition to an emergency circuit. Emergency circuit will have a key switch located in an accessible janitor's closet to allow for annual battery discharge.

Use photo controls in lieu of time locks whenever possible. Lighting control contactors will be electrically and mechanically held. (This allows for manual closing of a contractor when needed.

All lighting fixtures and signs will be equipped with a renewable fuse in an external GLR fuse holder. Fuse placement will be in the most readily accessible location. An example would be to locate the pole-mounted fixture fuses at the bottom of the pole accessible from the handhold.

3.16.T Section 16670 - Lightning Protection

Lightning protection system will be designed in compliance with provisions of NFPA No. 780, "Standard for the Installation of Lightning Protection Systems."

The lightning protection system will be placed on the structure by experienced installers in compliance with provisions of the NFPA and Underwriters' Laboratories. Installers will be LPI (Lightning Protection Institute) certified, master, and journeyman in accordance with LPI standards. A UL Master Label and LPI certification will be required for the system.

Materials will comply in weight, size, and composition with the requirements of UL and the NFPA relating to this type of installation, and will be UL-labeled.

Air terminals will be solid copper with nickel-plated point, and will have proper base support for surface on which they are attached and will be securely anchored to this surface. Terminals will project a minimum of 10 inches above top of object to which attached.

Conductors will consist of commercially pure copper, complying with the weight and construction requirements of the Code, and will be coursed to interconnect with air terminals and, in general, provide a two-way minimum path to ground. The angle of any turn will not exceed 90 degrees, and will provide an approximately horizontal or downward course. Down conductors will be installed in concealed plastic conduit. Radius of bends will not be less than 8 inches.

Conductor fasteners will be of the same material as the conductor, having ample strength to support conductor. Where fasteners are to be mounted in masonry or structural work, they will be furnished to the contractor for installation during the construction of the project.

Ground connections will be made in accordance with requirements of all applicable codes. Ground rods will be placed in a minimum of two feet from building foundations. In addition to above artificial grounds, one down conductor of each two-path system will be connected to water piping system with approved water pipe type strap connector.

3.16 U Airfield Lighting

Airfield lighting will comply with FAA Advisory Circular 150/5340-30J Design and Installation Details for Airport Visual Aids. Additionally, the Authority prefers the installation of taxilane edge lights

along all aircraft aprons to better delineate island areas between adjacent taxiways/taxilanes and apron areas.

3.17 Telecommunications Infrastructure Standards

3.17.A General

The Hillsborough County Aviation Authority currently specifies the requirements for the installation and use of copper and fiber optic telecommunications cabling to support voice, data, video, security and all low voltage applications and services at Tampa International Airport. This document describes the minimum requirements, standards, specifications, and methods of execution pertaining to cable and infrastructure support for all telecommunications, data, video, security, and CCTV use at the Airport. It includes the furnishing, installation, testing and documentation of telecommunications copper and fiber optic cable, terminations, outlets, and related items for use throughout the Airport facilities.

3.17.A.1 Reference Standards

a. The publications listed below form a part of the telecommunications infrastructure requirements to the extent referenced. The publications are referred to in the text by basic designation only. All publications are intended to be the most current editions available.

b. Except where otherwise noted, all material and workmanship will conform to the following standards:

(1) ANSI/TIA-568-C.0 (February 2009), Generic Telecommunications Cabling for Customer Premises

(2) ANSI/TIA-568-C.1 (February 2009), Commercial Building Telecommunications Cabling Standard

(3) TIA-568-C.2 (August 2009), Balanced Twisted- Pair Telecommunications Cabling Components Standard

(4) ANSI/TIA-568-C.3 (June 2008), Optical Fiber Cabling Component Standard

(5) ANSI/TIA/-569-BCommercial Building Standard for Telecommunications Pathways and Spaces

Notes:

1. Particular attention is to be given to Basic Building Elements - Telecommunications Closets and Equipment Rooms. There will be a minimum of one Telecommunications Closet established for each floor of a building.

2. Each Telecommunications closet will be provided with a lockable door that, if practical, will be integrated with TPAs' Access Control System. If this isn't possible, the door will have a lock compatible with the existing IT / Telecommunications' closet lock.

(6) TIA/EIA-606-B Administration Standard for Commercial

Telecommunications Infrastructure

(7) ANSI-J-STD-607-B1Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

(8) TIA/EIA-758-A Customer Owned Outside Plant Telecommunications Infrastructure Standard

(9) ANSI/TIA-862 Building Automation systems Cabling Standard for Commercial buildings

(10) ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers

(11) ANSI/TIA-1005 Telecommunications Infrastructure Standards for Industrial Premises

(12) ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial building Telecommunications Cabling

(13) ANSI/NECA/BICSI-607-2011 Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

(14) ANSI/NFPA 70 National Electrical Code, CSA C22.1

(15) BICSI Telecommunications Distribution Methods Manual (TDMM)

(16) BICSI Telecommunications Cabling Installation Manual (TCIM) BICSI ITSIMM

(17) County Codes and Regulations

(18) Underwriters Laboratories (UL)

(19) FCC -Federal Communications Commission

(20) ADA Requirements

(21) Occupational Safety and Health Regulations (OSHA)

(22) National Fire Protection Association (NFPA)

(23) Florida Statutes and Administrative Rules

(24) Manufacturers Product Cabling Catalogs

(25) Manufacturers Training Manuals (Design and Installation).

3.17.A.2 Submittals

a. Materials & Equipment List: Prior to installation the contractor will submit for approval a complete list of materials, equipment, accessories, configurations and

installation methods proposed for work in accordance with these specifications. The list will include complete catalog identification numbers and models or system designator, quantities, options and catalogs "cuts."

b. As Built Drawings: The contractor will provide one set of reproducible drawings depicting the final installation details, including final cable locations, quantities and routing, upon completion of the project. The contractor will also provide as built drawings in electronic format. The formats are to be determined by TPA at the time of implementation of the project.

c. Cable Management System Documentation: The contractor will provide a listing in spreadsheet format of all horizontal and riser cables, indicating type of cable, origination and termination points and length. The contractor will provide this spreadsheet in electronic format, in Microsoft Excel (latest version available), using a specific spreadsheet format provided by TPA. The data will be entered into TPA's Cable Management System.

d. Record Drawings: The contractor will maintain and keep up to date a complete record set of drawings that will show every change from the Contract Drawings.

e. Room Labeling: Initial and all subsequent submittals will include a labeling scheme that reflects the labeling standards delineated in section 3.18 of the Design Criteria Manual.

3.17.A.3 Delivery, Storage, and Handling

a. Protection and Restoration: Suitably protect all equipment provided under this Division during construction. Restore all damaged surfaces and items to "like new" condition before a request for substantial completion inspection.

b. Handling: All materials will be properly protected and all conduit openings will be temporarily closed by the contractor to prevent obstruction and damage. Post notice prohibiting the use of all systems provided under this Contract, prior to completion of work and acceptance of all systems by the owner's representative. The contractor will take precautions to protect his materials from damage and theft.

c. Safeguards: The contractor will furnish, place and maintain proper safety guards for the prevention of accidents that might be caused by the workmanship, materials, equipment or systems provided under this contract.

d. Cleanup: Keep the job site free from all debris and rubbish. Remove all debris and rubbish from the site and leave premises in clean condition on a daily basis.

3.17.B Products

3.17.B.1 General – Materials Alternates and Substitutions

TPA has established standards for products to be used for telecommunications infrastructure to be installed at the Airport. These standards are established to ensure commonality of services throughout the Airport regardless of manufacturer, vendor or owner.

a. Alternates: Specified products or manufacturers that will be in compliance with the performance and quality provisions of the specifications and may be proposed for use by the contractor. Alternates will also be a different model number from those identified on the documents. Acceptable alternates are as listed on the documents. Alternates must be justified on the basis of need, cost or both as long as there is no identified reduction in quality and that all design parameters are met.

b. Substitutions: Products of unnamed manufacturers. Substitutions will not be acceptable.

c. The contractor is expected to base his bid on materials and equipment complying fully with the drawings and specification. In the event he bases his bid on materials or equipment which do not conform, he will be responsible for providing materials and equipment which fully conform at no change in his contract price. In any case, where a specific specification for any item that is required is not shown, the contractor will provide only the best quality equipment or material consistent with the quality of other specified equipment and material. The items of equipment will be provided in the quantity as shown by the drawings or in the quantity as specified herein.

d. The use of acceptable equipment does not relieve the contractor of responsibility for the alternate equipment. The contractor, at no cost to the owner, will remove and replace with the specified equipment any equipment or system that shows evidence of improper operation, function, or size.

e. It is the responsibility of the contractor to supply a working overall system. All equipment and material as well as labor must be provided whether or not specifically mentioned in the specification or shown by the drawings.

f. The contractor selected for each Division 27 and 28 system must be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning the Project.

g. Contractor, as a minimum, must carry a current State issued limited energy license.

h. Additional requirements as indicated on each individual specifications section.

3.17.B.2 Fiber Optic Backbone Cable Subsystem

a. Single mode fiber cable used will have the following optical characteristics:

Size: Core/Cladding 9/125um

Attenuation	Bandwidth	Notes
1.0/1.0 dB/km@1310/1550	100 terahertz	OS1 – Tight Buffered/Inside Plant
0.4/0.4 dB/km@1310/1550	100 terahertz	OS2 – Loose Tube/Outside Plant

b. Multimode fiber cable used will have the following characteristics:

Size: Core/Cladding 50/125um

Attenuation	Bandwidth	Notes
3.0/1.0 dB/km@850/1300	500/500 MHz-km	OM2 – Laser - rated
3.0/1.0 dB/km@850/1300	2000/500 MHz-km	OM3 – Optimized for 850 nm
3.0/1.0 dB/km@850/1300	3600/500 MHz-km	OM4 – Optimized for 850 nm

Size: Core/Cladding 62.5/125um

Attenuation	Bandwidth	Notes

3.0/1.0 dB/km@1310/1550	160-200/500 MHz-km	OM1 – LAN fiber

c. Inside backbone cable will consist of tight-buffered single mode cable consisting of multiple fiber bundles and a dielectric central strength member. The outer jacket will meet the NEC requirements for Riser or Plenum.

d. Outside plant fiber cable will be of water-blocked, loose tube, single mode construction. The cable will consist of multiple fiber bundles surrounding a dielectric central strength member, and covered with a fire resistant jacket.

e. Acceptable manufacturers: Corning, Optical Cable Corporation, Superior Essex, Comm Scope, Berk-Tek or approved equal.

3.17.B.3 Fiber Distribution Panels

a. Panels used for terminating outside plant and inside building fiber optic cables will be of the distribution type. Where feasible, all fiber distribution panels will be rack mounted. Panels will be low profile, and selected to occupy minimum rack spaces.

Distribution panels will have both termination bays and splice bays, with the proper number of LC panels/mounting plates with stainless steel couplers and splice organizer trays plus 20% for expansion.

b. Acceptable manufacturers: Panduit, Ortronics, Commscope, Leviton or approved equal.

3.17.B.4 Fiber Cable LC Connectors

a. LC compatible connector couplings will be able to accommodate ceramic connectors. The contractor will use couplings specifically rated by the manufacturer for high-speed applications.

b. Multimode and single mode fiber connectors will be LC compatible, epoxy type, with ceramic tips. The maximum average insertion loss specifications will be as follows:

(1) Singlemode: .75dB/connector

(2) Multimode: .75dB/connector

Acceptable manufacturers: Panduit, Leviton or approved equal.

3.17.B.5 Fiber Optic Patch Cables

a. Fiber patch cables will be appropriate length duplex LC-to-LC fiber patch cords for all fiber distribution panel ports.

b. The contractor will provide cable management rings and support brackets for routing and support of all fiber patch cables and will ensure equipment is in place that will protect the fiber patch cables from damage.

c. Acceptable manufacturers: Panduit, Leviton, or approved equal.

3.17.B.6 Interior Copper Cable Backbone Subsystem

a. The interior copper cable backbone system will consist of the following:

(1) Multi-pair copper cable, UTP 4PR CAT 6 plenum and non plenum cable.

(2) 8 Position Modular (RJ45) Patch Panels and Jacks, 110 Punch Down Blocks, 66 Punch Down Blocks and Wire Management Devices.

(3) Fiber Optic – Conventional and Air Blown Fiber Optic Cables, Singlemode and Multimode, Connectors, Fiber Distribution and Termination Cabinets.

b. The contractor will provide cable management rings and support brackets for routing and support of all interior copper backbone cables.

c. Interior copper backbone cable will be UTP Category 6 cable minimum and will be in compliance with the TIA/EIA standards.

d. Acceptable manufacturers: Berk-Tek, Superior Essex, or approved equal.

3.17.B.7 Outside Plant Copper Cable Subsystem

a. Outside copper cable will be gel-filled to inhibit water penetration, and armored to enhance protection from external means. Outside copper cable will meet RUS PE-89 specifications.

b. Acceptable manufactures: Superior Essex, or approved equal.

3.17.B.8 Cable Voltage Protection

The contractor will provide gas-tube voltage protection blocks for outside plant cables. Voltage protection blocks will be wall mounted with locking front cover. Acceptable manufacturers: Porta Systems or approved equal.

3.17.B.9 Horizontal Cable Subsystem

a. The horizontal cable subsystem will consist of Category 6 non shielded or foil shielded UTP and six strands of multimode, fiber optic cable end-to-end installation as identified in the latest ANSI/TIA568-C standard. Copper cables will consist of 4 twisted pair cable; either PVC-jacketed or plenum-rated as required in the environment where work is occurring. All cable will meet the following requirements:

(1) Category 6 cable will meet all performance requirements as specified in the most current version of the ANSI/TIA 568-C.

(2) Unless otherwise specified, the standard category 6 cable complement will be four 4-pair data cables. All category 6 cable will be color coded and placed in the face plate as follows:

Cable	Cable Color	Insert Color	Placement
Access Control and Video Management Systems	Red	Red	
Data 1	Blue	Blue - if available	Upper Left
Data 2	Blue	Blue – if available	Upper Right Left

Data 3	Blue	Blue – if available	Lower Left
Data 4	Blue	Blue – if available	Lower Right
Fiber 1*	Blue and Orange	Electric Ivory	Center Right
Fiber 2*	Green and Brown	Electric Ivory	Upper Right

**If installed*

(3) Unless otherwise specified, the standard fiber installation will consist of two, two-strand fiber connections placed below the copper connections on the face plate as shown in section 3.18, page 4,of the DCM.

(4) Unless otherwise specified, all CAT 6 jacks will be Panduit part numbers CJS6X88TGY.

(5) Unless otherwise specified, all fiber jacks for the faceplates will be Panduit part number CMDJLCEI.

(6) Unless otherwise specified, all double-gang faceplates will be Panduit part number CFPF12EI-2G and all single gang faceplates will be Panduit part number CBEI.

b. Horizontal copper cable runs will not exceed 90 meters from the outlet to the IDF. If cable routing requires horizontal runs in excess of 90 meters, the contractor will notify TPA in advance of installation.

c. All fiber horizontal cable will be 6 strand, 50/125 multimode (OM3) micron cable.

d. Acceptable manufacturers: Panduit or approved equal for fiber; Panduit, Corning, Optical Cable Corporation or Superior for copper cable.

B.17.B.10 Station Cable Faceplates and Jacks

a. All faceplates used will have a capacity of a minimum of four outlets utilizing a square, single gang box that is 2 inches wide and as deep as physically permissible.

b. Data, voice and fiber communications jacks will meet all performance requirements as specified in the latest issue of the ANSI/TIA 568-C and will be wired to accommodate the T-568B wiring sequence.

c. Faceplates will be flush mounted. Any surface mounted boxes must be approved in advance by TPA.

d. Fiber inserts on the faceplate will have recessed inserts with a downward slope of 30 degrees.

e. All modular jacks & plugs used will comply with FCC part 68 specifications.

f. Metal faceplates may be used with prior approval from TPA.

g. Acceptable manufacturers: Panduit or approved equal.

3.17.B.11 Category 6 Patch Panels

a. Category 6 patch panels will meet the ANSI/TIA requirements for Category 6 cross-connect and switching hardware.

b. The contractor will provide Category 6, 8 Pos modular patch panels in all wiring closets adequate to support all installed Category 6 cables (data and voice), plus 20% growth in each wiring closet.

c. Category 6 patch panels will include wire management components that will be used for routing of communications cable to and from telecommunications panels and equipment. These components will include:

(1) Wire slots to organize cables

(2) Cable brackets for support and routing

(3) Strain relief clips

(4) Wire management panels

d. Acceptable 8 Pos modular patch panel manufacturers: Panduit, or approved equal.

3.17.B.12 Fiber Optic Distribution Panels

a. Fiber Optic Patch Panels will meet the ANSI/TIA requirements for fiber optic hardware.

b. The contractor will provide Fiber Optic LC patch panels in all wiring closets adequate to support all installed fiber optic cables plus a 20% growth in each wiring closet.

c. Fiber Optic Distribution Panels will include management components that will be used for routing of communications cable to and from related Fiber Optic source equipment.

(1) Wire slots to organize cables

(2) Cable brackets for support and routing

(3) Strain relief clips

(4) Wire management panels

d. Acceptable manufacturers: Panduit or approved equal.

3.17.B.13 Equipment Racks

a. In each wiring closet the contractor will mount 8 Pos modular patch panels and fiber distribution panels in floor-mounted, 84” high, 19” equipment racks with cable management troughs. Furnish and install adequate racks to support rack-mounted fiber optic distribution panels and category 6, RJ-45 patch panels, and 20% growth.

b. Acceptable manufacturers: B-Line, Chatsworth, X-Mark or approved equal.

3.17.B.14 Category Patch Cables and Fiber Optic Cross-Connect Cables

a. The contractor will provide adequate Category 6 patch cables and Fiber Optic cross-connect cables of appropriate lengths to support all patch panel ports and Fiber Optic distribution panels installed.

b. The contractor will not be responsible for installing patch cables. This specification only calls for furnishing the required patch cables to be installed.

c. Acceptable manufacturers: Leviton, Siemon, Corning, Optical Cable Corporation, Comm Scope, Berk-Tek or approved equal.

d. Prior to purchase of patch cables, the contractor will consult the Aviation Authority Telecom Group concerning cable length to be supplied.

3.17.B.15 Fiber and Cable Management

a. Vertical Cable Management will be required for each side of the equipment rack. The cable management devices must be sized accurately for the cable types and maximum capacity. Drop-downs of Copper and Fiber cables will be accomplished utilizing conduit “waterfall”, Panduit Part Number CMW-KIT, and waterfall accessories as appropriate. The contractor will consult with the Aviation Authority Telcom Group to clarify any questions on this matter.

b. Horizontal Cable Management is required below each patch panel and switch. A 24-port patch panel requires one horizontal cable manager below and a 48-port patch panel requires one horizontal cable manager above and below the patch panel. The use of patch panels larger than 48-ports is discouraged. The cable management devices must be sized accurately for the cable types and maximum capacity.

c. Acceptable manufactures: Panduit or approved equal.

3.17.C Execution

3.17.C.1 Installation

a. General Instructions

(1) The contractor will install all provided and furnished materials in accordance with manufacturer's specifications, recommendations and guidelines. Copies of the manufacturer's guidelines, specifications and recommendations will be provided by the contractor to TPA and will be made available on site to the contractor's personnel.

(2) Install all wiring and cabling in accordance with the National Electric Code (NEC) where the provisions of the NEC are applicable.

(3) Installation will be in conformance to generally acceptable telecommunications means and methods and the manufacturers’ specifications. Stress on any cable during installation will not exceed manufacturers’ specifications. All splicing and connections will be in accordance with industry-standard practices.

(4) The contractor will coordinate installation of all cabling to promote ease of installation and efficient use of rack space, backboard space, conduits and cable trays.

b. Fiber Optic Cable Plant Installation

(1) All fiber cable will be terminated in LC connectors mounted in fiber distribution centers. The contractor will use fiber pigtails and splice trays at all distribution points.

(2) All Backbone fiber optic cables will be installed in innerduct tubing to protect and isolate it.

(3) All Horizontal fiber optic cables will be six strand, armored, multimode.

(4) Fiber optic cable will be installed in accordance with manufactures specifications. The contractor will not exceed the maximum pulling tension or minimum bend radius of the cable.

c. Copper Outside Plant Installation Requirements

(1) All outside plant cables will be terminated in 110 blocks.

(2) All copper outside plant cable will terminate in voltage protection units upon entering the wiring closet in each building.

(3) All copper outside plant copper cable will be installed in accordance with manufacturers' specifications. The contractor will not exceed the maximum pulling tension or minimum bend radius of the cable.

d. Copper Inside Plant Backbone/Riser Subsystem

(1) All cables will be terminated in 110 blocks or 8 Pos modular patch panels.

(2) All copper inside plant copper cable will be installed in accordance with manufacturers' specifications. The contractor will not exceed the maximum pulling tension or minimum bend radius of the cable.

e. Horizontal Cabling

(1) The standard for horizontal distribution systems will consist of a complete Category 6 installation, using UTP cables and/or fiber optic cables where national and local codes will allow for such installation. Any cable designated to be routed in spaces identified as riser or return air plenum spaces will conform to the installation requirements for these spaces by national and local codes, such as the use of riser and plenum rated cables.

(2) Electrical service boxes identified for use as communications outlets will be connected to the accessible ceiling locations via continuous and integral electrical metallic tubing (EMT) conduit, at a minimum. This conduit will be routed between the CO and the accessible ceiling designated communications cable tray where the end of the conduit will terminate no further than 6" to 12" from the point of cable tray exit, and in such a manner that there is no requirement to support the communication cable between the cable tray and the CO conduit. This CO and

conduit installation is a TPA requirement. If any deviation from this requirement is proposed by the contractor, the contractor will obtain explicit written permission from TPA for only the specified points of installation.

(a) If CO service boxes and integral conduit runs do not exist or specifically provided by others, then it will be the responsibility of the contractor to furnish and install them. The minimum installation requirements will be a double-gang box and a 1" conduit run. The conduit run will be provided with swept conduit bends, not to exceed 180° in total, such that the conduit run is horizontal to the ceiling and at the same level of the accessible ceiling communication cable tray within ±3 inches vertically.

(b) All conduits will be reamed to remove sharp inside edges and any open conduit end will have a bushing installed to protect the communications cable jacket.

(c) All conduits will be adequately supported at 48" intervals or less.

(d) It is understood that certain communications outlet conduit installations may be impractical due to pathway and space limitations such as routing, penetrations and architectural aesthetics. For such conditions, the contractor is required to submit an alternate pathway design and rational for TPA approval.

(e) When any cable is pulled through a CO conduit, an internal dragline is to be left in place to facilitate the installation of future cables.

(3) Between the end of the conduit stub-up and the wiring closet, the contractor will install appropriate cable tray of appropriate capacity to accommodate the expected full build-out at the area of the building facility being served. It is the expectation of TPA that cable tray be used in horizontal distribution. The contractor will install the appropriate cable tray support hardware. In no instance will the contractor attach cables to any other support hardware in the ceiling space. The cable tray will be supported at 48" intervals or less. The weight of maximum cable capacity will dictate a more frequent support.

(a) At locations where a cable tray cannot be accommodated due to floor/wall penetrations, structure and/or aesthetics, the cable routing must transition to other types of pathways. The contractor will utilize cable bridle rings or J-Hooks (open top cable supports) attached to hanger rod supports to secure the cable to the point of entry of the alternate pathways. Cable at these transition points between the cable tray and alternate pathways will be supported at spacing of 48" or less depending on the weight of the bundle.

(b) Under no circumstances will cable be laid on suspended ceiling or draped across other conduits, pipes, ducts, or other facilities installed along the path of the cable.

f. Route Preparation, Drilling and Coring

Field coordination with TPA will be required prior to installing cable trays (where specified), sleeves, wall or floor penetrations and/or cables.

g. Termination

(1) The contractor will terminate all conductors of all cables. Each copper outside plant and riser cable pair will be terminated contiguously on wall-mounted 110 blocks with protectors. Terminations will be in color code sequence from left to right and from top to bottom on each block for each cable. 110 blocks will be labeled in a permanent legible fashion, in compliance with TPA's approved labeling scheme.

(2) Fiber strands will be field terminated in rack-mounted fiber distribution panels on LC connectors according to the specification of the manufacturer. Only tool kits and consumables that are specified by the manufacturer will be utilized. Completed LC connectors will be placed into the sleeve of the fiber termination panel from left to right in color code sequence. Strands will be protected and secured within the fiber panel to ensure both strain relief and bend radius. The fiber cable will be tie wrapped (this means the total cable with all strands inside of outer jacket) at the point of entry of the patch panel to prevent strain on the strands. Where required, to secure the fiber optic cable from pulling tension, the Kevlar strength members will be separated from the fiber strands and attached to the panel by a clamp. Fiber connectors will be terminated on LC connectors using manufacturer-approved methods.

(3) The contractor will terminate horizontal cables in modular jack inserts at the outlet in accordance with the floor plans, using the T568B wiring sequence.

(4) The contractor will terminate horizontal cables on rack mounted Category 6, 8 Pos Modular patch panels and/or Fiber Optic Fiber Distribution Panels according to the T568B wiring sequence.

h. Site Survey

(1) Prior to placing any lateral, riser or outside plant cable, penetration, etc. the contractor will survey the site to see that job conditions do not impose any obstructions that would interfere with the safe and satisfactory placement of the cables, and arrange to remove any obstructions with TPA. The contractor will provide shop drawings for approval by TPA prior to starting work.

(2) The contractor is responsible for notifying TPA as soon as field conditions prevent proper installation.

(3) The contractor will verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly that will void warranty, and will report in writing to TPA, prior to purchase or shipment of equipment involved, on conditions that may prevent proper installation.

i. Inspection

All cable will be inspected as it is pulled off the reel for any obvious defects. If defects are observed, further use of the cable from this reel will be halted.

j. Pulling Tension

(1) No cable will be installed with a pulling tension exceeding the maximum recommended by the manufacturer. Pulling tension should be monitored with a tension gauge.

(2) If multiple cables are to be pulled at one time, the contractor will make the necessary allowances to back off the pulling tension of the bundle.

(3) Cable pulls will be protected by means of an overload cutoff or breakaway clutch set at least 10% below the cable manufacturers' maximum recommended pulling tension.

k. Bend Radii

All cables will be installed with a bend radius greater than recommended by the manufacturer.

l. Slack

(1) The contractor will leave a service loop prior to termination and patching.

(2) Prior to termination, the contractor will leave a service loop for riser cables to provide some degree of flexibility and for service rearrangement.

m. Securing Methods

(1) The contractor will provide Velcro tie wraps, riser cable support grips, vertical and horizontal cable trays in wiring closets and other equipment spaces based upon field conditions to maintain orderly cable organization.

(2) The contractor will be responsible for securing all cabling in a way to satisfy any structural engineering requirements.

(3) The contractor will obtain required structural engineering related information for any item that may affect the infrastructure of the building, and submit the information to TPA for prior review and approval.

(4) The contractor will provide suspended platforms, threaded rods, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall or ceiling mounting of equipment provided under this Section. The contractor will provide steel supports and hardware for proper installation of hangers, anchors, guides, etc., and will provide cut sheets, weights, and other pertinent data required for proper coordination of equipment support.

(5) Velcro tie wraps will be used at approximately 60-inch intervals to secure cables in cable trays and to provide strain relief at termination points.

n. Placing Cable in Conduit

(1) The contractor will verify that any conduits to be employed are clear of obstructions unless TPA has approved an exception in writing. For fiber, inner duct will be placed in conduit. A fishline and mandrel will be used to clear conduits of obstructions and as a guide for pulling the cable through.

(2) For riser cable, the cable strength members will be affixed to the pulling medium or, a properly sized "kellum" type grip will be employed to make the pull. Cable pull tension will be monitored during the pull with a tension meter as necessary and if mechanical pulling equipment is used, a clutch set at10% below the cable manufacturer's maximum pulling tension will be used.

(3) A nylon dragline will be pulled along with each conduit run installed so that future cables may be pulled in that conduit. Conduit bushings will be used to protect the cable jacket from abrasion as it is pulled through conduit and at each exposed end.

o. Lubrication

As necessary, for cable pulls in conduit, the contractor will use only an approved lubricant compatible with the cable's outer jacket insulation.

p. Protection

During installation, and prior to final acceptance, the contractor will protect finished and unfinished work against damage and loss. In the event of such damage or loss, the contractor will replace or repair such work at no additional cost to TPA. As cable is installed, care must be taken to avoid nicks, kinks or other damage to the cable. Cable is to be labeled at each end as specified. Provide strain relief at each termination point and 24 inches of slack to allow for easy re- termination of the cable, if required later.

q. Cable Routes and Clearances

Unshielded twisted pair cable will be routed so as to maintain the following minimum distances from power sources:

Condition	Minimum Separation Distance		
	<2 kVA	2-5 kVA	>5 kVA
Unshielded power lines or electrical equipment in proximity to open or nonmetal pathways	5 in	12 in	24 in
Unshielded power lines or electrical equipment in proximity to grounded metal conduit pathway	2.5 in	6 in	12 in
Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal conduit pathway		3 in	6 in
Electrical motors and transformers			48 in

r. Grounding

(1) All metallic sheathed cables will be bonded and grounded. Riser cables will be bonded to the metal frames of the mounting hardware in the wiring closet using bonding clamps appropriate to the size of the cable.

(2) Each wiring closet will have a single ground point. This point is bonded to the integral building grounding system or to the local structural steel. All grounding and bonding in each wiring closet will be connected to that point either directly or through the use of ground bus connections.

(3) All cables with a metallic component, which enter a wiring closet from outside a building, will be grounded and bonded at the point of entrance with appropriate lightning protection.

s. Splicing

No splicing of any cables will be performed unless otherwise explicitly noted in the Drawings or pre-approved in writing by TPA.

t. Materials Management

(1) Equipment and materials will be properly stored, adequately protected and carefully handled to prevent damage until acceptance.

(2) The contractor will ensure delivery of cable, factory-packaged in containers or on reels. Storage of all components will be provided by the contractor including rental of containers or other suitable methods as specified.

u. Fire Stopping

(1) The contractor will suitably fire stop all riser shaft openings; horizontal sleeve penetrations, both ends of any horizontal conduits and all slot cuts in walls and under the raised access floors which are needed to facilitate cable access/egress.

(2) The contractor will verify to TPA's satisfaction that the integrity of all fire stops is maintained upon completion of the work.

v. Protection/Restoration of Premises

The contractor will, as required, during the progress of work, remove and properly dispose of resultant dirt and debris, hang protective plastic sheathing when specified and keep premises clean. Upon completion of work, the contractor will remove equipment and unused material provided for work.

w. Quality Assurance

(1) The work will be executed in full accordance with the current rulings of the latest applicable standards and all rulings by state, utility, and local authorities. Where codes conflict, the more stringent will apply. Where the specification requirements exceed the requirements of these authorities, codes, and standards, the specification requirements will prevail.

(2) The contractor will replace any imperfect or rejected work with work conforming to the requirements of the specification and will be satisfactory to TPA without extra cost to TPA.

(3) The contractor will report to TPA promptly in writing, whenever plans or specifications are believed to be at variance with these requirements and will not proceed with such work until further instructed in writing by TPA.

x. Abandoned and Future Cabling

(1) Abandoned cable will be removed from all pathways and spaces by the contractor anywhere the contractor is conducting new installations, renovations or replacement of existing cable plant backbone or horizontal pathways and space.

(2) Abandoned cable will be identified by the contractor, in consultation with TPA, for each project. Any cable later identified by the contractor as possibly abandoned will be brought to the attention of TPA.

(3) Any un-terminated communications cabling identified for future use by TPA will be documented by the contractor pursuant to TPA's cable management system specifications.

3.17.C.2 Testing

a. General Instructions

(1) For projects with a contract value in excess of $25,000, testing will be performed by an independent testing agency, retained by and at the expense of the contractor. For projects valued at $25,000 or less, inspections will be performed by the contractor.

(2) The contractor will thoroughly test, or have tested, all cables and connectors that they furnish and install. TPA requires certification that all pairs were tested and found to be 100% reliable end-to-end (block-to-block and block-to-receptacle); bad pairs/punch-downs and/terminations will not be used, but rather be corrected and/or replaced at no additional cost to TPA. The contractor will present all testing plans to TPA for approval prior to the start of testing.

(3) The contractor will provide a complete description of acceptance testing procedures and will notify TPA upon successful completion of acceptance testing.

b. General Rules

(1) The contractor will provide all labor, test equipment, and tools necessary to verify proper operation prior to final acceptance by TPA.

(2) Prior to any testing, the contractor will provide TPA with a two day minimum advance notice of the date testing is to begin. All test results hall be documented, and submitted to TPA for review, prior to final acceptance by TPA.

(3) The contractor will repair or replace all cable, connectors, and equipment supplied by the contractor, which do not meet acceptance criteria, prior to final acceptance by TPA.

c. Replacement

(1) Any cable, connector, or wiring block, patch panel or other device furnished by the contractor which tests below manufacturer's standards will be replaced at no additional cost to TPA. The replacement will be re-tested to verify compliance.

(2) Successful completion of all tests indicated below is required for acceptance.

d. Testing Procedures

(1) The contractor will provide the necessary test equipment to conduct the tests.

(2) Field tests may be required to be performed in the presence of TPA and/or its duly authorized representatives. The contractor will provide written documentation reporting the results of all tests.

e. Pre-Installation Testing

The contractor will obtain factory test data for each reel of cable including, but not limited to:

(1) Physical Production Tests (tensile strength)
(2) Transmission Production Tests

f. Fiber Optic Cable Test Procedures - Backbone and Horizontal

(1) Following the physical installation and termination of the fiber optic cables, the contractor will conduct any pre-checkout tests deemed necessary prior to the conduct of formal acceptance tests with the owner.

(2) The contractor will verify continuity of all optical fiber strands.

(3) The contractor will be responsible to perform optical loss (attenuation) measurements and Optical Time Domain Reflectometer (OTDR) tests. The contractor will document such items as the personnel involved in the testing, type of equipment utilized, equipment settings, the date tested, reel number (or cable ID when tested post-installation) and strand number. The contractor will be responsible to supply sufficient cable for the installation and to take whatever action is necessary to provide such cable at no additional cost to TPA.

(4) The contractor will provide written results, including actual trace records in As Built Drawings that the optical loss for each strand is within the limits established.

(5) If a fiber cable loss exceeds either the established optical loss or the manufacturer's standards, the contractor will first clean the connections at both ends and retest the cable. If loss is still excessive, the contractor will inspect the connections. Re-polishing or connector replacement may be required. If the connector terminations are determined to be acceptable, the cable may be defective. An Optical Time Domain Reflectometer (OTDR) will be used to locate cable breaks and points at which losses occur.

(6) In the event that the fiber continues to test outside of acceptable specifications, the contractor will replace the cable at no additional cost to TPA in accordance with TPA’s schedule.

g. Acceptance Testing

The contractor will perform the tests and inspections described in this section in the presence of TPA. Each floor and closet will be tested individually and accepted on a per floor basis. The cabling system will be tested for compliance with the specifications for physical placement, electrical specifications, wiring accuracy, continuity, and proper labeling and identification. Document all test results.

h. Physical Inspection

Prior to conducting any transmission testing, the following visual inspections will be performed:

(1) Verify that cable has been installed to comply with contract documents.

(2) Check for physical damage to Distribution Panels and Termination Blocks.

(3) Verify that outlets have been securely mounted and properly labeled.

(4) Check that all cabling is properly jacketed, installed and labeled at both ends (to the appropriate block/panel in the TR).

(5) Verify that all cable bends are within the manufacturer's minimum bend radius allowed.

(6) Check and demonstrate that all cable shields have been correctly grounded or bonded.

(7) Verify that the cable is properly supported for termination and long-term placement (approvals must be obtained from TPA).

(8) Verify that all cables are properly supported and independent of any other support/hanger rods in the ceiling space.

(9) Verify that cables have been terminated properly and in proper color code sequence.

i. Copper Cable Transmission Tests

(1) Electrical tests of copper cables will be performed only with connectors installed and cables punched down. Copper Riser and horizontal cables will be tested End-to-End from termination point to termination point via the appropriate punch-down on the termination block. 100% TESTING OF ALL PAIRS ON ALL CABLES IS REQUIRED. Manufacturer standard test equipment will be employed in addition to any special test gear required.

(2) All pairs of each cable will be electrically tested for:

(a) Continuity - The measured resistance value will be recorded.

(b) Opens

(c) Ground Faults

(d) Correct Termination - For the unshielded twisted pair, the correct color code will be punched down to be appropriate block/pin on the 110 block.

(e) Reversals (Correct Polarity)

(f) Splits

(g) Crosses

(3) The contractor will create a punch list of bad pairs and re- terminate and, as necessary, replace any defective cables, connectors and/or panels.

j. Horizontal Station Cable Testing - Copper

(1) Perform testing, and certify Category 6 compliance on all horizontal cable subsystems. All components of each horizontal subsystem must be of the Category 6 rating (cable, jack insert, patch panel, patch and station cables) and the link must be tested. Test results will be documented on hard copy media and listed by outlet.

(2) The contractor will identify the test equipment and procedures that will be followed to complete and document the testing.

(3) Test measurements will be conducted for bandwidth up to 625MHz, and include the following:

(a) Insertion Loss (Attenuation)
(b) Propagation Delay
(c) Delay Skew
(d) NEXT (Near-End Crosstalk) Loss
(e) PSNEXT (Power Sum Near-End Crosstalk) Loss
(f) Return Loss
(g) Wire Map
(h) Length
(i) ACRF (Attenuation-to-Crosstalk Ration, Far-End) Loss
PSACRF (Power Sum Attenuation-to-Crosstalk Far-End) Loss

3.17.C.3 General Instructions

a. The contractor will provide documentation enumerating termination panels and every cable run. Any additional documentation not explicitly listed that the contractor feels should be provided to facilitate a complete, working installation prior to acceptance by TPA will also be supplied.

b. Documentation of all installed cable, manhole racking diagrams and splicing diagrams will be provided in an electronic database suitable for direct entry into TPA's cable management system. Fiber optic OTDR test results will be provided in hardcopy format.

3.17.C.4 Cleaning

a. The contractor will clean up all work areas at the end of each day, removing all cartons, debris, emptied containers, etc. as the work progresses.

b. Just prior to inspection for substantial completion the contractor will perform all final cleaning and sealing of equipment required to bring the installation to optimum appearance.3.16.A.

3.18 Aviation Authority Labeling Standards

The Aviation Authority has implemented a labeling scheme for the labeling of all telecommunications cable, faceplates, patch panels, wiring blocks and equipment racks.

Building Identifiers

Each building on the airport property is designated by a two-character code as shown below.

Designation	Building Name

AA	Airside A
AB	Airside A Baggage Sort Building
AC	Airside C
AE	Airside E
AF	Airside F
AM	Airfield Maintenance
CB	Cargo Building
CF	Canine Facility
CL	Cell Lot
CB	Customs Bldg
EP	Economy Remote Garage
EV	East Airfield Electrical Vault
FB	Airside F Baggage Sort Building
FS	Fire Station
FX	Federal Express Building
GA	Guard Shack for Airside A
GB	Check Point Bravo
GC	Guard Shack for Airside C
GE	Guard Shack for Airside E
GF	Guard Shack for Airside F
LP	Long Term Parking
NP	North Parking Lot
PO	Post Office
RB	Raytheon Building (Currently Signature Flight Services)
SB	Service Building
TB	Terminal Building
TP	Toll Plaza
WV	West Airfield Electrical Vault

Telecommunications Spaces

Telecommunications Rooms are defined using a seven (7)-character designation. The designation consists of the following:

Characters 1 & 2 - Building designation (i.e., TB = Terminal Building) Characters 3 & 4 – Floor designation (i.e., 04 = 4th floor, 71 = 71 foot level)

Characters 5, 6 &7 – Room number (i.e., 880 = room 880) A list of current Telecommunications Spaces follows.

Terminal Building

Location	Designation
1st Level	
A Core Bag Make-up	TB01280
B Core Bag Make-up	TB01380
C Core Bag Make-up	TB01680
D Core Bag Make-up	TB01780
2nd Level	
2nd floor Comm Room	TB02680
NOC Server Room	TB02180
TSA Oversize	TB02380
Valet Door	TB02381
Behind Air Canada T/C	TB02682
Behind British Air T/C	TB02683

Behind Delta T/C	TB02780
3rd Level	
Suite B	TB03980
48 Foot Level	
48' Level A Core	TB48180
48' Level B Core	TB48480
48' Level C Core	TB48580
48' Level D Core	TB48880
71 Foot Level	
71' Level A Core	TB71180
71' Level B Core	TB71480
71' Level C Core	TB71580
71' Level D Core	TB71880
4th Level	
4th Floor Comm Room D Core	TB04880
4th Floor Comm Room A Core	TB04180
4th Floor Comm Room B Core	TB04480
4th Floor Comm Room C Core	TB04580
91st Foot Level	
91' Level A Core	TB91180
91' Level B Core	TB91480
91' Level C Core	TB91580
91' Level D Core	TB91880
Long Term Parking	
High Vehicle MDF	LPHV680
Elev. Mach. Room A	LP91880
Elev. Mach. Room B	LP91580
Elev. Mach. Room C	LP91180
Elev. Mach. Room D	LP91480
Toll Plaza Office DATA IDF	TP02581
Toll Plaza Office Voice IDF	TP02580

Airsides

A/S-A MDF	AA01580
A/S-A IDF-A	AA01780
A/S-A IDF-B	AA01680
A/S-A IDF-C	AA01380
A/S-A Comm. Room	AA01180
A/S-A Comm. Room	AA01181
A/S-C MDF	AC01780
A/S-C IDF -West	AC01480
A/S-C IDF ----East	AC01280
A/S-E MDF	AE01380
A/S-E IDF-A	AE01880
A/S-E IDF-B	AE01680
A/S-E IDF-C	AE01280
A/S-E IDF-D	AE03380

A/S-E Shuttle Car Bay	AE01480
A/S-E Behind Delta Crown Rm	AE03580
A/S-F MDF	AF01980
A/S-F Shuttle Car Bay	AF01981
A/S-F TE	AF01480
A/S-F TE	AF01680

Outlying Buildings

Canine Facility MDF	CF01114
Airfield Maintenance MDF	AF02209
Airfield Maintenance	AF02180
Fire Station MDF	FS01370
Customs Bldg MDF	CS01980
Economy Parking Garage	EP01980
EPG Admin Bldg	EP01180
EPG Phase 2 (by Orange Elevators)	EP01204
A-Sort	AS01107

Backbone Cable Designations

Backbone cable designations will be based on the near-end and far-end of the cable. For example, a backbone cable from the 71 foot level, D Core of the Terminal Building to the Airside A MDF will be designated “TB71880/AA01580.”

For backbone cables between telecommunications spaces within the same building, the building designation is dropped from the cable designation. For example, a cable between Airside A MDF and Airside A IDF-A will be designated “01580/01780.”
In general, the 1st part of the cable designation is defined as the near-end cable termination point and the 2nd part of the cable designation is defined as the far-end.

Cable labels will be placed no more than three (3) inches from each end of the cable.

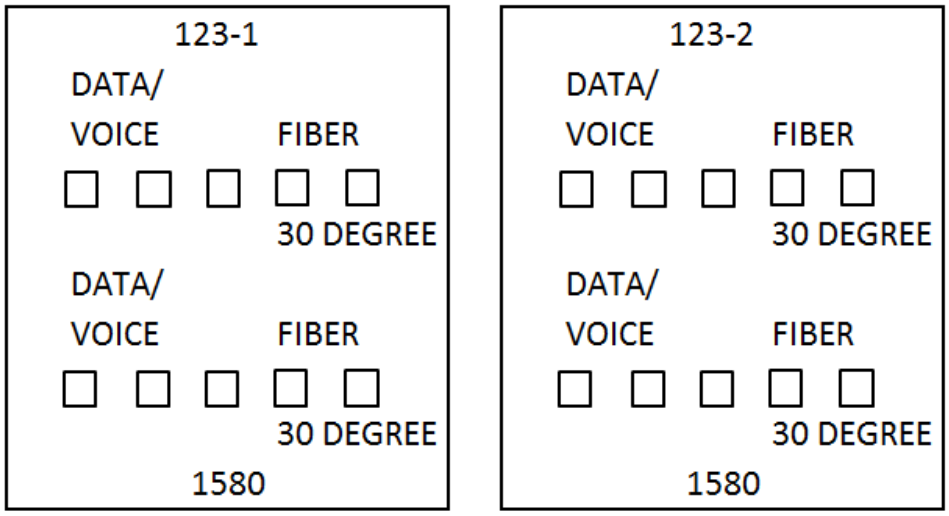
In cases where more than one cable exists between the same two points, the cable designation will include a modifier to indicate multiple cables, as in the following example:

1st Cable – AA01580/TB71880-1
2nd Cable – AA01580/TB71880-2

In cases where cables originating from different locations terminate in the same Telecommunications space, each cable will be terminated on a separate patch panel or wiring block.

Faceplates and Jacks

Faceplates will be labeled as illustrated on the following sketch:



In the above examples:

1. The faceplate labels include the faceplate identification number on the top, which consists of the room number (123) and the faceplate number in the room (-1) or (-2). In rooms with multiple faceplates, the numbering system begins with the first faceplate to the left of the entrance door, as you enter, and proceeds clockwise around the room.

2. The faceplate labeling also includes the identification of the Telecommunications Space (TS, wiring closet) in which the jacks terminate. Note that when labeling the faceplate, the two character building designation does not need to be applied.

3. Typically, there will be multiple jacks on each faceplate. Each jack on the faceplate will have a designation. Unused jacks will have “blanks’ inserted into their slots. On the double-gang faceplate shown above, the individual jacks will be identified (but not labeled on the faceplate) as follows:

Upper Left	123-1-1
Upper 2nd from Left	123-1-2
Upper 3rd from Left	123-1-3
Upper 4th from Left	123-1-4
Upper Right	123-1-5
Lower Left	123-1-6
Lower 2nd from Left	123-1-7
Lower 3rd from Left	123-1-8
Lower 4th from Left	123-1-9
Lower Right	123-1-10

4. The copper connections will be on jacks #2 and #7. Additional copper connections would go to jacks #1 and # 6 as needed.

5. The fiber connections will be on jacks #4 and #8.

6. Note that the Fiber connectors have a 30 Degree down slant on the faceplate.

The individual jack designations are not labeled on the faceplate due to space constraints. However, the jack designations are labeled in the Telecommunications Space on the appropriate patch panel or wiring block, as described below.

Each patch panel port will be labeled with the individual jack designation connected to each port. For example, the patch panel port connected to jack 123-1-1 will be labeled
12311. The hyphens and are deleted due to space constraints.

In telecommunications spaces with multiple patch panels, each patch panel is sequentially numbered beginning with number "1."

Wiring Blocks

66 blocks will be covered with industry standard color-coded covers as follows:

- Interbuilding Backbone Cable Green
- 1st Level Riser (Backbone) Cable White
- 2nd Level Riser (Backbone) Cable Gray
- Horizontal Cable Blue

66 block covers will be labeled with the cable designation and pair count. For example: Cable 01580/01780 – Pairs 1-50

110 blocks will be labeled with the same information as found on the 66 block covers.

Section 4 – Miscellaneous

4.1 Safety Risk Management

All projects will be required to proactively identify potential safety risks and include consideration of reasonable measures to mitigate known safety risks. During the design phase, the design professional will coordinate with the Authority's Project Team, Safety Management System (SMS) Manager and Risk Management Department via the Project Director, to make a professional assessment of the project's overall level of safety risk by classifying it into low, medium or high risk. A determination of "low risk" will require no further action. A determination of "medium risk" will require a recommendation by the design professional of measures that should be considered for inclusion into the design that results in an acceptable level of risk. A determination of "high risk" will require that formal action be taken by the design professional as part of the design to mitigate the level of risk via a Safety Risk Assessment and formal Risk Mitigation Plan that results in an acceptable level of risk. The design professional will continue engagement with the SMS Manager on an as-needed basis during the construction of the project to assure that risk management is tracking in accordance with the determinations made during the design phase.

4.2 Environmental Matters

Local, state, and federal regulatory agencies have established air and water quality standards which are in effect at the Authority's airports. The Authority provides criteria for dealing with potentially hazardous substances. Three topics include: property notifications, limitations on bringing hazardous substances onto construction projects, and a roadmap for managing pre-existing hazardous substance conditions on construction projects.

4.2.A Radon Gas and Other Property Condition Notifications

a. Radon Gas: In accordance with requirements of the State, the following notification statement will be included in all agreements relating to rental of real property. This is provided for information purposes only. Radon is a naturally occurring radioactive gas that, when it has accumulated in a building in sufficient quantities, may present health risks to

persons who are exposed to it over time. Levels of radon that exceed federal and state guidelines have been found in buildings in Florida. Additional information regarding radon and radon testing may be obtained from your county health department.

b. Other Property Conditions: Areas of Authority property are impacted by the past release of pollutants that are regulated by the FDEP. This is the result of historical airport operations, commercial and industrial activities that occurred prior to property acquisition, or naturally-occurring conditions. FDEP manages the State's site restoration program. FDEP requires site restoration to be commensurate with land use, public health and the environment. These provisions allow low levels of contaminants to remain in place and run with the land subject to the implementation of required controls including but not limited to property use restrictions, activity and use limitations, institutional controls, or engineering controls. At TPA, Authority worked with FDEP to develop Soil and Groundwater Use Regulations that memorialize these controls. The Soil Use Regulation provides a process for Authority to review and approve in advance all plans for soil excavation or disturbance. The Groundwater Use Regulation restricts drilling for water and requires that buildings used for human occupancy be piped to the public water system. Although the Soil and Groundwater Use Regulations apply to TPA, the same protections and standards are generally applied at all Authority property including the general aviation airports. As restoration projects are completed on Authority property, documents and maps are submitted to FDEP. FDEP maintains this information in an information repository that provides a self-service portal called Map Direct that allows map viewing and document download. Areas of Authority property that are undergoing a site restoration project, or have achieved a closed status, can be viewed in Map Direct. The Soil and Groundwater Use Regulations, and links to State radon protection maps and other property condition maps are posted on Authority website at www.TampaAirport.com > Learn about TPA > Airport Business > More Business Links – Radon Gas and Other Property Conditions.

4.2.B Hazardous Substance Limitations on Construction Projects

4.2.B.1 Design Phase Considerations

i. Provided below is a list of new product material classes that are not authorized on Authority property. The design professional will review the list and ensure the construction drawings and specifications are consistent with this requirement. If any exceptions are requested or necessary due to the project scope, the design professional will schedule a coordination meeting with the owner's representative.

4.2.B.2 Construction Phase Considerations

ii. Provided below is a list of new product material classes the contractor is not authorized to bring onto Authority property. Limited exceptions may be allowed; the contractor should schedule a coordination meeting with the owner's representative and design professional.

1. Asbestos: Incorporation of asbestos in the project is not permitted on Authority property.

2. Lead: Paint or primer containing lead is not permitted on Authority property.

3. PFAS: Products or materials containing per- and polyfluoroalkyl substances (PFAS) are not permitted on Authority property. The project team should work closely with the owner's representative if the project scope involves PFAS-related products including but not limited to fire protection equipment and supplies, foam, carpeting, etc. Any product or

material that contains PFAS will only be permitted if the design professional prepares an alternatives analysis to determine if a non-PFAS alternative product or material is viable. If a non-PFAS alternative is determined to be viable, it may be used pending Authority review and approval of the analysis.

4. Hazardous Substances: Products or materials containing hazardous substances or characteristics, as defined below, are not permitted on Authority property.

iii. Safety Data Sheets as required by law and pertaining to materials or substances used or consumed in the performance of the work, whether obtained by the design professional, contractor and/or tenant will be maintained at the worksite and made available to the owner's representative.

4.2.C Management of Existing Site Conditions

4.2.C.1 Design Phase Considerations

iv. Provided below is a list of potential pre-existing hazardous substances that could be encountered on Authority projects that the project team will review, investigate and plan for to ensure the project complies with applicable regulations. The design professional will review the list and ensure the construction drawings and specifications are consistent with this requirement. If any exceptions are requested or necessary the design professional will schedule a coordination meeting with the owner's representative.

v. The design professional will develop a plan to identify all potential occurrences of pre-existing hazardous substances to ensure worker and occupant/tenant safety, environmental, disposal, remediation and/or encapsulation requirements are met.

1. The design professional will schedule a coordination meeting with the owner's representative to discuss this matter and request any historical documents that may be available for review. The Authority will disclose information actually known to and in the possession of the Authority regarding the presence of pollutants, hazardous substances, or other environmental conditions at the project site. The Authority does not warrant the accuracy or completeness of any such information.

2. Depending on project-specific circumstances, the design professional will engage the services of a materials tester to assess field conditions. This includes but is not limited to asbestos surveys, indoor air quality/mold assessments, and lead field screening using a portable X-ray fluorescence (XRF) spectrometer. Other less common items that may warrant testing include petroleum products and metals, polychlorinated biphenyls (PCB), mercury-containing building elements and radioactive elements.

3. The owner's representative will be notified immediately if soil or groundwater contamination or any potential pre-existing hazardous substances listed below are identified on Authority property.

4.2.C.2 Construction Phase Considerations

vi. Provided below is a list of potential pre-existing hazardous substances that must be reviewed and possibly addressed during construction.

1. Asbestos: Asbestos is commonly found in buildings or underground in asbestos cement piping.

2. Lead: Lead-based paint and primer is commonly found in painted structural steel, stair railings, overhead signs and certain traffic paint.

3. PFAS: PFAS is commonly found in soil and groundwater, carpet products, and various firefighting and fire protection equipment and supplies including foam.

4. Hazardous Substances: Hazardous Substances include products or materials containing hazardous substances or characteristics, as defined below. Petroleum and metals contamination in soil and groundwater is included in this section.

5. Universal Wastes: Universal wastes commonly include used oil, batteries, mercury-containing equipment, mercury-containing lamps or bulbs, and fluorescent light ballasts that contain PCBs, pesticides and pharmaceuticals. For refence, the definition of universal waste is included in the definition of solid waste which is provided below.

vii. If after commencement of construction unexpected pre-existing hazardous substances are discovered, the contractor will schedule a meeting with the design professional and owner's representative.

viii. Contractors should assume that all waste material, including rubble and debris, and hazardous substances will be removed from the Airport at the contractor's expense. No hazardous substance waste material will be stored or relocated within the Airport complex. Burning on Airport property is prohibited.

4.2.D Definitions

4.2.D.1 Hazardous Substance Definition:

Hazardous Substances are defined as any substance that (i) the presence of which requires investigation, reporting, removal or remediation under any Environmental Law; (ii) that is or becomes defined as a "hazardous waste," "hazardous substance," "hazardous material," "extremely hazardous substance," or other type of pollutant or contaminant under any applicable Environmental Law; (iii) that is toxic, reactive, explosive, corrosive, flammable, radioactive, carcinogenic, mutagenic, teratogenic, or otherwise hazardous and is or becomes regulated by any applicable Environmental Law; (iv) that is or contains oil, gasoline, diesel fuel, aviation fuel, or other petroleum hydrocarbons, products or derivatives, other than petroleum, crude oil, and petroleum products to the extent contained within regularly operated motor vehicles; (v) that is or contains PCBs, asbestos, radon, urea formaldehyde or any substance that contains PFAS; (vi) that is fungi or bacterial matter which reproduces through the release of spores or the splitting of cells, including but not limited to, mold (including, without limitation, penicillium/aspergillus and stachybotrys chartarum), and Legionella (legionella pneumophila); or (vii) the presence of which causes or threatens to cause a nuisance upon the Property or to adjacent property or poses or threatens to pose a hazard to the health or safety of any person, to plant or animal life, or to the environment, including, but not limited to sewage sludge, industrial slag, solvents and/or any other similar substances or materials.

4.2.D.2 Solid Waste Including Universal Waste Definition

Solid Waste including Universal Waste is defined as any waste that is or becomes defined as a “solid waste”, “waste”, “special waste”, “garbage”, or “commercial solid waste” under any environmental law or any waste that can require special handling and management, including but not limited to, white goods, waste tires, used oil, lead-acid batteries, construction and demolition debris, ash residue, yard trash, biological wastes, pesticides, pharmaceuticals and mercury-containing devices and lamps; or any waste that is not hazardous waste and that is not prohibited from disposal in a lined landfill or yard trash, construction and demolition debris, processed tires, asbestos, carpet, cardboard, paper, glass, plastic, or furniture other than appliances.

4.3 Airfield Lighting Control and Monitoring System

Any modifications to the existing airfield lighting system or Navigation Aids at Tampa International Airport will require an update to the “Airfield Lighting Control and Monitoring System” (ALCMS). All modifications and/or updates to the ALCMS must be done by Eaton Crouse-Hinds, 1200 Kennedy Road Windsor, CT 06095, USA, (860) 683-4300. This will include any changes, modification or updates to the system software and hardware including monitoring equipment and system computers.

4.4 Design Quality Control / Assurance

Quality Assurance and Quality Control (QA/QC) throughout the design phase is critically important to the Authority and the success of each project. All submitted information shall receive the appropriate level of quality control review by the design professional. It shall not be the Authority’s responsibility to provide the level of review that is required by the design professional and their subconsultants.

1. The design professional and subconsultants will submit, adhere to, and document observance of their respective corporate design quality review processes and manuals.

2. The design professional shall develop and formally submit a project specific Quality Control Plan (QCP) which outlines their proposed quality control process, timeline and review team’s organization including names of proposed reviewers.

3. Formal design QA/QC reviews will be conducted and incorporated into each submittal and all associated deliverables by the design team at 30%, 60%, 90%, 100%, and bid document milestones. Documentation of the reviews conducted is required as part of each submittal.

4. The design reviews should focus on the organization, clarity, accuracy and completeness of the information presented. At a minimum, design reviews should address technical content, biddability, and constructability included in the drawings and specifications.

4.5 Construction Cost Estimating

Accuracy and timing of construction cost estimates by the design team is vital to the design development of each project so that cost reporting and potential adjustments related to budget and/or project scope can be considered by the Authority as the design progresses from conceptual to final.

1. Each cost estimate shall include, at a minimum:

    a. Submittals at milestones of 30%, 60%, 90%, 100%, and bid documents.

    b. Consideration of the time necessary in the project schedule to develop and QA/QC review the cost estimate prior to submittal to the Authority and commensurate with the associated milestone deliverable.

    c. Formatting of the estimate for comparison to the Authority’s Project Management Plan (PMP) estimate along with comparison to each previous estimate submitted along with comments

related to notable variances.

d. Quantity and unit price detail commensurate with the particular stage of design.

e. Below the line contingency amounts and percentages (e.g., escalation, design evolution, construction contingencies, etc.)

f. Recommendation of an appropriate owner's allowance to be carried in the project/bid based on the particulars of the project.

Appendix A - Main Terminal Public Restroom Criteria

Toilet Partitions
American Accessory
304 series stainless steel, diamond textured
Doors: 1" thick, 22 gauge stainless steel #4 finish
Panels: 1" thick, 22 gauge stainless steel #4 finish
Ceiling Hung Pilasters: 1 1/4" thick, 26 gauge stainless steel #4 finish

Ceramic Floor Tile
Manufacturer : Stone Peak
Pattern: Materia 3D Selection
Color: Sisal
Size: 12" x 24"
Thickness: 9 mm
Finish: Honed
Grout: Truecolor, Almond - H153/Coffee D-G28

Ceramic Wall Tile
Manufacturer: Stone Peak
Pattern: Materia 3D Selection
Color: Sisal
Size: 12" x 24"
Thickness: 9 mm
Finish: Lappato
Grout: Truecolor, Almond - H153/Coffee D-G28

Quartz Surface Material
Manufacturer: Dupont Zodiaq
Color: Galaxy Black
Size: 1 1/8" Thick

Water Closets
Manufacturer: Kohler
Model: K-4323
Flush Valve: Zurn ZEMS6000 AV

Urinal
Manufacturer: Kohler
Model: UT104E

Lavatories
Sink: Kohler Verticyl K-2882
Color: 0-White
Faucet: Kohler K-13463
Soap Dispenser: Sloan SJS-1750 Foam

Toilet Accessories
Partition Mounted Seat-Cover Dispenser, Sanitary Napkin Disposal, Toilet Tissue Dispenser:

- Bobrick B-3571

Recessed Seat-Cover Dispenser, Sanitary Napkin Disposal, Toilet Tissue Dispenser:

- Bobrick B-3574

Recessed Seat-Cover and Toilet Tissue Dispenser

- Bobrick B-3474

Recessed Paper Towel Dispenser
- Bobrick B-35903

Recessed Paper Towel Dispenser and Waste Receptacle
- Bobrick B-3803

Recessed Napkin/Tampon Vendor
- Bobrick B-37063

Custom Paper Towel Dispenser/Mirror Combination Unit
- American Accessories, Inc. Maryland Series MD-1 Modified for TIA
- Bobrick B

Angle Mirror
- American Accessories Arkansas Series AR-Mirror 17.125" x 46"
- American Accessories Arkansas Series AR-Mirror 36" x 86"

Robe Hook
- Bobrick B-6716 Surface Mounted

Partition Door Stop
- Jack Knob 4153, Pilaster Mounted

Grab Bar
- Bobrick B-6806x48 48" stainless steel
- Bobrick B-6806x36 36" stainless steel

Fold Down Shower Seat
- Health Craft WS-36 SerenaSeat

Sharps Disposal
- Sharps Compliance, Inc. Items #50030, 10101, 50026

Electric Hand Dryer
- Dyson Airblade Model AB-02

Baby Changing Station
- Koala Kare Products Model KB110-SSRE Recess Mounted

Under Vanity Waste Receptacle
- American Accessories WA-7 modified

EXHIBIT C
SCRUTINIZED COMPANY CERTIFICATION

Tampa International Airport

Hillsborough County Aviation Authority
PO Box 22287
Tampa, FL 33622
Telephone. 813-870-8700

This certification is required pursuant to Florida Statute Section 287.135.

A company that, at the time of bidding or submitting a proposal for a new contract or renewal of an existing contract for goods or services of $1 million or more, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in Iran Terrorism Sectors List or that has business operations in Cuba or Syria, is ineligible for, and may not bid on, submit a proposal/response for, or enter into or renew a contract/agreement with an agency or local governmental entity.

A company that, at the time of bidding or submitting a proposal for a new contract or renewal of an existing contract for goods or services of any amount, participating in a boycott of Israel is ineligible for, and may not bid on, submit a proposal/response for, or enter into or renew a contract/agreement with an agency or local governmental entity.

Company: Comco Communication Installations & Service CO. Inc.		
Address: 4581 62nd Ave N,		
City: Pinellas Park,	State: FL	Zip Code: 33781
Phone: 727-522-3477	Email: mike@comcoinc.net	
Federal ID Number: 59-3154487		

I, Michael C Bugner, as a representative of Comco Communication Installations & Service CO. Inc., certify and affirm that, subject to the dollar limitations set forth in Florida Statute Section 287.135, this company is not on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in Iran Terrorism Sectors List, does not have business operations in Cuba or Syria, and is not participating in a boycott of Israel.

Signature

President
Title

Michael C Bugner
Printed Name

1-19-2026
Date

EXHIBIT D

Affidavit of Compliance with Anti-Human Trafficking Laws

In accordance with Section 787.06 (14), Florida Statutes, the undersigned, on behalf of COMCO Communication Installation and Service Company, Inc. ("Company"), hereby attests under penalty of perjury that the Company:

1. Does not use coercion for labor or services as defined in Section 787.06, Florida Statutes.

The undersigned is authorized to execute this Affidavit on behalf of Company.

Date: 1-19, 2026 Signed: _____

Entity: Comco Communication Installations & Service CO. Inc. Name: Michael C Bugner

Title: President