CONTRACT FOR ON-CALL CONSTRUCTION

THIS CONTRACT FOR ON-CALL CONSTRUCTION ("**Contract**") is made and entered into as of the date stated on the City's signature page below (the "**Effective Date**") by and between the **CITY AND COUNTY OF DENVER**, a municipal corporation of the State of Colorado acting on behalf of its Department of Aviation (the "**City**"), and **SERVITECH, INC.,** a Colorado corporation ("**Contractor** ") (collectively the "**Parties**").

W I T N E S S E T H

WHEREAS, the City, for at least three (3) consecutive days, advertised that proposals would be received for furnishing all labor, tools, supplies, equipment, materials and everything necessary and required for the construction and installation of the work described in Request for Proposal No. 202579856, On-Call Inside/Outside Plant Telecom Project (the "**Project**") at Denver International Airport ("**DEN**"); and

WHEREAS, proposals in response to said advertisement have been received by the Chief Executive Officer of DEN (the "**CEO**"), and Contractor's proposal was selected for award; and

WHEREAS, Contractor is qualified, willing, and able to perform the work in accordance with its proposal and the Contract Documents defined below;

NOW, THEREFORE, for and in consideration of the compensation to be paid by the City to Contractor and subject to the terms of this Contracts, the Parties agree as follows:

CONTRACT DOCUMENTS

It is agreed by the Parties that the instruments, drawings, and documents described below and whether attached to and bound with this Contract or not (the "**Contract Documents**"), are incorporated into the Contract by this reference, and are as fully a part of this Contract as if they were set out here verbatim and in full:

- Contract
- Task Order(s)
- Building Information Modeling ("**BIM**") if applicable
- Change Directives
- Change Orders
- Appendix 1 Federal Appendices
- Exhibit A Scope of Work
- Exhibit B Equal Employment Opportunity Provisions
- Exhibit C Insurance Requirements
- Exhibit D Prevailing Wage Schedules
- Exhibit E Special Conditions

- Exhibit F Standard Specifications for Construction General Contract Conditions (2011 Edition) (the "**Yellow Book**") ("**General Conditions**") (Table of Contents attached as Exhibit F)
- Exhibit G Payment and Performance Bonds
  Exhibit H Request for Proposals and Contractor's Response to Request for Proposal and Forms
- Exhibit I Schedule of Rates and Markups
- Exhibit J Task Proposals and Execution Process
- Exhibit K EDI Plan
- Exhibit L Design Standards Manual – Communication and Electronic Systems

In the event of an irreconcilable conflict between a provision of Sections 1 through 32 of this Contract document and any other provisions of the Contract Documents such that it is impossible to give effect to both, the order of precedence to determine which document shall control to resolve such conflict is as follows, in descending order:

1. Appendix 1 Federal Appendices
2. Contract
3. Task Orders
4. Change Directives
5. Change Orders
6. Exhibit A Scope of Work
7. Exhibit J Task Proposals and Execution Process
8. Exhibit B Equal Employment Opportunity Provisions
9. Exhibit E Special Conditions
10. Exhibit L Design Standards Manual – Communication and Electronic Systems
11. Exhibit F Standard Specifications for Construction General Contract Conditions (2011 Edition) (the "**Yellow Book**") ("**General Conditions**") (Table of Contents attached as Exhibit F)
12. Exhibit C Insurance Requirements
13. Exhibit D Prevailing Wage Schedules
14. Exhibit I Schedule of Rates and Markups
15. Exhibit K EDI Plan
16. Exhibit H Request for Proposals and Contractor's Response to Request for Proposal and Forms
17. Exhibit G Payment and Performance Bond
18. Building Information Modeling ("**BIM**") if applicable

The remaining order of precedence is established in General Conditions Title 4.

1. SCOPE OF WORK:

A. Contractor shall furnish all labor and tools, supplies, equipment, superintendence, materials, and everything necessary for and required to do, perform, and complete all of the work described, drawn, set forth, shown, and included in the Scope of Work, attached as ***Exhibit A***, the Task Orders issued pursuant to this Contract, and the Contract Documents (the "**Work**").

B. Task Orders. The Project Manager will issue task orders for work to be completed under this Contract ("**Task Orders**"), and the Task Order process is specified in ***Exhibit J***. The terms of each Task Order may include but are not limited to information regarding schedule, staffing, and pricing. In the City's sole discretion, the Project Manager may elect to directly solicit or competitively procure the work under each Task Order. Bids for such Task Orders shall be submitted as required by the City, including as specified in ***Exhibit J*** and may not necessarily require utilization of the rates and markups in ***Exhibit I***. Changed work in competitively bid Task Orders will utilize the rates and markups in ***Exhibit I*** unless otherwise specified in a Task Order**.**

C. Hardware and Software. After receiving a written Task Order, the Contractor will furnish, in accordance with a delivery schedule agreed to by the City and Contractor, all of the technical, administrative and consulting services and other labor; all office supplies and materials, printing, vehicles, local travel, office space and facilities, testing and analyses, calculations, and any other facilities or resources required to install, test, and validate the correct and intended operation of all Hardware and Software described in any Task Order issues pursuant to ***Exhibit A***.

D. Direct Tenant Services. The City reserves the right to coordinate Premises Wire Communication System ("**PWCS**") installation services on behalf of tenants and direct tenants to use authorized Inside/Outside plant Contractors for those projects that modify the PWCS. Coordination activities may include design, scope of work formulation, written task order preparation, review of bid submittals, and inspection activities for a specific project effort to ensure that modifications to the PWCS infrastructure are acceptable to the City. For these instances, payment for services will come directly from the tenant to the awarded On-Call Professional Inside/Outside Plant Telecommunications Contractor. The City shall not be liable for any payment of services, taxes, late charges or penalties of any nature related to these services. The City shall not engage in any dispute resolution between the awarded Contractor and the tenant. All work by the Contractor under this provision shall still comply with Tenant Design Guidelines, Airport Technical Specifications, Airport Rules and Regulations, and DEN Premises Wire Communications Standards. City reserves the right to participate in customer acceptance of work product and direct Contractor to bring installed items up to compliance with PWCS standards upon discovery of discrepancy. Awarded Contractor for a specific project that is deemed "Direct Tenant Services" will need to define fees and terms of payment upfront with the requesting tenant. Notice to proceed with work will only come from requesting tenant after mutually accepted fee and payment terms are agreed to between the Contractor and the tenant. Billing rates applied to "Direct Tenant Services" shall not exceed rates called out in this Contract. All work product related to additions/changes/modifications to the PWCS infrastructure under this provision will still become property of the City upon completion. When performing Direct Tenant Services, the Contractor will provide weekly updates to designated DEN PWCS Project Manager as to the progress of discovered issues with regards to the specific job. When performing a Direct Tenant Service job on behalf of the PWCS Operations group, the Contractor agrees to comply with all standards requirements as defined in "Part 40 – Conduct of Commercial Operators Using the Airport" specifically 40.21 Telecommunications.

2. TERM OF CONTRACT:

A. The Term of this Contract shall commence on the Effective Date and shall expire five (5) years from the Effective Date, unless terminated in accordance with the terms stated herein (the "**Expiration Date**"). If, at the Expiration Date, there remains any outstanding Work to be completed under a validly issued Task Order, the Senior Vice President of Business Technology Office, in his or her sole discretion, may direct the Contractor to complete the Work in accordance with the terms and conditions of the Task Order and this Contract.

B. Contractor agrees to begin the performance of the work required under this Contract or any individual Task Order within ten (10) days after being notified to commence work by the Senior Vice President of Business Technologies Office (the "**SVP**") and agrees to fully complete the Work described in each Task Order in its entirety within the time frame established for the Task Order. This period of performance for each Task Order is also referred to as "**Contract Time**." The Contractor is not authorized to commence work prior to its receipt of each Task Order or Notice to Proceed, if one is provided for in a Task Order.

3. TERMS OF PAYMENT:

A. The City agrees to pay Contractor for the performance and completion of all of the Work required by the Scope of Work, each authorized Task Order and the Contract Documents, and Contractor and the City shall not be liable under the terms of this Contract for an amount in excess of a total amount of **Fifteen Million Dollars and Zero Cents** (**$15,000,000.00**) (the "**Maximum Contract Amount**"). Contractor acknowledges that this Contract is an On-Call Contract and there is no obligation for the City to issue any Task Orders under this Contract.

B. In no event will the City's entire liability under this Contract exceed the Maximum Contract Amount, as adjusted by duly authorized Change Orders in accordance with this Contract. The Parties specifically agree that any performance by Contractor hereunder shall not subject the City to any cost, charge, or fee not specified in this Contract.

C. Rates and Markups. The Schedule of Rates and Markups is set forth in ***Exhibit I***. Certain initial hourly rates, including any applicable multiplier, are set forth in ***Exhibit I.*** The Project Manager, in his or her sole discretion, may annually adjust these hourly rates and the Hourly Rate for Allowances on which these hourly rates charged to the City are calculated, on the anniversary of the Effective Date through a Task Order applicable to future work as further provided in the Task Order. Hourly rate adjustments shall not exceed the Denver-Aurora-Lakewood Consumer Price Index issued by the U.S. Department of Labor, Bureau of Labor Statistics.

4. VERIFIED STATEMENT OF CLAIMS:

Colorado Revised Statutes § 38-26-107 ("**C.R.S.**") requires that, in the event any person or company files a verified statement of amounts due and unpaid in connection with a claim for labor and materials supplied on this project, the City shall withhold from payments to Contractor sufficient funds to insure the payment of any such claims. Should the City be made a party to any lawsuit to enforce such unpaid claims or any lawsuit arising out of or relating to such withheld

funds, Contractor agrees to pay to the City its costs and a reasonable attorney's fee incurred in any such lawsuit. Because the City Attorney Staff does not bill the City for legal services on an hourly basis, Contractor agrees a reasonable fee shall be computed at the rate of two hundred dollars and no cents ($200.00) per hour of City Attorney time.

5. DISPUTES:

All disputes arising under or related to this Contract shall be resolved by administrative hearing under the procedures described in ***Exhibit F***, as modified by ***Exhibit E***, if any, and the Denver Revised Municipal Code § 5-17 ("**D.R.M.C**.") and all related rules and procedures, including but not limited to DEN Rule 250. The determination resulting from said administrative hearing shall be final, subject only to Contractor's right to appeal the determination under Colorado Rule of Civil Procedure, Rule 106.

6. DEFENSE AND INDEMNIFICATION:

A. To the fullest extent permitted by law, Contractor hereby agrees to defend, indemnify, reimburse and hold harmless City, its appointed and elected officials, agents and employees for, from and against all liabilities, claims, judgments, suits or demands for damages to persons or property arising out of, resulting from, or related to the work performed under this Contract that are due to the negligence or fault of Contractor or Contractor's agents, representatives, subcontractors, or suppliers ("**Claims**"). This indemnity shall be interpreted in the broadest possible manner consistent with the applicable law to indemnify the City.

B. Contractor's duty to defend and indemnify City arise at the time written notice of the Claim is first provided to the City regardless of whether suit has been filed and even if Contractor is not named as a Defendant.

C. Contractor will defend any and all Claims which may be brought or threatened against the City and will pay on behalf of the City any expenses incurred by reason of such Claims including, but not limited to, court costs and attorney's fees incurred in defending and investigating such Claims or seeking to enforce this indemnity obligation, including but not limited to time expended by the City Attorney Staff, whose costs shall be computed at the rate specified in Section 5. Such payments on behalf of the City shall be in addition to any other legal remedies available to City and shall not be considered the City's exclusive remedy.

D. Insurance coverage requirements specified in this Contract shall in no way lessen or limit the liability of Contractor under the terms of this indemnification obligation. Contractor shall obtain, at its own expense, any additional insurance that it deems necessary for the City's protection in the performance of this Contract.

E. This defense and indemnification obligation shall survive the expiration or termination of this Contract.

7. WAIVER OF C.R.S. § 13-20-801, *et seq.*:

Notwithstanding any other provision of this Contract, Contractor specifically waives all of the provisions of C.R.S. §§ 13-20-801 *et seq*. as they may relate to Contractor's performance under this Contract.

8. LIQUIDATED DAMAGES:

If Contractor fails to achieve Substantial Completion of the Work pursuant to each Task Order within the Contract Time or fails to substantially complete the Work described in the Scope of Work or any Task Order within the time set forth in the Special Conditions or the applicable Task Order, the City will suffer substantial damages, which damages would be difficult to accurately determine. The Parties hereto have considered the possible elements of damages and have agreed that the amount of liquidated damages for Contractor's failure to substantially complete the work pursuant to each Task Order within the Contract Time shall be specified in the Task Order. If Contractor shall fail to pay such liquidated damages promptly upon demand therefor, the Surety on its Performance Bond and Payment Bond shall pay such damages. Also, the City may withhold all, or any part of, such liquidated damages from any payment due Contractor. Additional provisions relating to liquidated damages are set forth in the Construction Contract General Conditions and Special Conditions.

9. INSURANCE REQUIREMENTS:

A. Contractor shall obtain and keep in force all of the minimum insurance coverage forms and amounts set forth in ***Exhibit C*** ("**Insurance Requirements**") during the entire Term of this Contract, including any extensions of the Contract or other extended period stipulations stated in ***Exhibit C***. All certificates of insurance must be received and accepted by the City before any airport access or work commences.

B. Contractor shall ensure and document that all subcontractors performing services or providing goods hereunder procure and maintain insurance coverage that is appropriate to the primary business risks for their respective scopes of performance. At minimum, such insurance must conform to all applicable requirements of DEN Rules and Regulations Part 230 and all other applicable laws and regulations.

C. The City in no way warrants or represents the minimum limits contained herein are sufficient to protect Contractor from liabilities arising out of the performance of the terms and conditions of this Contract by Contractor, its agents, representatives, employees, or subcontractors. Contractor shall assess its own risks and maintain higher limits and/or broader coverage as it deems appropriate and/or prudent. Contractor is not relieved of any liability or other obligations assumed or undertaken pursuant to this Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration, or types.

D. In no event shall the City be liable for any of the following: (i) business interruption or other consequential damages sustained by Contractor; (ii) damage, theft, or destruction of Contractor's inventory, or property of any kind; or (iii) damage, theft, or destruction of an automobile, whether or not insured.

E. The Parties understand and agree that the City, its elected and appointed officials, employees, agents and volunteers are relying on, and do not waive or intend to waive by any provisions of this Contract, the monetary limitations and any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*., or otherwise available to the City, its elected and appointed officials, employees, agents and volunteers.

10. CONTRACT BINDING:

It is agreed that this Contract shall be binding on and inure to the benefit of the Parties hereto, their heirs, executors, administrators, assigns, and successors.

11. SEVERABILITY:

If any part, portion, or provision of this Contract shall be found or declared null, void, or unenforceable for any reason whatsoever by any court of competent jurisdiction or any governmental agency having authority thereover, only such part, portion, or provision shall be affected thereby and all other parts, portions, and provisions of this Contract shall remain in full force and effect.

12. ASSIGNMENT:

Contractor shall not assign, pledge or transfer its duties, obligations, and rights under this Contract, in whole or in part, without first obtaining the written consent of the CEO or their authorized representative. Any attempt by Contractor to assign or transfer its rights hereunder without such prior written consent shall, at the option of the CEO or their authorized representative, automatically terminate this Contract and all rights of Contractor hereunder.

13. APPROPRIATIONS:

Payment will be in accordance with the provisions of the Contract Documents, including Title 9 of the General Conditions, and will be made solely and exclusively from funds appropriated and otherwise lawfully made available for the purposes of this Contract from the Airport System Funds. The City has no obligation to make payments from any other fund or source or to make additional appropriations or allocations to such fund to satisfy such costs or other obligations.

14. APPROVALS:

In the event this Contract calls for the payment by the City of Five Million Dollars and no cents ($5,000,000.00) or more, approval by the Denver City Council, acting by Resolution in accordance with Section 3.2.6 of the Charter of the City and County of Denver, is and shall be an express condition precedent to the lawful and binding execution and performance of this Contract.

15. JOINT VENTURE:

If Contractor is a Joint Venture, the partners to the Joint Venture shall be jointly and severally liable to the City for the performance of all duties and obligations of Contractor which are set forth in the Contract.

16. NO DISCRIMINATION IN EMPLOYMENT:

In connection with the performance of work under the Contract, the Contractor may not refuse to hire, discharge, promote, demote, or discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, ethnicity, citizenship, immigration status, gender, age, sexual orientation, gender identity, gender expression, marital status, source of income, military status, protective hairstyle, or disability. The Contractor shall insert the foregoing provision in all subcontracts.

17. COORDINATION OF SERVICES:

Contractor agrees to perform its work under this Contract in accordance with the operational requirements of DEN, and all work and movement of personnel or equipment on areas included within the DEN site shall be subject to the regulations and restrictions established by the City or its authorized agents.

18. COMPLIANCE WITH ALL LAWS AND REGULATIONS:

A. Contractor and its subcontractor(s) shall perform all work under this Contract in compliance with all existing and future applicable laws, rules, regulations, and codes of the United States and the State of Colorado and with the City Charter, ordinances, Executive Orders, and rules and regulations of the City.

B. Contractor shall perform all work in compliance with Executive Order 123 regarding Sustainability as may be directed by the City, including the requirement that all new City buildings and major renovations will be certified to the applicable LEED Gold Certification, with the goal of achieving LEED Platinum where economically feasible. Contractor also shall comply with all applicable DEN design and construction standards, including the DEN Design Standards Manuals, which are attached herein as ***Exhibit L***. Current versions can be found at: https://business.flydenver.com/bizops/bizRequirements.asp.

19. PREVAILING WAGE REQUIREMENTS:

A. Contractor shall comply with, and agrees to be bound by, all requirements, conditions and determinations of the City regarding the Payment of Prevailing Wages Ordinance, D.R.M.C. §§20-76 through 20-79, including, but not limited to, the requirement that every covered worker working on a City-owned or leased building or on City-owned land shall be paid no less than the prevailing wages and fringe benefits in effect on the date the bid or request for proposal was advertised. In the event a request for bids, or a request for proposal, was not advertised, Contractor shall pay every covered worker no less than the prevailing wages and fringe benefits in effect on the date funds for the Contract were encumbered.

Date bid or proposal issuance was advertised: September 18. 2025.

A. Prevailing wage and fringe rates will adjust on the yearly anniversary of the actual date of bid or proposal issuance, if applicable, or the date of the written encumbrance if no bid/proposal issuance date is applicable. Unless expressly provided for in this Contract, Contractor will receive no additional compensation for increases in prevailing wages or fringe rates.

B. Contractor shall provide the Auditor of the City and County of Denver with a list of all subcontractors providing any services under the Contract.

C. Contractor shall provide the Auditor with electronically-certified payroll records for all covered workers employed under the Contract in a manner specified by the Auditor.

D. Contractor shall prominently post at the work site the current prevailing wage and fringe rates. The posting must inform workers that any complaints regarding the payment of prevailing wages or fringe benefits may be submitted to the Denver Auditor by calling 720-913-5000 or emailing auditor@denvergov.org.

E. If Contractor fails to pay workers as required by the Prevailing Wage Ordinance, Contractor will not be paid until documentation of payment satisfactory to the Auditor has been provided. The Auditor may enforce the Prevailing Wage Ordinance in a manner provided by law, including the Prevailing Wage Ordinance. The City also may, by written notice, suspend or terminate work if Contractor fails to pay required wages and fringe rates.

20. NON-EXCLUSIVE RIGHTS:

This Contract does not create an exclusive right for Contractor to perform the work described herein at the Airport. The City may, at any time, award other contracts to other contractors or consultants for the same or similar services to those described herein. In the event of a dispute between Contractor and any other party at DEN, including DEN itself, as to the privileges of the parties under their respective contracts, DEN shall determine the privileges of each party and Contractor agrees to be bound by DEN's decision.

21. CITY PROMPT PAYMENT:

A. Unless otherwise provided in this Contract, the City will make monthly progress payments to the Contractor for all services performed under this Contract based upon the Contractor's monthly invoices and in compliance with the General Conditions, as they may be modified in this Contract. The City's Prompt Payment Ordinance, D.R.M.C. §§ 20-107 to 20-118 applies to invoicing and payment under this Contract.

B. Final Payment to the Contractor shall not be made until after the Project is accepted, and all certificates of completion, record drawings and reproducible copies are delivered to the City, and the Contract is otherwise fully performed by the Contractor. In addition to retention, the City may, at the discretion of the Director, withhold reasonable amounts from billing and the entirety of the final payment until all such requirements are performed to the satisfaction of the Director.

C. Prompt Pay of MWBE Subcontractors. For contracts of one million dollars ($1,000,000.00) and over to which D.R.M.C. § 28-72applies, the Contractor is required to comply with the Prompt Payment provisions under D.R.M.C. § 28-72, with regard to payments by the Contractor to MWBE subcontractors. The Contractor shall make payment by no later than thirty-five (35) days from receipt by the Contractor of the subcontractor's invoice.

22. OWNERSHIP AND DELIVERABLES:

Upon payment to Contractor, all records, data, deliverables, and any other work product prepared by Contractor or any custom development work performed by Contractor for the purpose of performing this Contract on or before the day of payment for such work shall become the sole property of the City. Upon request by the City, or based on any schedule agreed to by Contractor and the City, Contractor shall provide the City with copies of the data/files that have been uploaded to any database maintained by or on behalf of Contractor or otherwise saved or maintained by Contractor as part of the services provided to the City under this Contract. All such data/files shall be provided to the City electronically in a format agreed to by the Parties. Contractor also agrees to allow the City to review any of the procedures Contractor uses in performing any work or other obligations under this Contract, and to make available for inspection any and all notes, documents, materials, and devices used in the preparation for or performance of any of the scope of work, for up to six (6) years after termination of this Contract. Upon written request from the City, Contractor shall deliver any information requested pursuant to this Section within ten (10) business days in the event a schedule or otherwise agreed-upon timeframe does not exist.

23. COLORADO OPEN RECORDS ACT:

A. Contractor acknowledges that the City is subject to the provisions of the Colorado Open Records Act ("**CORA**"), C.R.S. §§ 24-72-201 *et seq*., and Contractor agrees that it will fully cooperate with the City in the event of a request or lawsuit arising under such act for the disclosure of any materials or information which Contractor asserts is confidential or otherwise exempt from disclosure. Any other provision of this Contract notwithstanding, all materials, records, and information provided by Contractor to the City shall be considered confidential by the City only to the extent provided in CORA, and Contractor agrees that any disclosure of information by the City consistent with the provisions of CORA shall result in no liability of the City.

B. In the event of a request to the City for disclosure of such information, time and circumstances permitting, the City will make a good faith effort to advise Contractor of such request in order to give Contractor the opportunity to object to the disclosure of any material Contractor may consider confidential, proprietary, or otherwise exempt from disclosure. In the event Contractor objects to disclosure, the City, in its sole and absolute discretion, may file an application to the Denver District Court for a determination of whether disclosure is required or exempted. In the event a lawsuit to compel disclosure is filed, the City may tender all such material to the court for judicial determination of the issue of disclosure. In both situations, Contractor agrees it will either waive any claim of privilege or confidentiality or intervene in such legal process to protect materials Contractor does not wish disclosed. Contractor agrees to defend, indemnify, and hold harmless the City, its officers, agents, and employees from any claim, damages, expense, loss, or costs arising out of Contractor's objection to disclosure, including

prompt reimbursement to the City of all reasonable attorney's fees, costs, and damages the City may incur directly or may be ordered to pay by such court, including but not limited to time expended by the City Attorney Staff, whose costs shall be computed at the rate of two hundred dollars and no cents ($200.00) per hour of City Attorney time.

24. EXAMINATION OF RECORDS AND AUDITS:

A. Any authorized agent of the City, including the City Auditor or his or her representative, has the right to access and the right to examine, copy and retain copies, at City's election in paper or electronic form, any pertinent books, documents, papers and records related to Consultant's performance pursuant to this Agreement, provision of any goods or services to the City, and any other transactions related to this Agreement. Consultant shall cooperate with City representatives and City representatives shall be granted access to the foregoing documents and information during reasonable business hours and until the latter of three (3) years after the final payment under the Agreement or expiration of the applicable statute of limitations. When conducting an audit of this Agreement, the City Auditor shall be subject to government auditing standards issued by the United States Government Accountability Office by the Comptroller General of the United States, including with respect to disclosure of information acquired during the course of an audit. No examination of records and audit pursuant to this paragraph shall require Parties to make disclosures in violation of state or federal privacy laws. Parties shall at all times comply with D.R.M.C. 20-276.

B. Additionally, Contractor agrees until the expiration of six (6) years after the final payment under this Contract , any duly authorized representative of the City, including the CEO or their representative, shall have the right to examine any pertinent books, documents, papers and records of Contractor related to Contractor's performance of this Contract, including communications or correspondence related to Contractor's performance, without regard to whether the work was paid for in whole or in part with federal funds or was otherwise related to a federal grant program.

C. In the event the City receives federal funds to be used toward the services performed under this Contract, the Federal Aviation Administration ("**FAA**"), the Comptroller General of the United States and any other duly authorized representatives shall have access to any books, documents, papers and records of Contractor which are directly pertinent to a specific grant program for the purpose of making audit, examination, excerpts and transcriptions. Contractor further agrees that such records will contain information concerning the hours and specific services performed along with the applicable federal project number.

25. COMPLIANCE WITH DENVER WAGE LAWS:

To the extent applicable to the Contractor's provision of Services hereunder, the Contractor shall comply with, and agrees to be bound by, all rules, regulations, requirements, conditions, and City determinations regarding the City's Minimum Wage and Civil Wage Theft Ordinances, Sections 58-1 through 58-26 D.R.M.C., including, but not limited to, the requirement that every covered worker shall be paid all earned wages under applicable state, federal, and city law in accordance with the foregoing D.R.M.C. Sections. By executing this Agreement, the Contractor

expressly acknowledges that the Contractor is aware of the requirements of the City's Minimum Wage and Civil Wage Theft Ordinances and that any failure by the Contractor, or any other individual or entity acting subject to this Agreement, to strictly comply with the foregoing D.R.M.C. Sections shall result in the penalties and other remedies authorized therein.

26. COMPLIANCE WITH MINORITY/WOMEN BUSINESS ENTERPRISE REQUIREMENTS:

A. This Agreement is subject to Article V of Chapter 28, Denver Revised Municipal Code ("**D.R.M.C.**"), designated as §§ 28-117 to 28-199 (the "**Goods and Services Ordinance**"); and any Rules and Regulations promulgated pursuant thereto. The Contractor's Goal Commitment to MWBE participation for this Agreement is 21% as stipulated in the Division of Small Business Opportunity's ("**DSBO**") Commitment to MWBE Participation Form submitted by the Contractor. Contractor shall comply with the Equity, Diversity and Inclusion Plan attached as **Exhibit K** ("**EDI Plan**") and as it may be modified in the future by DSBO. Unless a separate Utilization Plan is required by DSBO, the EDI Plan shall constitute the Utilization Plan required by D.R.M.C. § 28-129.

B. Under § 28-132, D.R.M.C., the Contractor has an ongoing, affirmative obligation to maintain for the duration of this Agreement, at a minimum, compliance with the MWBE participation upon which this Agreement was awarded, unless there is a change in the work by the City under § 28-133, D.R.M.C. The Contractor acknowledges that:

(i) If directed by DSBO, the Contractor is required to develop and comply with an approved Utilization Plan and the requirements therein, in accordance with § 28-129(c), D.R.M.C. Along with the Utilization Plan requirements, the Contractor must establish and maintain records and submit regular reports, as directed by DSBO, which will allow the City to assess progress in complying with the Utilization Plan and achieving the MWBE requirement. The Utilization Plan is subject to modification by DSBO.

(ii) If contract modifications are issued under the Agreement, whether by amendment or otherwise, the Contractor shall have a continuing obligation to promptly inform DSBO in writing of any agreed upon increase or decrease in the scope of work of such contract, upon any of the bases under § 28-133, D.R.M.C., regardless of whether such increase or decrease in scope of work has been reduced to writing at the time of notification of the change to the City.

(iii) If there are changes in the work that include an increase in scope of work under this Agreement, whether by amendment or otherwise, which increases the dollar value of the contract, whether or not such change is within the scope of work designated for performance by an MWBE at the time of contract award, such change or modification shall be immediately submitted to DSBO for notification purposes.

(iv) Those amendments or other modifications that involve a changed scope of work that cannot be performed by existing subcontractors shall be subject to the original requirement on the contract. The Contractor shall satisfy such requirement with respect to

the changed scope of work by soliciting new MWBEs in accordance with §§ 28-133, D.R.M.C. The Contractor must also satisfy the requirements under §§ 28-128 and 28-136, D.R.M.C., with regard to changes in MWBE scope or participation. The Contractor shall supply to DSBO all required documentation under §§ 28-128, 28-133, and 28-136, D.R.M.C., with respect to the modified dollar value or work under the contract.

(v) If applicable, for contracts of one million dollars ($1,000,000.00) and over, the Contractor is required to comply with § 28-135, D.R.M.C., regarding prompt payment to MWBEs. Payment to MWBE subcontractors shall be made by no later than thirty-five (35) days after receipt of the MWBE subcontractor's invoice.

(vi) Termination or substitution of an MWBE subcontractor requires compliance with § 28-136, D.R.M.C.

(vii) Failure to comply with these provisions may subject the Contractor to sanctions set forth in § 28-139 of the Goods and Services Ordinance.

(viii) Should any questions arise regarding DSBO requirements, the Contractor should consult the Goods and Services Ordinance or may contact the designated DSBO representative at (720) 913-1999.

27. SENSITIVE SECURITY INFORMATION:

Contractor acknowledges that, in the course of performing its work under this Contract, Contractor may be given access to Sensitive Security Information ("**SSI**"), as material is described in the Code of Federal Regulations, 49 C.F.R. Part 1520. Contractor specifically agrees to comply with all requirements of the applicable federal regulations, including but not limited to, 49 C.F.R. Parts 15 and 1520. Contractor understands any questions it may have regarding its obligations with respect to SSI must be referred to DEN's Security Office.

28. DEN SECURITY:

A. Contractor, its officers, authorized officials, employees, agents, subcontractors, and those under its control, shall comply with safety, operational, or security measures required of Contractor or the City by the FAA or TSA. If Contractor, its officers, authorized officials, employees, agents, subcontractors or those under its control, fail or refuse to comply with said measures and such non-compliance results in a monetary penalty being assessed against the City, then, in addition to any other remedies available to the City, Contractor shall fully reimburse the City any fines or penalties levied against the City, and any attorney fees or related costs paid by the City as a result of any such violation. Contractor must pay this amount within fifteen (15) days from the date of the invoice or written notice. Any fines and fees assessed by the FAA or TSA against the City due to the actions of Contractor and/or its agents will be deducted directly from the invoice for that billing period.

B. Contractor is responsible for compliance with Airport Security regulations and 49 C.F.R. Parts 1542 (Airport Security) and 14 C.R.F. Parts 139 (Airport Certification and Operations). Any and all violations pertaining to Parts 1542 and 139 resulting in a fine will be

passed on to and borne by Contractor. The fee/fine will be deducted from the invoice at time of billing.

29. FEDERAL RIGHTS:

A. This Contract is subject and subordinate to the terms, reservations, restrictions and conditions of any existing or future contracts between the City and the United States, the execution of which has been or may be required as a condition precedent to the transfer of federal rights or property to the City for airport purposes, and the expenditure of federal funds for the extension, expansion or development of the Airport System. It also is subject to the terms below and in Appendix 1 to this Contract.

(i) General Civil Rights: Contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal Assistance. This provision binds Contractor and subcontractors from the bid solicitation period through the completion of the Contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

(ii) Federal Fair Labor Standards Act: This Contract incorporates by reference the provisions of 29 C.F.R. Part 201, the Federal Fair Labor Standards Act ("FLSA"), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers. Contractor agrees to incorporate by reference the provisions of FLSA in all contracts and subcontracts resulting from this Contract. Contractor has full responsibility to monitor compliance to the referenced regulation. Contractor must address any claims or disputes arising from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

(iii) Occupational Safety and Health Act: This Contract incorporates by reference the requirements of 29 C.F.R. Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. Contractor retains full responsibility to monitor its compliance and any subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 C.F.R. Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

(iv) Contractor covenants it will include the provisions of this section in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Federal Acts, Regulations and directives issued pursuant thereto. Contractor covenants it will take action with respect to any subcontract or procurement as the City or the FAA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, Contractor may request

the City to enter into any litigation to protect the interests of the City. In addition, Contractor may request the United States to enter into the litigation to protect the interests of the United States.

30. CITY EXECUTION OF CONTRACT:

This Contract is expressly subject to, and shall become effective upon, the execution of all signatories of the City and, if required, the approval of Denver City Council. This Contract may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same.

31. ELECTRONIC SIGNATURES AND ELECTRONIC RECORDS:

The Contract, and any other documents requiring a signature hereunder, may be signed electronically by the City and/or Contractor in the manner specified by the City. The Parties agree not to deny the legal effect or enforceability of the Contract solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Contract in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

[SIGNATURE PAGES FOLLOW]

Contract Control Number: PLANE-202683150-00
Contractor Name: SERVITECH, INC.

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at Denver, Colorado as of:

SEAL

CITY AND COUNTY OF DENVER:

ATTEST:

By: _____

_____

APPROVED AS TO FORM:

Attorney for the City and County of Denver

By: _____

REGISTERED AND COUNTERSIGNED:

By: _____

By: _____

Contract Control Number: PLANE-202683150-00
Contractor Name: SERVITECH, INC.

By: 806E7F7B2C0645F... Monika Stenger DocuSigned By: Monika Stenger

Name: Monika Stenger
(please print)

Title: PRESIDENT
(please print)

ATTEST: [if required]

By: _____

Name: _____
(please print)

Title: _____
(please print)

Appendix No. 1

Standard Federal Provisions

GENERAL CIVIL RIGHTS PROVISIONS

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin, creed, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

COMPLIANCE WITH NONDISCRIMINATION REQUIREMENTS:

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:

1. **Compliance with Regulations:** The Contractor (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 herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the 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. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21 including any amendments thereto.
3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The Contractor 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 Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to
   a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
   b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Sponsor to enter into any litigation to protect the interests of the Sponsor. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

TITLE VI LIST OF PERTINENT NONDISCRIMINATION ACTS AND AUTHORITIES

During the performance of this contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- 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);

- 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;

- 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);

- 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);

- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq.*) (prohibits discrimination on the basis of age);

- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);

- The Civil Rights Restoration Act of 1987 (P.L. 100-259) (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);

- Titles II and III of the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, et seq) (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) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;

- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681, et seq).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

Contractor is responsible for complying with the Federal Fair Labor Standards Act and for monitoring compliance by its subcontractors. Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

Inside / Outside Plant Telecommunications Infrastructure On call Professional Services

Exhibit A – Scope of Work

DENVER INTERNATIONAL AIRPORT

Table of Contents

1. Glossary

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials International
BICSI	Building Industry Consulting Service International
BT	Business Technologies
City/DEN	the City & County of Denver / Denver International Airport
Contractor	Primary service provider and it's sub-contracting providers
EIA	Electronics Industries Alliance
EMT	Electrical Magnetic Tubing
ePDU	Power Distribution Unit
HVAC	Heating, Ventilating and Air Conditioning
IDF	Intermediate Distribution Frame room
I/O Plant	Inside and Outside structured cabling and infrastructure
IT	Information Technology
MDF	Main Distribution Frame
NEC	National Electric Code
NECA	National Electrical Contractors Association
NEMA	National Electric Manufacturers Association
NFPA	National Fire Protection Association
OHSA	Occupational Safety & Health Administration
PWCS	Premise Wiring Communications Service / System
RFP	Request for Proposal
SME	Subject Matter Expert
TIA	Telecommunications Industry Association
TO	Task Order
UL	Underwriters Laboratories
UPS	Uninterrupted Power Source
WO	Work Order

2. Introduction

Denver International Airport (DEN) is an agency of the City and County of Denver. DEN owns and operates a comprehensive telecommunications infrastructure used to transport data, video, voice, and other electronic technologies and services throughout its 53-square mile campus. This infrastructure consists of approximately fifty miles of duct bank and pathways that carry more than 16,000 linear miles of copper and fiber-optic backbone and horizontal cabling. It connects more than 180 defined MDF/IDF rooms with two datacenter locations, which together support the information technology needs of

thousands of end users and IT devices across the campus. This infrastructure includes electronic systems such as telecommunications cable infrastructure, CAT 3/6+ cable, single-mode and multimode fiber optic cable, twisted pair copper, and coaxial cable, along with network, compute, and storage facilities.

Equipment includes closed-circuit cameras, airfield lighting control, vehicle gate controllers, UHF/VHF radio systems, security access control systems including biometrics, fire alarm systems, computers/computer networks, PLC control and signaling systems, and other electronic/electrical systems.

The Business Technologies Division PWCS team is responsible for supporting the IT infrastructure at DEN. Supporting this infrastructure often involves leveraging additional resources and services for used on an On-Call basis.

Via this scope of work, the awardee will collaborate with DEN staff on the design and installation of inside and outside structured cabling systems and associated infrastructure. These skills include experience in Inside/Outside Plant Telecommunications Infrastructure Engineering, Construction, Installation, Professional Services, and technical staffing disciplines.

3. Task Orders and Work Orders Based Model

Contractors will perform all work efforts under a defined “Task Order / Work Order” based model.

- A written scope of work will accompany each effort and, when applicable, a conceptual drawing.
- Efforts may follow a formal competitive BID process or be directly awarded at the discretion of DEN.
- All contractors will be requested to provide a reasonable cost estimate for all assigned work before proceeding.
    - BID / Estimates may include:
        - Materials - All necessary parts and materials are on a per-task basis for each effort / assigned work.
        - Labor
        - Design / Permit fees
    - Formal “Notice to Proceed” (NTP) on all efforts will be based on the supporting Purchase Order (PO) from DEN Finance being in place.
- Once an effort has been authorized, DEN or the Contractor may engage the services of experienced telecommunications firms to execute and coordinate multiple competitive estimates for the cost of task/work.
- DEN reserves the right to review estimates provided by the Contractor’s sub-contract firms as part of the task order authorization process or as change requests are made from the Contractor to DEN.
    - All sub-contract firms leveraged in the service delivery must be disclosed to DEN.

- The Contractor assumes responsibility and liability for each sub-contract firm used in each authorized task / work effort.
- All sub-contract firms are required to abide by all City and / or DEN regulations.

- The Contractor will be required to track all labor incurred and materials used on a real time basis.
  - Payment will be based on services rendered.
    - Efforts that exceed the original BID estimate will require a formal change order notification and DEN approval prior to exceeding the original BID estimate.
    - Efforts that fall short of the original BID estimate will be paid out based on the actual labor and materials used.
  - DEN may authorize progress payments for efforts of extended duration.

New Construction

These efforts will require collaboration with DEN staff and management by the Contractor. In this role, the firm will serve as a consultant and construction manager for DEN.

Contractors will be required to follow published DEN Standards, including DEN Division One and Orange Book standards, Professional Industry Norms and Standards, ANSI, ASTM, BICSI, EIA, EMT, HVAC, NEC, NECA, NEMA, and UL.

Contractors must comply with all applicable county, state, and federal laws and regulations.

Contractors may be requested to participate in:

- Performing new construction and/or augmenting existing structures, including excavation and trenching, duct bank, direct-buried methods, directional boring, aerial solutions, wireless systems, or other industry-acceptable methods as required.
- Constructing and/or enhancing existing high-capacity backbone and access layer horizontal runs of copper cable, fiber optic cable, and transmission or termination equipment.
- Executing new construction and/or enhancement of high-voltage electrical infrastructure connections, cables, and equipment, including conduit as necessary.
- Construction of standalone communications buildings, internal buildings, manholes, vaults, and Distribution Frame rooms, including foundations and concrete or other structural components, appropriate HVAC, and electrical systems that may be required to support telecommunications equipment
- Ability to program UPS and ePDUs used across the DEN campus.
- Location and/or relocation of existing cable infrastructure.
- Install and terminate data circuit connections, following DEN-approved standards.
- Performing installation and placement on equipment of the IT infrastructure leveraged across the DEN campus. Ex. Computing Hardware, Network Hardware, Telephony / Communications Hardware, and Video Hardware.
- Ensure staffing and / or supplement the workforce as needed to guarantee timely delivery of services and/or administration and project management for authorized projects. This administrative work shall involve attending construction meetings, inspecting installed work, coordinating with related trades, and resolving issues that arise during construction.

Contractors may be responsible for providing:

- DEN defined industry-standard telecommunication racks and bays, cable raceways, termination blocks, bulkheads, and electrical surge and lightning protection; termination and certification of copper and/or optical communication cables.
- Conduit installation, fiber termination and splicing, large-scale outdoor communication plant installation, and electrical power.
- All installations must adhere to DEN and industry standards, including the necessary certification and labeling.
- AutoCAD, Bluebeam, or other specified drawing support as determined by DEN, provided by qualified individuals.
- All work shall be captured and incorporated into the DEN master cable management system.
- DEN reserves the right to specify the exact manufacture and part numbers of materials to be used, ensuring that all installed infrastructure meets minimum standards and aligns with DEN sparing plans.
- Provide and maintain to DEN Business Technologies the As-Built documentation of all communications infrastructure installations, including design, test results, electrical load measures and HVAC specifications, electrical and communications cabling, and rack layouts, for efforts authorized under this SOW.
- Revisions to existing drawings and produce new drawings affected by or involved in a new project. These drawings shall be created or modified in electronic form and delivered in electronic and hard copy form to the DEN City as-built records archive. Where an existing drawing is involved, the Contractor shall obtain a current copy of the drawing in electronic form, incorporate revisions, and return the drawing to the as-built archive with a new revision level. All drawings at DEN are currently available in AutoCAD® DWG and/or Bluebeam format.

Repair and Maintenance of existing IT infrastructure

Contractors may be asked to participate in the repair and maintenance of existing IT infrastructure.

Contractors must follow published DEN Standards, including those of DEN Division One and Orange Book, Professional Industry Norms and Standards, ANSI, ASTM, BICSI, EIA, EMT, HVAC, NEC, NECA, NEMA, and UL.

Contractors must adhere to all applicable Denver County, State, and Federal laws and regulations.

Contractors may be requested to participate in:

- Location and/or repair or relocation of existing cable infrastructure.
- Move-Add-Change actions to existing IT infrastructure.
- System optimization services.
- The decommission and removal of legacy IT infrastructure.

Professional Services / Supplemental Technical Staff

Throughout the term of this scope of work, the Contractor may be asked to provide additional technical staff resources to the DEN Business Technologies team in a supplemental support role. These resources will assist with the ongoing operational maintenance and support of the DEN IT infrastructure.

- This work will also be authorized and performed under a defined Task / Work Order.

4. Qualifications / Special Items / Additional Requirements

As an awardee of this contract, each firm commits to the following criteria:

HAS a minimum of 10 years of experience in the design and installation of inside and outside structure cabling systems.

- Minimum of 5 years of experience for Onsite Project Management staff
- Minimum of 1 year of experience for Onsite Technical staff

IS qualified, skilled in and able to support the industry standard telecommunications infrastructure leveraged at DEN.

IS REQUIRED to provide an overview of their Project Management and Organizational approach and methods for delivering on the requirements in this Scope of Work.

WILL BE REQUIRED to participate in and be able to perform all work defined in this Scope of Work and associated Task/Work Orders.

DEN ***WILL NOT*** reimburse any firm for certifications and training costs related to a given technology leveraged at DEN.

- Non-proprietary technologies: Each firm is expected to be trained and or certified in the non-proprietary technologies leveraged at DEN at contract signature.
- Proprietary technologies: DEN will coordinate and facilitate training sessions with local SMEs; however, the staff time for these training sessions will not be reimbursed by DEN—training for proprietary technologies to be coordinated post-award and contract signature.

WILL PROVIDE all equipment necessary to perform the duties required to deliver task/work functions, such as construction equipment and implements, staff vehicles – carts/trucks, testing equipment, and tools.

IS certified in Confined Space Entry and Procedures following OSHA and local government safety standards and regulations. Versed in the City and County of Denver Building Department Permits process for Electrical, and Access Control permitting. As well as possessing applicable certifications and licenses as required by Professional Industry Norms and Standards; ANSI, ASTM, BICSI, EIA, EMT, HVAC, NEC, NECA, NEMA, UL.

IS skilled and experienced in installing and using Dura-Line Micro Duct / Future Path technologies for fiber cabling and associated products.

IS skilled and experienced in the installation of and use of “Blown” Fiber technologies and associated products.

IS skilled and experienced in relevant Optical Fiber splicing techniques:

- Fusion Splicing
- Mechanical Splicing

IS skilled and experienced in Cable and Duct Location Services

- The utilities at DEN are covered under a blanket locate agreement for incidental jobs. The Contractor shall provide on-site cable locating support to augment the current DEN locate service provider in situations where cable depth must be determined or where direct buried facilities which fall outside of the provider service must be located. In addition, the Contractor's locate capability will be used to meet delivery schedules of move, add, change or repair service.

DEN reserves the right to request that the Contractor staff up or staff down work orders and task orders to ensure that enough resources are available to deliver services under this statement of work.

All work products performed under this statement of work by the Contractor become the property of DEN.

Inside/Outside plant contractors are not allowed to work directly for airlines, tenants, and concessions without DEN's knowledge.

Any work performed outside this scope of work on behalf of airline, tenants and concessionaires is to be performed in accordance with published DEN Standards; including DEN Division One and Orange Book standards, Professional Industry Norms and Standards; ANSI, ASTM, BICSI, EIA, EMT, HVAC, NEC, NECA, NEMA, UL.

All work that modifies or touches the Premises Wire Communications System, including the use of pathways and spaces outside of leasehold spaces, must be reviewed and approved by DEN personnel prior to starting work. Inside/Outside plant Contractors who violate this term will have their access permissions revoked and removed from the job site.

The Contractor will be required to report on the progress of all work under this statement of work, as requested. City personnel will communicate the report format to the Contractor as part of the task order issued for the scope of work.

Internal DEN processes and procedures shall apply and be complied with for those efforts governed by work orders issued under this statement of work. Task order work shall be governed by individual scopes issued by the City and existing standards governing the PWCS infrastructure.

5. Rate Schedule

- Rate Schedule / Materials Markup – Exhibit I Rate Schedule INSIDE OUTSIDE PLANT form provided
    - Each firm has provided the fully loaded hourly rate for each position for the 5 year contract term. Items such as back-office staffing / support and other benefits should be predetermined and included in your published rate schedule.
    - Published rates should also include a reasonable forecast/estimate of a cost-of-living increase were applicable.
    - At DEN's direction, the vendor maybe asked to procure specific materials necessary to complete a Task Order. DEN acknowledges that there may be a reasonable fee/markup associated with procuring materials on DENs behalf, please define that rate.

CITY AND COUNTY OF DENVER
RULES AND REGULATIONS AND BID
CONDITIONS OF THE
MANAGER OF PUBLIC WORKS

PERTAINING TO EQUAL EMPLOYMENT OPPORTUNITY
IN THE CITY AND COUNTY OF DENVER

APPROVED FOR LEGALITY:	APPROVED AND ADOPTED:
/s/_____	/s/_____
Attorney for the City and County of Denver	Manager of Public Works

Adopted and Published Pursuant to Article 111, Division 2 of Chapter 28
the Revised Municipal Code
of the City and County of Denver

These Rules and Regulations cancel and supersede any and all previous issued Rules and Regulations on the subject

RULES AND REGULATIONS
REGARDING
EQUAL EMPLOYMENT OPPORTUNITY

Promulgated and adopted by the Manager of Public Works pursuant to and by authority of Article III, Division 2, Chapter 28 of the Revised Municipal Code of the City and County of Denver, and for the purpose of insuring that contractors. subcontractors and suppliers soliciting and receiving compensation for contract work from or through the City and County of Denver provide equal opportunity in employment without regard to race, color, creed, sex, national origin, age, religion, marital status, political opinion or affiliation or mental or physical handicap and meet certain requirements for the hiring' training promotion and treatment during employment of members of ethnic groups subjected to differential treatment , including persons of African descent (Black), Spanish-surnamed (Hispanic), Asian-American and American Indian groups.

RULE I
DEFINITIONS

A. "City" means the City and County of Denver.
B. "Manager" shall mean the Manager of Public Works for the City and County of Denver.
C. "Contract" means a contract entered into with the City and County of Denver, financed in whole or in part by local resources or funds of the City and County of Denver, for the construction of any public building or prosecution or completion of any public work.
D. "Contractor" means the original party to a contract with the City and County of Denver, also referred to as the "general" or "prime" contractor.
E. "Director" means the Director of the Mayor's Office of Contract Compliance.
F. "Subcontractor" means any person company, association, partnership, corporation, or other entity which assumes by subordinate agreement some or all of the obligations of the general or prime contractor.
G. The Phrase "Bidding Specifications" as used in Article 111, Division 2 of Chapter 28 of the Revised Municipal Code shall include BID CONDITION, INVITATION TO BID AND NOTICE OF PROPOSAL.
H. "Affirmative Action Program" means a set of specific and result-oriented procedures or steps to which a contractor commits himself to apply every good faith effort to employ members of ethnic minority groups, to include persons of African descent (Black), Spanish surnamed (Hispanic), Asian-American, American Indians, and persons with mental or physical handicap.
I. "Mayor's Office of Contract Compliance" means the City agency established pursuant to Article III, Division 1 of Chapter 28 of the Denver Revised Municipal Code.

RULE II
NOTICE OF HEARING

When results of conciliation efforts are unsatisfactory to the Manager and he is informed in accordance with Article III, Division 2 of Chapter 28 of the Revised Municipal Code that a contractor or subcontractor has apparently failed to meet affirmative action and equal employment opportunity requirements after a reasonable period of notice to correct deficiencies, the Manager will, prior to imposition of any sanctions, afford the general contractor a hearing in order to determine whether the contractor or his subcontractors have failed to comply with the affirmative action and equal employment opportunity requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or of the contract. Written notice of such hearing shall be delivered personally or sent by certified mail return receipt requested, to the contractor and to any subcontractor involved at least ten days prior to the date scheduled for the hearing.

RULE III
HEARING

A. Contractors will appear at hearings and may be represented by counsel, and may present testimony orally and other evidence.
B. Hearings shall be conducted by one or more hearing examiners designated as such by the Manager.
C. The Director of the Mayor's Office of Contract Compliance may participate in hearings as a witness.
D. Hearings shall be held at the place specified in the notice of hearing.
E. All oral testimony shall be given under oath or affirmation and a record of such proceedings shall be made.
F. All hearings shall be open to the public.
G. The hearing officer shall make recommendations to the Manager who shall make a final decision.

REGULATIONS

REGULATION NO. 1. **ORDINANCE**: The Rules and Regulations of the Manager shall be inserted in the bidding specifications for every contract for which bidding is required.

REGULATION NO. 2. **EXEMPTIONS:** Each contract and subcontract, regardless of dollar amount, shall be subject to affirmative action requirements unless specifically exempted in writing individually by the Manager. Exemptions apply only to "affirmative action" in equal employment opportunity, and are not to be construed as condonation in any manner of "discrimination" or "discriminatory practices" in employment because of race, color, creed sex age national origin, religion, marital status, political opinion or mental or physical handicap.

REGULATION NO. 3. DIRECTOR OF CONTRACT COMPLIANCE: The Director of the Mayor's Office of Contract Compliance shall perform the duties assigned to such official by Article III, Division 2 of Chapter 28 of the Revised Municipal Code and by the Manager. (1) The Director of the Mayor's Office of Contract Compliance or designated representatives shall inform. bidders and contractors of affirmative action procedures, programs, and goals in accordance with the ordinance at pre-bid and pre-construction conference; (2) make regular on-site inspections; (3) supply contractors and subcontractors with report forms to be completed by them when requested, and furnished to the Director of the Mayor's Office of Contract Compliance; and (4) review payroll records, employment records and practices of general contractors and their subcontractors and suppliers during the performance of any contract. The Director of the Mayor's Office of Contract Compliance shall promptly report apparent affirmative action deficiencies to the Manager.

REGULATION NO. 4. GOALS AND TIMETABLES: In general, goals and timetables should take into account anticipated vacancies and the availability of skills in the market place from which employees should be drawn. In addition, where discrimination in employment by a general contractor or any of his subcontractors is indicated, a corrective action program will take into account the need by the general contractor and his subcontractors to correct past discriminatory practices and reach goals of minority manpower utilization on a timely basis through such recruiting and advertising efforts as are necessary and appropriate.

REGULATION NO.5. AWARD OF CONTRACTS: It shall be the responsibility of the Director of the Mayor's Office of Contract Compliance to determine the affirmative action capability of bidders, contractors and subcontractors and to recommend to the Manager the award of contracts to those bidders, contractors and subcontractors and suppliers who demonstrate the ability and willingness to comply with the terms of their contract.

REGULATION NO. 6. PUBLICATION AND DUPLICATION: Copies of these Rules and Regulations as amended by the Manager from time to time, shall as soon as practicable and after Notice being published will be made a part of all City Contracts.

REGULATION NO. 7. NOTICE TO PROCEED: Prior to issuance of Notice to Proceed a sign-off will be required of the Director of the Mayor's Office of Contract Compliance or his designee.

REGULATION NO. 8. CONTRACTS WITH SUBCONTRACTORS: To the greatest extent possible the contractor shall make a good faith effort to contract with minority contractors, subcontractors and suppliers for services and supplies by taking affirmative actions which include but are not limited to the following:

1. Advertise invitations for subcontractor bids in minority community news media.
2. Contact minority contractor organizations for referral of prospective subcontractors.
3. Purchase materials and supplies from minority material suppliers.

REGULATION NO. 9. AGENCY REFERRALS: it shall be no excuse that the union with which the contractor or subcontractor has an agreement providing for referral, exclusive or otherwise, failed to refer minority employees.

REGULATION NO. 10. CLAUSES: The Manager shall include the appropriate clauses in every contract and the contractor shall cause to be inserted in every subcontract the appropriate clauses:

1. **APPENDIX A:** City and County of Denver Equal Opportunity Clause-ALL CONTRACTS funded only with City & County of Denver monies.
2. **APPENDIX B:** Equal Opportunity Clause (11246)-ALL FEDERAL ASSISTED
3. **APPENDIX C:** Section 3-Assurance of Compliance-HUD ASSISTED PROJECTS.
4. **APPENDIX D:** Section 3-Clause-HUD ASSISTED PROJECTS.

All amendments to the appendices shall be included by reference.

REGULATION NO. 11. SHOW CAUSE NOTICES: When the Manager has reasonable cause to believe that a contractor has violated Article III, Division 2 of Chapter 28 of the Revised Municipal Code, he may issue a notice requiring the contractor to show cause, within fifteen days why enforcement procedures, or other appropriate action to insure compliance, should not be instituted.

REGULATION NO. 12. BID CONDITIONS-AFFIRMATIVE ACTION REQUIREMENTS- EQUAL EMPLOYMENT OPPORTUNITY:

1. **APPENDIX E:**
   The Bid Conditions- Affirmative Action Requirements-Equal Employment Opportunity as amended and published by the U.S. Department of Labor, Employment Standards Administration, Office of Federal Contract Compliance, shall be inserted verbatim for bidding specification for every non-exempt contract involving the use of Federal funds.

2. **APPENDIX F:**
   The Bid Conditions- Affirmative Action Requirements-Equal Employment Opportunity as published by the Department of Public Works, City and County of Denver shall be inserted verbatim as bidding specifications for every non-exempt contract using City funds.

APPENDIX A

CITY AND COUNTY OF DENVER EQUAL OPPORTUNITY CLAUSE-ALL CONTRACTS

1. The contractor will not discriminate against any employee or applicant for employment because of race creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection f6r training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided, advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. Each contractor will comply with all provisions of Article III, Division 2, Chapter 28 of the Revised Municipal Code, and the rules, regulations, and relevant orders of the Manager and Director.
5. The contractor will furnish all information and reports required by Article III, Division 2, Chapter 28 of the Revised Municipal Code, and by rules, regulations and orders of the Manager and Director or pursuant thereto, and will permit access to his books, records, and accounts by the Manager, Director or their designee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations or orders this contract may be cancelled, terminated., or suspended in whole or in part and the contractor may be declared ineligible for further City contracts in accordance with procedures authorized in Article III, Division 2, Chapter 28 of the Revised Municipal Code, or by rules, regulations, or order of the Manager.
7. The contractor will include Regulation 12 Paragraph 2 and the provisions of paragraphs (1) through (6) in every subcontract or purchase order unless, exempted by rules, regulations, or orders of the Manager issued pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, so that such provisions will be binding upon each subcontractor or suppliers. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

The applicant further agrees to be bound by the above equal opportunity clauses with respect to its own employment practices when it participates in City contracts. The contractor agrees to assist and cooperate actively with the Manager and the Director in obtaining compliance of subcontractors and suppliers with the equal opportunity clause and the rules, regulations and relevant orders of the Manager, and will furnish the Manager and the Director such information as they may require for the supervision of compliance, and will otherwise assist the Manager and Director in the discharge of the City's primary responsibility for securing compliance. The contractor further agrees to refrain from entering into any contract or contract modification subject to Article III, Division 2, Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who has not demonstrated eligibility for, City contracts.

The contractor will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the Manager and Director. In addition, the contractor agrees that failure or refusal to comply with these undertakings the Manager may take any or all of the following actions:

A. Cancellation, termination, or suspension in whole or in part of this contract.
B. Refrain from extending any further assistance to the applicant under the program with respect to which the failure occurred until satisfactory assurance of future compliance has been received from such applicant.
C. Refer the case to the City Attorney for appropriate legal proceedings.

SUBCONTRACTS: Each prime contractor or subcontractor shall include the equal opportunity clause in each of its subcontracts.

APPENDIX F
BID CONDITIONS
AFFIRMATIVE ACTION REQUIREMENTS
EQUAL EMPLOYMENT OPPORTUNITY

For all Non-Exempt Construction Contracts to be Awarded by
the City and County of Denver, Department of Public Works

NOTICE

EACH BIDDER, CONTRACTOR OR SUBCONTRACTOR (HEREINAFTER THE CONTRACTOR) MUST FULLY COMPLY WITH THE REQUIREMENTS OF THESE BID CONDITIONS AS TO EACH CONSTRUCTION TRADE IT INTENDS TO USE ON THIS CONSTRUCTION CONTRACT, AND ALL OTHER CONSTRUCTION WORK (BOTH CITY AND NON-CITY) IN THE DENVER AREA DURING THE PERFORMANCE OF THIS CONTRACT OR SUBCONTRACT. THE CONTRACTOR COMMITS ITSELF TO THE GOALS FOR MINORITY MANPOWER UTILIZATION, AS APPLICABLE, AND ALL OTHER REQUIREMENTS, TERMS AND CONDITION OF THESE BID CONDITIONS BY SUBMITTING A PROPERLY SIGNED BID.

THE CONTRACTOR SHALL APPOINT A COMPANY EXECUTIVE TO ASSUME THE RESPONSIBILITY FOR THE IMPLEMENTATION OF THE REQUIREMENTS, TERMS AND CONDITIONS OF THESE BID CONDITIONS.

EULOIS CLECKLEY
Manager of Public Works
City and County of Denver

A. REQUIREMENTS --AN AFFIRM ATIVE ACTION PLAN:

Contractors shall be subject to the provisions and requirements of these bid conditions including the goals and timetables for minority' and female utilization, and specific affirmative action steps set forth by the Office of Contract Compliance. The contractor's commitment to the goals for minority, and female utilization as required constitutes a commitment that it will make every good faith effort to meet such goals.

1. **GOALS AND TIMETABLES**:

The goals and timetables for minority[1] and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade are as follows:

GOALS FOR MINORITY PARTICIPATION FOR EACH TRADE	GOALS FOR FEMALE PARTICIPATION FOR EACH TRADE
From January 1, 1982 to 21.7% - 23.5% Until Further Notice	From January 1, 1982 to 6.9% Until Further Notice

The goals for minority and female utilization above are expressed in terms of hours of training and employment as a proportion of the total number of hours to be worked by the contractor's aggregate workforce, which includes all supervisory personnel, in each trade, on all projects for the City and County of Denver during the performance of its contract (i.e., The period beginning with the first day of work on the City and County of Denver funded construction contract and ending with the last day of work).

The hours of minority and female employment and training must be substantially uniform throughout the length of the contract in each trade and minorities and females must be employed evenly on each of a contractor's projects. Therefore, the transfer of minority or female employees from contractor to contractor or from project to project for the purpose of meeting the contractor's goals shall be a violation of these Bid Conditions.

If the contractor counts the nonworking hours of apprentices they must be employed by the contractor during the training period; the contractor must have made a commitment to employ apprentices at the completion of their training subject to the availability of employment opportunities; and the apprentices must be trained pursuant to training programs approved by the Bureau of Apprenticeship and Training.

[1] "Minority" is defined as including, Blacks, Spanish Surname Americans, Asian-Americans, and American Indians, and includes both men and Minority women.

2. **SPECIFIC AFFIRMATIVE ACTION STEPS**:

No contractor shall be found to be in noncompliance solely on account of its failure to meet its goals, but will be given an opportunity to demonstrate that the contractor has instituted all the specific affirmative action steps specified and has made every good faith effort to make these steps work toward the attainment of its goals within the timetables, all to the purpose of expanding minority and female utilization in its aggregate workforce. A contractor, who fails to comply with its obligation under the Equal Opportunity Clause of its contract and fails to achieve its commitments to the goals for minority and female utilization has the burden of proving that it has engaged in an Affirmative Action Program directed at increasing minority and female utilization and that such efforts were at least as extensive and as specific as the following:

a. The contractor should have notified minority and female organizations when employment opportunities were available and should have maintained records of the organization's response.
b. The contractor should have maintained a file of the names and addresses of each minority and female referred to it by any individual or organization and what action was taken with respect to each such referred individual, and if the individual was not employed by the contractor, the reasons. If such individual was sent to the union hiring hall for referral and not referred back by the union or if referred, not employed by the contractor, the file should have documented this and their reasons.
c. The contractor should have promptly notified the Department of Public Works, and Mayor's Office of Contract Compliance when the union or unions with which the contractor has collective bargaining agreements did not refer to the contractor a minority or female sent by the contractor, or when the contractor has other information that the union referral process has impeded efforts to meet its goals.
d. The contractor should have disseminated its EEO policy within its organization by including it in any employee handbook or policy manual; by publicizing it in company newspapers and annual reports and by advertising such policy at reasonable intervals in union publications. The EEO policy should be further disseminated by conducting staff meetings to explain and discuss the policy; by posting of the policy; and by review of the policy with minority and female employees.
e. The contractor should have disseminated its EEO policy externally by informing and discussing it with all recruitment sources; by advertising in news media, specifically including minority and female news media; and by notifying and discussing it with all subcontractors.
f. The contractor should have made both specific and reasonably recurrent written and oral recruitment efforts. Such efforts should have been directed at minority and female organizations, schools with substantial minority and female enrollment, and minority and female recruitment and training organizations within the contractor's recruitment area.

g. The contractor should have evidence available for inspection that all tests and other selection techniques used to select from among candidates for hire, transfer, promotion, training, or retention are being used in a manner that does not violate the OFCCP Testing Guidelines in 41 CFR Part 60-3.
h. The contractor should have made sure that seniority practices and job classifications do not have a discriminatory effect.
i. The contractor should have made certain that all facilities are not segregated by race.
j. The contractor should have continually monitored all personnel activities to ensure that its EEO policy was being carried out including the evaluation of minority and female employees for promotional opportunities on a quarterly basis and the encouragement of such employees to seek those opportunities.
k. The contractor should have solicited bids for subcontracts from available minority and female subcontractors engaged in the trades covered by these Bid conditions, including circulation of minority and female contractor associations.

NOTE: The Director and the Mayor's Office of Contract Compliance will provide technical assistance on questions pertaining to minority and female recruitment sources, minority and female community organizations, and minority and female news media upon receipt of a request for assistance from a contractor.

3. **NON-DISCRIMINATION**:
In no event may a contractor utilize the goals and affirmative action steps required in such a manner as to cause or result in discrimination against any person on account of race, color, religion, sex, marital status, national origin, age, mental or physical handicap, political opinion or affiliation.

4. **COMPLIANCE AND ENFORCEMENT**:
In all cases, the compliance of a contractor will be determined in accordance with its obligations under the terms of these Bid Conditions. All contractors performing or to perform work on projects subject to these Bid Conditions hereby agree to inform their subcontractors in writing of their respective obligations under the terms and requirements of these Bid Conditions, including the provisions relating to goals of minority and female employment and training.

A. **Contractors Subject to these Bid Conditions**:
In regard to these Bid Conditions, if the contractor meets the goals set forth therein or can demonstrate that it has made every good faith effort to meet these goals, the contractor shall be presumed to be in compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, the implementing regulations and its obligations under these Bid Conditions. In the event, no formal sanctions or proceedings leading toward sanctions shall be instituted unless the contracting or administering agency otherwise determines that the contractor is violating the Equal Opportunity Clause.

1. Where the Office of Contract Compliance finds that a contractor failed to comply with the requirements of Article 111, Division 2, Chapter 28 of the Revised Municipal

Code or the implementing regulations and the obligations under these Bid Conditions, and so informs the Manager, the Manager shall take such action and impose such sanctions, which include suspension, termination, cancellation, and debarment, as may be appropriate under the Ordinance and its regulations. When the Manager proceeds with such formal action it has the burden of proving that the contractor has not met the goals contained in these Bid Conditions. The contractor's failure to meet its goals shall shift to it the requirement to come forward with evidence to show that it has met the good faith requirements of these Bid Conditions.

2. The pendency of such proceedings shall be taken into consideration by the Department of Public Works in determining whether such contractor can comply with the requirements of Article 111, Division 2, Chapter 28 of the Revised Municipal Code, and is therefore a "responsible prospective contractor".
3. The Mayor's Office of Contract Compliance shall review the contractor's employment practices during the performance of the contract. If the Mayor's Office of Contract Compliance determines that the contractor's Affirmative Action Plan is no longer an acceptable program, the Director shall notify the Manager.

B. **Obligations Applicable to Contractors**:

It shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority or female employees. Discrimination in referral for employment, even if pursuant to provisions of a collective bargaining agreement, is prohibited by the National Labor Relations Act, as amended, Title VI of the Civil Rights Act of 1964, as amended, and Article III, Division 2, Chapter 28 of the Revised Municipal Code. It is the policy of the Department of Public Works that contractors have a responsibility to provide equal employment opportunity, if they wish to participate in City and County of Denver contracts. To the extent they have delegated the responsibility for some of their employment practices to a labor organization and, as a result, are prevented from meeting their obligations pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, such Contractors cannot be considered to be in compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, or its implementing rules and regulations.

C. **General Requirements**

Contractors are responsible for informing their subcontractors in writing regardless of tier, as to their respective obligations. Whenever a contractor subcontracts a portion of work in any trade covered by these Bid Conditions, it shall include these Bid Conditions in such subcontracts and each subcontractor shall be bound by these Bid Conditions to the full extent as if it were the prime contractor. The contractor shall not, however, be held accountable for the failure of its subcontractors to fulfill their obligations under these Bid Conditions. However, the prime contractor shall give notice to the Director of any refusal or failure of any subcontractor to fulfill the obligations under these Bid Conditions. A subcontractor's failure to comply will be treated in the same manner as such failure by a prime contractor.

1. Contractors hereby agree to refrain from entering into any contract or contract modification subject to Article 111, Division 2, Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who is determined not to be a "responsive" bidder for the City and County of Denver contracts pursuant to the Ordinance.
2. The contractor shall carry out such sanctions and penalties for violation of these Bid Conditions and the Equal Opportunity Clause including suspension, termination and cancellation of existing subcontracts and debarment from future contracts as may be ordered by the Manager pursuant to Article 111, Division 2, Chapter 28 of the Revised Municipal Code and its implementing regulations.
3. Nothing herein is intended to relieve any contractor during the term of its contract from compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, and the Equal Opportunity Clause of its contract with respect to matters not covered in these Bid Conditions.
4. Contractors must keep such records and file such reports relating to the provisions of these Bid Conditions as shall be required by the Office of Contract Compliance.
5. Requests for exemptions from these Bid Conditions must be made in writing, with justification, to the Manager of Public Works, City and County Building, Room 379, Denver, Colorado 80202, and shall be forwarded through and with the endorsement of the Director.

EXHIBIT C

CITY AND COUNTY OF DENVER
INSURANCE REQUIREMENTS FOR DEPARTMENT OF AVIATION
PROFESSIONAL SERVICES AGREEMENT

A. Certificate Holder and Submission Instructions

Commercial Operator must provide a Certificate of Insurance as follows:

Certificate Holder: CITY AND COUNTY OF DENVER
Denver International Airport
8500 Peña Boulevard
Denver CO 80249

- ACORD Form (or equivalent) certificate is required.
- Commercial Operator must be evidenced as a Named Insured party.
- Electronic submission only, hard copy documents will not be accepted.
- Reference on the certificate must include the City-assigned Contract Number, if applicable.

The official repository for Certificates of Insurance (COIs) within DEN is PINS Advantage. Upon contract initiation, an email will be sent to the Commercial Operator with instructions to upload the COIs for insurance compliance. The City may at any time modify submission requirements, including the use of third-party software and/or services, which may include an additional fee to the Commercial Operator.

B. Defined Terms

1. "Agreement" as used in this exhibit refers to the contractual agreement to which this exhibit is attached, irrespective of any other title or name it may otherwise have.
2. "Commercial Operator" as used in this exhibit refers to the party contracting with the City and County of Denver pursuant to the attached Agreement.

C. Coverages and Limits

1. Commercial General Liability

   Commercial Operator shall maintain insurance coverage including bodily injury, property damage, personal injury, advertising injury, independent contractors, and products and completed operations in minimum limits of $1,000,000 each occurrence, $2,000,000 products and completed operations aggregate; if policy contains a general aggregate, a minimum limit of $2,000,000 annual per location aggregate must be maintained.

   a. Coverage shall include Contractual Liability covering liability assumed under this Agreement (including defense costs assumed under contract) within the scope of coverages provided.
   b. Coverage shall include Mobile Equipment Liability, if used to perform services under this Agreement.
   c. If a "per location" policy aggregate is required, "location" shall mean the entire airport premises.

2. Business Automobile Liability

   Commercial Operator shall maintain a minimum limit of $1,000,000 combined single limit each occurrence for bodily injury and property damage for all owned, leased, hired and/or non-owned vehicles used in performing services under this Agreement.

   a. If operating vehicles unescorted airside at DEN, a $10,000,000 combined single limit each occurrence for bodily injury and property damage is required. DEN has established an Airside Unescorted Excess Auto Liability Program to support Commercial Operators in meeting the $10,000,000 auto liability requirement for unescorted airside driving privileges. This program offers $9,000,000 in excess

coverage over a $1,000,000 base liability. For more information, please visit: DEN AirsideDrive Program.

b. If Commercial Operator does not have blanket coverage on all owned and operated vehicles and will require unescorted airside driving privileges, then a schedule of insured vehicles (including year, make, model and VIN number) must be submitted with the Certificate of Insurance.
c. If transporting waste, hazardous material, or regulated substances, Commercial Operator shall carry a Broadened Pollution Endorsement and an MCS 90 endorsement on its policy.
d. If Commercial Operator does not own any fleet vehicles and/or Commercial Operator's owners, officers, directors, and/or employees use their personal vehicles to perform services under this Agreement, Commercial Operator shall ensure that Personal Automobile Liability including a Business Use Endorsement is maintained by the vehicle owner, and if appropriate, Non-Owned Auto Liability by the Commercial Operator. This provision does not apply to persons solely commuting to and from the airport.
e. If Commercial Operator will be completing all services to DEN under this Agreement remotely and not be driving to locations under direction of the City to perform services this requirement is waived.

3. Workers' Compensation and Employer's Liability Insurance
Commercial Operator shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits no less than $100,000 per occurrence for each bodily injury claim, $100,000 per occurrence for each bodily injury caused by disease claim, and $500,000 aggregate for all bodily injuries caused by disease claims.

a. Colorado Workers' Compensation Act allows for certain, limited exemptions from Worker's Compensation insurance coverage requirements. It is the sole responsibility of the Commercial Operator to determine their eligibility for providing this coverage, executing all required documentation with the State of Colorado, and obtaining all necessary approvals. Verification document(s) evidencing exemption status must be submitted with the Certificate of Insurance.

4. Property Insurance
Commercial Operator is solely responsible for any loss or damage to its real or business personal property located on DEN premises including, but not limited to, materials, tools, equipment, vehicles, furnishings, structures and personal property of its employees and subcontractors unless caused by the sole, gross negligence of the City. If Commercial Operator carries property insurance on its property located on DEN premises, a waiver of subrogation as outlined in Section F will be required from its insurer.

5. Professional Liability (Errors and Omissions) Insurance
Commercial Operator shall maintain a minimum limit of $1,000,000 each claim and annual policy aggregate, providing coverage for all applicable professional services outlined in this Agreement.

6. Unmanned Aerial Vehicle (UAV) Liability:
If Commercial Operator desires to use drones in any aspect of its work or presence on DEN premises, the following requirements must be met prior to commencing any drone operations:

a. Express written permission must be granted by DEN.
b. Express written permission must be granted by the Federal Aviation Administration (FAA).
c. Drone equipment must be properly registered with the FAA.
d. Drone operator(s) must be properly licensed by the FAA.
e. Commercial Operator must maintain UAV Liability including flight coverage, personal and advertising injury liability, and hired/non-owned UAV liability for its commercial drone operations with a limit no less than $1,000,000 combined single limit per occurrence for bodily injury and property damage.

7. Excess/Umbrella Liability
   Combination of primary and excess coverage may be used to achieve minimum required coverage limits. Excess/Umbrella policy(ies) must follow form of the primary policies with which they are related to provide the minimum limits and be verified as such on any submitted Certificate of Insurance.

D. Reference to Project and/or Contract

The City Project Name, Title of Agreement and/or Contract Number and description shall be noted on the Certificate of Insurance, if applicable.

E. Additional Insured

For all coverages required under this Agreement (excluding Workers' Compensation, Employer's Liability and Professional Liability, if required), Commercial Operator's insurer(s) shall include the City and County of Denver, its elected and appointed officials, successors, agents, employees, and volunteers as Additional Insureds by policy endorsement.

F. Waiver of Subrogation

For all coverages required under this Agreement (excluding Professional Liability, if required), Commercial Operator's insurer(s) shall waive subrogation rights against the City and County of Denver, its elected and appointed officials, successors, agents, employees, and volunteers by policy endorsement.

If Commercial Operator will be completing all services to the City under this Agreement remotely and not be traveling to locations under direction of the City to perform services, this requirement is waived specific to Workers' Compensation coverage.

If Commercial Operator and its employees performing services under this Agreement are domiciled in a monopolistic state this requirement shall not apply to Workers' Compensation policy(ies) issued by a state fund. However, Commercial Operator understands any subrogation against the City from its state-funded Workers' Compensation insurer arising from a claim related to this Agreement shall become the responsibility of the Commercial Operator under Section 14.01 Defense and Indemnification of this Agreement subject to the terms, conditions and limitations therein.

G. Notice of Material Change, Cancellation or Nonrenewal

Each certificate and related policy shall contain a valid provision requiring notification to the Certificate Holder in the event any of the required policies be canceled or non-renewed or reduction in required coverage before the expiration date thereof.

1. Such notice shall reference the DEN assigned contract number related to this Agreement.
2. Such notice shall be sent thirty (30) calendar days prior to such cancellation or non-renewal or reduction in required coverage unless due to non-payment of premiums for which notice shall be sent ten (10) calendar days prior.
3. If such written notice is unavailable from the insurer or afforded as outlined above, Commercial Operator shall provide written notice of cancellation, non-renewal and any reduction in required coverage to the Certificate Holder within three (3) business days of receiving such notice by its insurer(s) and include documentation of the formal notice received from its insurer(s) as verification. Commercial Operator shall replace cancelled or nonrenewed policies with no lapse in coverage and provide an updated Certificate of Insurance to DEN.
4. In the event any general aggregate or other aggregate limits are reduced below the required minimum per occurrence limits, Commercial Operator will procure, at its own expense, coverage at the requirement minimum per occurrence limits. If Commercial Operator cannot replenish coverage within ten (10) calendar days, it must notify the City immediately.

H. Cooperation

Commercial Operator agrees to fully cooperate in connection with any investigation or inquiry and accept any formally tendered claim related to this Agreement, whether received from the City or its representative. Commercial Operator's failure to fully cooperate may, as determined in the City's sole discretion, provide cause

for default under the Agreement. The City understands acceptance of a tendered claim does not constitute acceptance of liability.

I. Additional Provisions

1. Deductibles or any type of retention are the sole responsibility of the Commercial Operator.
2. Defense costs shall be in addition to the limits of liability. If this provision is unavailable that limitation must be evidenced on the Certificate of Insurance.
3. Coverage required may not contain an exclusion related to operations on airport premises.
4. A severability of interests or separation of insureds provision (no insured vs. insured exclusion) is included under all policies where Additional Insured status is required.
5. A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by the City under all policies where Additional Insured status is required.
6. If the Commercial Operator procures or maintains insurance policies with coverages or limits beyond those stated herein, such greater policies will apply to their full effect and not be reduced or limited by the minimum requirements stated herein.
7. All policies shall be written on an occurrence form. If an occurrence form is unavailable or not industry norm for a given policy type, claims-made coverage will be accepted by the City provided the retroactive date is on or before the Agreement Effective Date or the first date when any goods or services were provided to the City, whichever is earlier, and continuous coverage will be maintained or an extended reporting period placed for three years (eight years for construction-related agreements) beginning at the time work under this Agreement is completed or the Agreement is terminated, whichever is later.
8. Certificates of Insurance must specify the issuing companies, policy numbers and policy periods for each required form of coverage. The certificates for each insurance policy are to be signed by an authorized representative and must be submitted to the City at the time Commercial Operator signed this Agreement.
9. The insurance shall be underwritten by an insurer licensed or authorized to do business in the State of Colorado and rated by A.M. Best Company as A- VIII or better.
10. Certificate of Insurance and Related Endorsements: The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements shall not act as a waiver of Commercial Operator's breach of this Agreement or of any of the City's rights or remedies under this Agreement. All coverage requirements shall be enforced unless waived or otherwise modified in writing by DEN Risk Management. Commercial Operator is solely responsible for ensuring all formal policy endorsements are issued by their insurers to support the requirements.
11. The City shall have the right to verify, at any time, all coverage, information, or representations, and the insured and its insurance representatives shall promptly and fully cooperate in any such audit the City may elect to undertake including provision of copies of insurance policies upon request. In the case of such audit, the City may be subject to a non-disclosure agreement and/or redactions of policy information unrelated to verification of required coverage.
12. No material changes, modifications, or interlineations to required insurance coverage shall be allowed without the review and written approval of DEN Risk Management.
13. Commercial Operator shall be responsible for ensuring the City is provided updated Certificate(s) of Insurance prior to each policy renewal.
14. Commercial Operator's failure to maintain required insurance shall be the basis for immediate suspension and cause for termination of this Agreement, at the City's sole discretion and without penalty to the City.

J. Part 230 and the DEN Airport Rules and Regulations

If the minimum insurance requirements set forth herein differ from the equivalent types of insurance requirements in Part 230 of the DEN Airport Rules and Regulations, the greater and broader insurance requirements shall supersede those lesser requirements, unless expressly excepted in writing by DEN Risk Management. Part 230 applies to Commercial Operator and its subcontractors of any tier. Part 230 and the DEN Airport Rules and Regulations may be found: DEN Airport Rules and Regulations.

K. Applicability of ROCIP Requirements

The City and County of Denver and Denver International Airport (hereinafter referred to collectively as "DEN") has arranged for certain construction activities at DEN to be insured under an Owner Controlled Insurance Program (OCIP) or a Rolling Owner Controlled Insurance Program (ROCIP) (hereinafter collectively referred to

as “ROCIP”). A ROCIP is a single insurance program that insures DEN, the Commercial Operator and subcontractors of any tier, and other designated parties (Enrolled Parties), for work performed at the Project Site. **Commercial Operator is NOT eligible for or provided insurance coverage under a ROCIP program. Commercial Operator must provide its own insurance as specified in this Agreement. If Commercial Operator is assigned work to be conducted within a ROCIP Project Site it must comply with the provisions of the DEN ROCIP Safety Manual, which is part of the Contract Documents and which is linked below to the most recent manual.**

DEN ROCIP Safety Manual

DEN is additionally providing links to the DEN ROCIP Insurance Manual and the DEN ROCIP Claims Guide solely for Commercial Operator’s information.

DEN ROCIP Insurance Manual
DEN ROCIP Claims Guide

Notice of Change to ROCIP: DEN reserves the right to assign work per task order to a specific ROCIP program, if more than one is active, as well as terminate or modify a DEN ROCIP or any portion thereof. Further, dependent on factors including, but not limited to, the official timing and duration of the ROCIP project for which services are provided or related to under this Agreement, DEN may need to transition from one ROCIP program to another and introduce corresponding requirements for Commercial Operators. DEN will provide Commercial Operator notice of changes regarding a ROCIP program as applicable to Commercial Operator’s work or responsibilities under the ROCIP Safety Manual.

Exhibit D

City and County of Denver

TIMOTHY M. O'BRIEN, CPA
AUDITOR

201 West Colfax Avenue, #705 • Denver, Colorado 80202
(720) 913-5000 • Fax (720) 913-5253 • denvergov.org/auditor

2025 Building General Wage Decision

TO: All Users of the City and County of Denver Prevailing Wage Schedules
FROM: Luis Osorio Jimenez, Prevailing Wage Administrator
DATE: May 16, 2025
SUBJECT: Latest Change to Prevailing Wage Schedules

The effective date for this publication will be **Tuesday, May 20, 2025,** and applies to the City and County of Denver for **BUILDING CONSTRUCTION PROJECTS** (does not include residential construction consisting of single-family homes and apartments up to and including four stories) in accordance with the Denver Revised Municipal Code, § 20-76(c).

General Wage Decision No. CO20250020

Superseded General Decision No. CO20240020
Modification No. 4
Publication Date: 05/16/2025
(5 pages)

Unless otherwise specified in this document, apprentices shall be permitted only if they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor (DOL). The employer and the individual apprentice must be registered in a program which has received prior approval by the DOL. Any employer who employs an apprentice and is found to be in violation of this provision shall be required to pay said apprentice the full journeyman scale.

Attachments as listed above.

In accordance to the amendment of Section 20-76, Division 3, Article IV, Chapter 20 of the Denver Revised Municipal Code enacted on August 21st, 2023, the Prevailing Wage Administrator is authorized to approve and adjust all Davis-Bacon classifications under $18.81 to comply with the city's minimum wage.

General Decision Number: CO20250020 05/16/2025

Superseded General Decision Number: CO20240020

State: Colorado

Construction Type: Building

County: Denver County in Colorado.

BUILDING CONSTRUCTION PROJECTS

(Does not include single-family homes or apartments up to and including four stories.)

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658.

Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:

- Executive Order 14026 generally applies to the contract.
- The contractor must pay all covered workers at least $18.81 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.

If the contract was awarded on or between January 1, 2015, and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:

- Executive order 13658 generally applies to the contract.
- The contractor must pay all covered workers at least $18.81 per hour (or the applicable wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at www.dol.gov/whd/govcontracts.

MODIFICATION NUMBER	PUBLICATION DATE
0	01/03/2025
1	02/07/2025
2	03/07/2025
3	03/14/2025
4	05/16/2025

ASBE0028-002 07/01/2024	RATES	FRINGES
ASBESTOS WORKER/HEAT & FROST INSULATOR – MECHANICAL (DUCT, PIPE & MECHANICAL SYSTEM INSULATION)	$34.98	$16.47

CARP0055-002 05/01/2024	RATES	FRINGES
CARPENTER (DRYWALL HANGING ONLY)	$35.10	$13.41

CARP1607-001 06/01/2024	RATES	FRINGES
MILLWRIGHT	$42.50	$17.93

ELEC0068-012 06/01/2024	RATES	FRINGES
ELECTRICIAN (INCLUDES LOW VOLTAGE WIRING)	$44.95	$19.08

ELEV0025-001 01/01/2024	RATES	FRINGES
ELEVATOR MECHANIC	$56.57	$40.35

FOOTNOTE:

a. Vacation: 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.
b. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ENGI0009-017 05/01/2024

POWER EQUIPMENT OPERATOR (CRANE)	RATES	FRINGE
141 TONS AND OVER	$39.80	$15.20
50 TONS AND UNDER	$35.78	$15.20
51 TO 90 TONS	$36.09	$15.20
91 TO 140 TONS	$37.34	$15.20

IRON0024-010 11/01/2024	RATES	FRINGES
IRONWORKER, STRUCTURAL/ORNAMENTAL	$39.21	$12.79

IRON00847- 11/01/2024	RATES	FRINGES
IRONWORKER, REINFORCING	$55.25	$3.65

PAIN0079-006 08/01/2022	RATES	FRINGES
PAINTER (BRUSH, ROLLER, AND SPRAY; EXCLUDES DRYWALL FINISHING/TAPING)	$27.41	$11.56

PAIN0079-007 08/01/2022	RATES	FRINGES
DRYWALL FINISHER/TAPER	$28.11	$11.56

PAIN0419-001 06/01/2022	RATES	FRINGES
SOFT FLOOR LAYER (VINYL AND CARPET)	$18.81	$14.33

PAIN0930-002 07/01/2024	RATES	FRINGES
GLAZIER	$35.51	$12.65

PLUM0003-009 06/01/2024	RATES	FRINGES
PLUMBER (EXCLUDES HVAC DUCT, PIPE AND UNIT INSTALLATION)	$45.43	$20.15

PLUM0208-008 06/01/2024	RATES	FRINGES
PIPEFITTER (INCLUDES HVAC PIPE AND UNIT INSTALLATION; EXCLUDES HVAC DUCT INSTALLATION)	$44.15	$22.43

SFCO0669-002 04/01/2024	RATES	FRINGES
SPRINKLER FITTER (FIRE SPRINKLERS)	$45.44	$26.98

SHEE0009-004 07/01/2024	RATES	FRINGES
SHEET METAL WORKER (INCLUDES HVAC DUCT INSTALLATION; EXCLUDES HVAC PIPE AND UNIT INSTALLATION)	$39.47	$21.83

SUCO2013-006 07/31/2015	RATES	FRINGES
BRICKLAYER	$21.96	$0.00
CARPENTER: ACOUSTICAL CEILING INSTALLATION ONLY	$22.40	$4.85
CARPENTER: METAL STUD INSTALLATION ONLY	$20.81	$0.00
CARPENTER, EXCLUDES ACOUSTICAL CEILING INSTALLATION, DRYWALL HANGING, AND METAL STUD INSTALLATION	$21.09	$6.31
CEMENT MASON/CONCRETE FINISHER	$20.09	$7.03
LABORER: COMMON OR GENERAL	$19.81	$5.22
LABORER: MASON TENDER – BRICK	$20.32	$0.00
LABORER: MASON TENDER – CEMENT/CONCRETE	$20.33	$0.00
LABORER: PIPELAYER	$19.86	$3.68
OPERATOR: BACKHOE/EXCAVATOR/TRACKHOE	$20.78	$5.78
OPERATOR: BOBCAT/SKID STEER/SKID LOADER	$20.10	$3.89
OPERATOR: GRADER/BLADE	$21.50	$0.00
ROOFER	$18.85	$0.00
TRUCK DRIVER: DUMP TRUCK	$18.97	$0.00
WATERPROOFER	$18.83	$0.00

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

Administrator Supplemental Rates

Specific to the Denver projects: Revision Date: 05/20/2025

CLASSIFICATION	BASE	FRINGE
BOILERMAKER	$30.97	$21.45
LABORER: CONCRETE SAW	$18.90	$0.00
PAPER HANGER	$20.15	$6.91
PLASTERER	$32.55	$13.00
PLASTER TENDER	$18.81	$0.00
TRUCK DRIVER: FLATBED	$19.14	$10.07
TRUCK DRIVER: SEMI	$19.48	$10.11

CLASSIFICATION: POWER EQUIPMENT OPERATOR	BASE	FRINGE
CONCRETE MIXER — LESS THAN ONE YD	$23.67	$10.67
CONCRETE MIXER – 1 YD AND OVER	$23.82	$10.68
DRILLERS	$23.97	$10.70
LOADER – UP TO AND INCLUDING SIX CU YD	$23.67	$10.67
LOADERS – OVER SIX CU YD	$23.82	$10.68
MECHANIC	$18.81	$0.00
MOTOR GRADER	$23.97	$10.70
OILERS	$22.97	$10.70
ROLLER	$23.67	$10.67

Go to www.DenverGov.org/Auditor to view the Prevailing Wage Clarification Document for complete list of classifications used.

I. SPECIAL CONDITIONS

SC–1 DRAWINGS AND SPECIFICATIONS TO BE FURNISHED BY THE CITY

The City will provide the following Contract Documents to the Contractor in electronic format at no expense to the Contractor:

Documents
Technical Specifications
Contract Drawings
Task Orders
Change Orders, Change Order Directives, and Change Notices

Additional copies of the foregoing documents will be furnished to the Contractor at the Contractor's expense. The Contractor will be responsible for supplying all subcontractors with copies of the Contract Documents at its expense.

The City will not supply any paper copies of the General Contract Conditions to the Contractor at City expense.

SC-2 REVISIONS TO G.C. 201

The second sentence of General Condition 201 is amended to read: "The unit responsible for this management and control is the Business Technologies Office under the supervision of the Senior Vice President for Business Technologies."

SC-3 CITY LINE OF AUTHORITY AND CONTACTS

In accordance with General Condition 214, the City's line of authority for administration of this Contract is:

Chief Executive Officer (CEO). Executive Office, 9th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249. Any reference to the Manager of Aviation shall also mean Chief Executive Officer, Department of Aviation (CEO).

Executive Vice President – Chief Financial Officer (EVP-CFO) who reports to the CEO. Business Technologies office, 9th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Senior Vice President – Business Technologies (SVP CIO) who reports to the COO. Business Technologies office, 2nd Floor, Concourse A - Center Core, 8500 Peña Boulevard, Denver, CO 80249.

IT Director - BT, reports to the SVP - BT Business Technologies, 1st Floor Concourse A - Center Core, 8500 Peña Boulevard, Denver, CO 80249.

Project Manager, the City representative who has day to day administrative responsibility of this Contract, and who reports to the SVP-BT. All notices, requests, pay applications (pursuant to G.C. 902), and other correspondence from the Contractor shall be sent to the assigned Project Manager unless otherwise provided in this Contract. The Project Manager for this Contract is: Michael Schneider, Business Technology Office, 7th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

The CEO may from time to time substitute a different City official as the designated "SVP-BT" hereunder, and any such change will be effective upon the issuance of written notice to the Contractor which identifies the successor

SVP-BT. The SVP-BT may from time to time change the assigned Project Manager, and any such change will be effective upon the issuance of written notice to the Contractor which identifies the successor Project Manager.

SC–4 CONTRACTOR PERFORMANCE; SUBCONTRACTING

With respect to General Condition 501, the level of subcontracted work will be specified by the Task Order. If no specific amount is specified, no more than ninety-five percent (95%) of the work may be subcontracted.

SC–5 COOPERATION WITH OTHERS

The Technical Specifications describe the constraints on the physical work site areas. These descriptions are not exhaustive, and the Contractor is required to coordinate its activities and work as may be required to meet FAA or City requirements while performing work on DEN. The Technical Specifications can be found at the following link: https://www.flydenver.com/business-and-community/tenant-information/#designstandards.

SC–6 PROSECUTION AND COMPLETION OF THE WORK:

Work will be issued to the Contractor as Task Orders upon reaching a negotiated agreement between the Contractor and the City as to the cost of the work. See Exhibit I for details of this process. The Work to be performed under the Contract is described in each Task Order.

SC–7 LIQUIDATED DAMAGES

If the Contractor fails to complete the work within the time specified or if the Contractor causes disruptions to DEN activities or operations as defined herein, the Contractor shall pay the City liquidated damages in the amounts as noted below or as noted in a future Task Order. Milestones and related Liquidated Damages will be identified for each Task Order.

For Disruption of Airport Activities for Any and All Task Orders

If DEN determines that the Contractor has disrupted the Airport Operations as described below and in the Technical Specifications, the Contractor shall be liable to the City for liquidated damages at the rates noted below per incident per day or per hour for each incident until the issue is corrected.

Contractor caused disruptions of Airport Operations and the required Liquidated Damages are as follows:

Amount per incident

1. Disruption of Fire Alarm – First Incident: $3,000.00
2. Disruption of Fire Alarm – All other incidents: $5,000.00
3. Disruption of Airline Baggage Operations – First Incident: $5,000.00 per hour
4. Disruption of Airline Baggage Operations – All other incidents $10,000.00 per hour.
5. Disruption of Airport Operations by introduction of dust, smoke, noise, water, chemicals or any offensive odors or fumes or any other disruption from the construction activity into the Terminal, any outdoor public area or baggage area that causes complaints from the building occupants, operations or the customers – First Incident: $1,000.00 per incident.
6. Disruption of Airport Operations by introduction of dust; smoke, noise, water, chemicals or any offensive odors or fumes or any other disruption from the construction activity into the Terminal or any outdoor public area or baggage area that causes complaints from the building occupants, operations or the customers – Any incident after the first: $5,000.00 per incident.
7. Should any of the disruptions described in items 5 or 6 above result in the evacuation or unplanned closure of a portion of the building or outdoor public space or baggage handling

area, this would result in a First Incident Liquidated Damage of $5,000 per hour.

At any time after the occurrence of the first incident, DEN may determine that by causing any of these disruptions, the Contractor is not properly managing the work and DEN may, in its sole discretion, terminate the entire Contract for Cause under General Contract Condition section 2201. In the event of such termination, the Contractor shall not be entitled to any cancellation penalty or additional compensation, and the Contractor shall be liable to DEN for all costs and expenses of taking over and completing the work as provided in General Contract Condition section 2201.

SC–8 FACILITY SECURITY AND PERSONNEL ACCESS

The Contractor shall conduct all its activities at the Airport in compliance with the Airport security system rules and regulations, which are administered by the Airport Operations Division. The Contractor shall obtain the proper access authorizations for its employees, subcontractors and suppliers (i.e., Badges and Permits), and shall be responsible for such persons' compliance with all the Airport rules and regulations. A copy of the Contractors' section of the Airport Security rules and regulations are available for Contractor review at the Airport Security Office, Concourse A East Subcore, 4th Level. Persons regularly entering the construction areas must obtain personnel access badges from the Airport Access Services Office and must display badges, at all times, upon entering the construction, restricted and sterile areas of the airport. Any employee, subcontractor or supplier who violates such rules may be subject to revocation of his access authorization, including authorization for access to the construction site and all other restricted and sterile areas.

The security status of the Airport is subject to change without notice. These contract Special Conditions are applicable to the current security status of the Airport. Should the security status of the Airport change at any time during the term of this Contract, a written notice shall be issued to the Contractor detailing all applicable security modifications from the airport’s current security status. The Contractor shall take **immediate steps** to comply with those security modifications as directed in the written notice.

If these security modifications involve any additional project cost, the Contractor shall submit a Contractor Change Request in accordance with the General Conditions for the additional cost. The Contractor Change Request shall outline in specific detail the effects of the security modifications on the Contractor's performance of the Contract, and shall provide a detailed cost breakdown for each item for which the Contractor is requesting reimbursement.

The Contractor shall return to the City, at contract completion or termination, or upon demand by the City, all access keys issued to it by the City to all areas of the Airport. If the Contractor fails to return any such key or keys at contract completion or termination or upon demand by the City, the Contractor shall be liable to the City for all the City's costs, including the City's labor costs for employees, incurred in re-coring doors and any other work which is required to prevent compromise of the Airport security system. In order to collect such costs hereunder, the City may withhold funds in such amount from any amounts due and payable to the Contractor under this Contract.

The construction of all the Project / Task Items that involve the breaching of any airport perimeter security boundary or continued access to restricted access rooms or areas will require the posting of authorized contract security personnel to maintain required security controls. The Contractor’s **Task Order Bid** shall include the cost of providing security services to maintain control and supervision of any and all airport perimeter security boundary breaches and for the duration of work activities where access to restricted areas is required and until the airport perimeter security boundaries are reestablished.

When security boundaries are opened for any reason, the Contractor must maintain one hundred percent (100%) control and supervision for the entire time that the openings are present to prevent unauthorized access to the

secure / restricted access areas.

THE IMPORTANCE OF THIS SPECIAL CONDITION CANNOT BE OVER-EMPHASIZED. SEVERE FINANCIAL PENALTIES AS WELL AS CONTRACT TERMINATION COULD RESULT IF AIRPORT PERIMETER SECURITY REQUIREMENTS ARE NOT STRICTLY FOLLOWED. THE REQUIREMENT TO PROVIDE ONE HUNDRED PERCENT (100%) CONTROL AND SUPERVISION OF BREACHES IN THE AIRPORT'S PERIMETER SECURITY BOUNDARY IS ABSOLUTE. AT NO TIME, DURING WORK AND NON-WORK HOURS SHALL ANY BREACHES IN THE AIRPORT'S SECURITY PERIMETER BE UNSUPERVISED AND / OR UNSECURED.

For off-hours of construction, the Contractor may choose to erect a temporary wall to close all perimeter openings. The wall construction shall be of sufficient materials and strength to prevent access to the airport's Sterile/Restricted Areas. The Contractor shall submit for review and approval, the details and materials for the temporary closure of security perimeter breaches for review and approval.

In the event posted security guards are required, The Contractor will not post, assign, or station any security guard at any site without the prior written approval and authorization of DEN Airport Security, Business Technologies, and Airport Operations prior to any work commencing. The Contractor is expressly prohibited from utilizing any security guard contractors that have not been provided by DEN Security Guard Contractor.

All security guards provided for this project must have a Denver Airport SIDA Badge.

The DEN Security Guard Contractor may change between the bidding or Bid phase of this contract from Notice to Proceed to closure of all security perimeter breaches. The Contractor shall maintain a contractual relationship with the Security Guard Contractor holding the most current contract with Denver International Airport.

The Contractor shall continue to provide security of these areas until such time that the breaches in the airport's security perimeter have been permanently secured.

The Contractor shall submit a written security plan for approval to the Director of Airport Security prior to the start of construction on any work where a breach of the perimeter security boundaries is required.

SC-9 CONSTRUCTION ACCESS

The work site is located at DEN. The Contractor shall have access to the work site via access routes as coordinated with the Project Manager. The Contractor is responsible for ensuring all of the Contractor's and Subcontractor's personnel have the ability to access and locate the areas of work where the scope is to be performed without additional escorting or supervision from DEN.

The City will not provide parking spaces for the Contractor's employees or subcontractor employees at the Airport. Arrangements for transportation and parking for all of its and its subcontractors' employees will be the responsibility of the Contractor. The Contractor's **Task Order Bid** shall include any and all costs associated with the Contractor's and subcontractors' employee parking. Information about parking facilities and charges is available from the Airport Parking Office. Refundable deposits are required for all parking passes.

Unless specifically required by the Contract Documents, the Contractor shall install no fences or other physical obstructions on or around any project work area without the approval of the City.

SC–10 VEHICLE PERMITTING

Vehicle access on the Airport Operation Area ("AOA") is controlled by and requires permission from the Airport Access Services Office. It is not anticipated that the Contractor will need to operate vehicles on the AOA to perform the Work. Only direct construction support vehicles and/or equipment will be allowed in the contractor's work areas or sites.

SC–11 VENDORS AND SUPPLIERS

The Contractor shall provide the Project Manager's office with a list of its equipment/material vendors and suppliers. Vendors or suppliers shall access the construction work areas via the Contractor's access route, described in SC-10 above. All delivery vehicles are subject to search.

SC–12 COMMUNICATION DEVICES

Any site communications devices, mobile communication devices or internet data devices used at DEN must be approved by DEN Technologies.

SC-13 REVISIONS TO G.C. 1102

G.C. 1102.2 is amended by replacing the phrase "Change Request" in all its occurrences in such G.C. with the phrase "Change Notice."

G.C. 1102.3 is amended by replacing the phrase "Field Order/Change Order Directive" in all its occurrences in such G.C. with the phrase "Change Order Directive."

SC-14 LISTING OF ACCEPTABLE MANUFACTURERS

The Technical Specifications list "Acceptable Manufacturers" for certain products. Such listing identifies manufacturers of certain products which have been determined by a preliminary review to be able to meet the basic product and/or system technical requirements. The listing is not intended to provide a blanket endorsement or acceptance of the manufacturer's specified products or product line. All products from listed manufacturers must meet the detailed requirements of the Technical Specifications. Products that do not meet all detailed Technical Specifications are not acceptable and will be rejected, regardless of whether the manufacturer was listed as "acceptable." The Contractor is responsible for determining the acceptability of all products under the Technical Specifications prior to submission of products for approval.

SC-15 ACCESSIBLE PARKING SPACES, ACCESS AISLES AND ROUTES OF TRAVEL

If any Work is performed in or adjacent to parking facilities at the Airport, the Contractor is responsible for compliance with this SC-21. "Accessible" parking spaces and access aisles as used in this SC-21 mean parking spaces and access aisles which are accessible for, and reserved for use by, persons with disabilities. These parking spaces and access aisles are designed and built to standards established by federal regulations implementing the Americans with Disabilities Act of 1990 ("ADA"), and are marked by signage. "Accessible routes of travel" as used herein means routes through parking facilities which comply with ADA accessibility standards, including degree of slope and absence of obstructions.

Accessible routes of travel and accessible parking spaces and access aisles must be kept free of obstructions and construction debris at all times. No accessible parking spaces or access aisles or accessible routes of travel shall be relocated, blocked or rendered unusable unless the contractor has obtained specific advance approval in writing for such actions from the airport's ADA Compliance Officer.

When prosecution of the Work requires that accessible spaces be temporarily blocked, those accessible spaces and their access aisles shall be temporarily relocated to another location as close as possible to an accessible building entrance. Temporary signage that identifies these parking spaces and access aisles as reserved for the handicapped shall be installed, and the accessible route shall be clearly marked as required.

Before blocking or relocating accessible parking spaces or accessible routes of travel, the contractor must obtain written approval from the DEN ADA Compliance Officer, by submitting a completed request form, which will be provided to the Contractor by the Project Manager at the preconstruction meeting if it is not included as a

standard form in the Technical Specifications. The request shall include the location of alternative spaces and/or routes, and specifications of the temporary signage to be used. Work shall not proceed without this approval.

If a vehicle is parked in any accessible space which is either temporary or approved to be relocated, the contractor will not remove signage or take any other action which would allow the access aisle for such parking space to be blocked. Such actions must be postponed until the parking space is no longer occupied.

SC–16 SUBCONTRACTOR PAYMENTS AND SUBCONTRACTOR RELEASES – REQUIRED USE OF THE B2G CONTRACT MANAGEMENT SYSTEM

The Contractor is required to use the City B2G Contract Management System to report all subcontractor payments and shall adhere to the City's Procedure for Reporting Subcontractor Payments. It is the Contractor's obligation to ensure that complete subcontractor information is entered into the B2G System prior to submission of the first application for payment in order to avoid any delays in payment. The Contractor shall, prior to the submission of each subsequent invoice, ensure payments to subcontractors have been entered into the B2G System, including subcontractor confirmation of amount of payment received, for services performed during the prior billing period.

SC-17 PAYMENTS TO CONTRACTORS

The Contractor recognizes and agrees that applications for payment may be submitted using the Textura® Payment Management System (PPM System) or by any method provided by Business Technologies, which will also be the payment mechanism to disburse payments to sub-contractors used on this Project. For more information, please refer to Division I, Technical Specifications.

The Contractor further agrees that, to the fullest possible within the TPM System or any other system provided by Business Technologies, the City shall be entitled to all non-Confidential records, reports, data and other information related to the project that are available to Contractor through the TPM System or other applicable system, including, but not limited to, information related to Contractor and subcontractor billings. To that end, Contractor agrees that it will activate any available settings within the TPM System or other applicable system that are necessary to grant the City access to such non-Confidential information related to the contract and the project. Applications for payment shall be based on the Contract Unit Prices or the approved Schedule of Values described in GC 903.1

In accordance with General Contract Condition 902, PAYMENT PROCEDURE, the party(ies) responsible for review of all Pay Applications shall be:

Agency/Firm

DEN Division CA

DEN Division PM

DEN Division Director

DEN Contract Services CA

CCD Denver Prevailing Wage

In accordance with General Contract Condition 906, APPLICATIONS FOR PAYMENT, each Application submitted shall include the following:

1. The estimate of Work completed shall be based on the approved schedule of values or unit prices, as applicable, and the percent of the Work complete.
2. Each Application for Payment shall include each and every independent subcontractor's payroll information including pay dates and pay amounts.
3. The Contractor shall also submit to the Auditor and other appropriate officials of the City in a timely fashion, information required by General Contract Condition 1004, REPORTING WAGES PAID.

In accordance with General Contract condition 907, RELEASES AND CONTRACTORS CERTIFICATION OF PAYMENT, Applications for Payment must be accompanied by a completed Partial or Final Claim Release Form, as appropriate, from EACH subcontractor and supplier, **AND** the Contractor's Certification of Payment Form.

SC–18 FUND AVAILABILITY

Task Order approval and acceptance is contingent upon the availability of funding. Approved Task Orders issued under this contract will obligate funds.

SC–19 PERFORMANCE AND PAYMENT BOND

Delete the requirements of General Contract Conditions 1501, 1502 and 1503 for separate bonds. Combined Performance and Payment Bonds in the total amount of all issued Task Orders, provided in the precise form contained in these documents, shall be furnished before any work is undertaken in connection with any Task Order. All other terms and conditions of General Contract Conditions 1501, 1502 and 1503 shall remain in effect.

Additionally, General Contract Condition 1501 shall be amended as follows:

> "Before this Contract is executed, the Contractor shall have paid for and furnished to the City a properly completed and executed Combined Performance and Payment Surety Bond, in an amount not less than Five Hundred Thousand Dollars and No Cents ($500,000.00). The Combined Surety Bond shall guarantee the faithful performance of the Contract and shall also guarantee the payment of bills for labor and materials under the Contract.
>
> In the event that the cumulative dollar value of all Task Order(s) issued under the Contract exceeds the amount of the Combined Surety Bond furnished prior to the execution of the Contract, the Contractor shall procure, pay for and furnish to the City a Combined Surety Bond Change Rider, in the proper form, for an amount which is One Hundred percent (100%) of the dollar value of the specified Task Order(s), that exceeds $500,000.00. All subsequent Task Orders contemplated under the Contract shall require separate Combined Surety Bond Change Riders for One Hundred percent (100%) of the dollar value of each Task Order before a Task Order is issued and any work under the Task Order commences.
>
> Any combined Surety Bond Change Riders furnished by the Contractor after the execution of the Contract must be reviewed and approved by the City Attorney prior to issuance of a Task Order and before any work commences."

SC–20 TASK ORDER PROCESS

TASK ORDERS

Upon review of any Contractor pricing submittal made pursuant to a Task Notice for Proposal, the City may, at its sole discretion, direct that the work described in the Task Notice for Proposal and priced by the Contractor be completed by issuance of a Task Order to the Contractor or reject the pricing submittal. The City reserves the right to issue such a Task Order, at the price (either lump sum or time and material) and under the terms of the Contractor's pricing submittal, at any time before the expiration 120 consecutive calendar days from the date the pricing submittal was received by the City. If no Task Order is issued and the pricing submittal is not rejected within this period, the Contractor's pricing Proposal shall be deemed rejected by the City. A Task Order shall not be issued and no work shall commence until such time as the Task Order is signed by the Contractor and all designated City officials and the Contractor has submitted a Payment and Performance Bond or Bond Change Rider for the work satisfactory to the City Attorney and the CEO. Upon issuance of a Task Order, the Contractor agrees to satisfactorily perform and complete all work or effort described in each issued Task Order or any subsequently issued Task Order Changes within the period of performance specified in the Task Order and Notice to Proceed plus such extensions of time as may be granted by the Manager in accordance with the provisions of this contract.

TASK ORDER CHANGES

In accordance with all terms and conditions provided for standard change orders under General Contract Conditions 1101 et seq. CHANGE ORDERS and ADJUSTMENT TO CONTRACT AMOUNT, the City may issue Change Orders providing for deletions, additions and modifications to the work under a duly issued Task Order. In the event of a conflict between GC 1104.2 and the markups submitted by the Contractor identified in the Schedule of Prices and Quantities, regarding any pay item identified in GC 1104.2, the markups and rates submitted by the Contractor in the Schedule of Prices and Quantities shall prevail.

TASK ORDER CLOSEOUT

After all work performed under each Task Order has been accepted hereunder, final payment and Task Order closeout shall be made in accordance with the terms and conditions of General Contract Condition 910 FINAL ESTIMATE AND PAYMENT. Except that, with the consent of the contractor, legal advertisement, pursuant to Article 26, Colorado Revised Statutes as amended may be held for Task Orders which do not exceed Fifteen Thousand Dollars ($15,000.00) until such time as several such projects are completed and eligible for legal advertisement.

CONTRACT CLOSEOUT

Following final closeout of all Task Orders performed hereunder, the Contract shall proceed to final contract closeout. Final contract closeout shall be completed in accordance with all procedures, terms and conditions set forth in the General Conditions except that final settlement and release or retention will be made upon completion of each Task Order rather than contract completion. In addition, Contractor shall execute a Final Receipt and provide a final contract closeout.

SC-21 TASK ORDER DIRECTIVES AND CHANGE ORDER DIRECTIVES

"Work", as defined in the General Conditions, shall include all work under any Task Order or Task Order Directive. Any reference in the General Conditions to "Change Directive" shall mean "Change Order Directive".

SC-22 NOTICE TO PROCEED AND COMPLETION OF THE WORK

GC 302 is hereby deleted and replaced with the following:

.1 A written Initial Notice to Proceed will be issued by the Deputy Manager to initiate the Contract only, and such Initial Notice to Proceed is not authorization for the Contractor to proceed with any Work or to proceed with mobilization. Thereafter, the Deputy Manager may issue a Task Order and subsequent NTP authorizing Work and/or mobilization for work on the relevant Task Order.

.2 Upon issuance of the Initial Notice to Proceed, the Contractor is allowed and authorized to incur reimbursable costs related to insurance, payment and performance bonds, and such other essential activities such as security access (vehicular access and personnel badging). Home office overhead, core staff and other allowable general conditions costs are not authorized under the initial Notice to Proceed.

.3 Core staff and agreed upon general conditions' costs are authorized and allowed only for the time Work is authorized pursuant to a Second or subsequent Notice to Proceed and Task Order issued by the Project Manager. These costs, in part, are identified on Schedule of Prices and Quantities attached hereto, related to the rates and charges mutually agreed upon by City and Contractor. Requests for Task Order pricing proposals will not authorize the contractor to accumulate reimbursable costs. Costs for Task Order proposal preparation and Task Order negotiation will not be reimbursable. Upon the substantial completion of Work under any subsequent Notice to Proceed, including a Second Notice to Proceed and/or Work Order, whichever is applicable, reimbursement for these costs expires unless otherwise agreed to in writing and authorized by the Project Manager, limited to the sole and only purpose of facilitating Final Completion of the authorized Work. Any costs the Contractor incurs, except for those costs allowed under the Initial Notice to Proceed, after substantial completion without written authorization by the Project Manager shall be absorbed by the Contractor and shall be at the Contractor's own risk.

.4 If any milestones are described in the Contract Documents, the Work described by each milestone shall be accomplished in accordance with the Contract Documents within the specified Contract Time, or in the alternative, if a Task Order is issued for Work, than the Work shall be accomplished in accordance with the Task Order and completed within the time set forth by said Task Order.

SC-23 MOBILIZATION

The Contractor, upon issuance of a Task Order, shall submit a detailed mobilization plan to the SVP of the Office of Business Technologies, or the SVP's designee, setting forth the proposed location for mobilization, mobilization costs and equipment to be rented or purchased for the specific Work authorized. All such costs are subject to the approval of the SVP of the Office of Business Technologies, or the SVP's designee, and any equipment purchase or rental costs wherein the value of such equipment is paid for in excess of 90% of such value, then such equipment may, at the end of the Contract Time or Final Completion, whichever occurs earlier, become subject to ownership by the City (Airport) at City's option. Further, such equipment shall be used solely by the Contractor for Work under this Contract unless otherwise authorized by the SVP of Business Technologies. Such equipment shall not be used for personal uses or activities.

SC-31 BONDS, SALES TAX AND INSURANCE

Bonds, sales and use tax and insurance shall be paid at cost without mark up.

SC-24 APPLICATIONS FOR AND PROGRESS PAYMENTS TO CONTRACTORS

General Condition 902.3 is amended by the addition of the following.

Where applicable, with respect to any Task Order issued hereunder, progress payments for performance of any work shall be based on completed work estimates and shall be subject to the following requirements.

1. The Contractor shall submit a complete and separate application for payment for the work estimates of each Task Order performed during the specified billing period.

2. Each submitted estimate shall specify the percent of the work complete. This percentage shall be certified by the Project Manager or the consulting architect or engineer, as appropriate.

3. Each estimate of work completed shall also specifically identify those minority- and women-owned business enterprises (MWBE) subcontractors or suppliers that the Contractor is utilizing on the project pursuant to the requirements of Article VII, Division 1 and 3 of Chapter 28, of the D.R.M.C.

4. Each estimate of work for each Task Order performed shall be submitted using a separate Application for Progress Payment Task Order Contracts (Form CM-18A), accompanied by either duplicate sets of verified Contractor's Certifications of Payment (Form CM-19), or by verified Partial Release of Contractor forms from each subcontractor and supplier (Form CM-26). Each estimate of work completed shall also be accompanied by:

    a. A written schedule of values, which set out the quantities and costs for the Project and

    b. The Project Manager's, or as applicable, consulting architect's or engineer's estimated statement of the percentage of work completed for each line item of cost for which the City has promised to pay the Contractor. The Contractor shall also submit to the auditor and other appropriate officials of the City, in a timely fashion, all information required by General Conditions Title 10.

5. The estimate of the percentage of estimate of work completed shall constitute a representation by the Contractor to the City that the work has progressed to the point indicated; that the quality of the work

covered by the estimate is in accordance with the Contract Documents; that each obligation covered by the estimate (except as otherwise noted), and the payments required will be used to discharge such obligation unless previously discharged; and that the Contractor is entitled to payment in the amount requested. The Project Manager or the consulting architect or engineer, as appropriate, in the event that such has been retained, will also verify the estimate of work completed prior to any acceptance by the City.

6. The Contractor warrants that:

    a. Title to work covered by an estimate of work completed will pass to the City by incorporation into the completed work;

    b. Work covered by previous estimates of work completed is free and clear of liens, claims, security interests or encumbrances, hereinafter referred to as “liens”, except for any interest created by retainage; and

    c. No work covered by an estimate of work completed will have been acquired by the Contractor, or any other person or entity performing work at the work site or furnishing materials or equipment for the project and that no work covered by any estimate is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person or entity.

7. Approval of an estimate of work completed or actual payment shall not foreclose the right of the City to examine the books and records of the Contractor to determine the correctness and accuracy of any estimate item.

8. Pursuant to General Condition 908, applications for a reduction in retainage must be accompanied by Partial Release of Contractor forms from each subcontractor or supplier (Form LR-1).

9. The final estimate for payment shall also be accompanied by Final Lien Release forms from each subcontractor and supplier (Form CM-70).

10. Receipt of Contractor’s Certifications of Payment or Partial Lien Release forms by the City hereunder shall not act to impair the City’s Obligations imposed by C.R.S. 38-26-107 or successor statute.

11. If the Contractor disputes a subcontractor’s and/or supplier’s entitlement to a portion of the previous month’s payment, the Contractor need not submit a Contractor’s Certificate of Payment or Partial Release for Contractors from such subcontractor and/or supplier. However, in lieu of such submittal, the Contractor shall submit to the City copies of a written communication from the Contractor to such subcontractor and/or supplier explaining the Contractor’s determination not to render payment to such subcontractor or supplier, together with proof of service of such written communication upon such subcontractor and/or supplier.

Exhibit F

City and County of Denver

DENVER
THE MILE HIGH CITY

DEPARTMENT OF AVIATION
DEPARTMENT OF PUBLIC WORKS

STANDARD SPECIFICATIONS FOR CONSTRUCTION
GENERAL CONTRACT CONDITIONS

2011 Edition

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SURESCAPE

Surescape Insurance Services
7800 S. Elati Street, Suite 100
Littleton, CO 80120
(303) 225-8030 Phone
(303) 225-8034 Fax

February 18, 2026

Assistant City Attorney
Airport Office Building 8500 Pena Blvd. # 9810
Denver, CO 80249-6340

RE: Servitech, Inc.
Contract No: **202683150**
Project Name: **On-Call Inside/Outside Plant Telecommunications Infrastructure Services**
Contract Amount: $500,000
Performance and Payment Bond No.: 101766014

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through Merchants National Bonding, Inc. insurance company, on February 18, 2026.

We hereby authorize the City and County of Denver, Department of Aviation, to date all bonds and powers of attorney to coincide with the date of the contract.

If you should have any additional questions or concerns, please don't hesitate to give me a call at (303) 225-8030

Thank you,

Kim Payton
Account Executive

XI. ATTACHMENT 6, PERFORMANCE AND PAYMENT BOND

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Servitech Inc. ,
a corporation organized and existing under and by virtue of the laws of the State of Colorado ,
hereafter referred to as the "Contractor", and Merchants National Bonding, Inc. ,
a corporation organized and existing under and by virtue of the laws of the State of Iowa ,
and authorized to transact business in the State of Colorado, as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereafter referred to as the "City", in the penal sum of **FIVE HUNDRED THOUSAND DOLLARS and NO CENTS ($500,000.00)**, lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents;

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bounden Contractor has entered into a written contract with the City for furnishing all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete **CONTRACT NO. 202683150 ON-CALL INSIDE/OUTSIDE PLANT TELECOM INFRASTRUCTURE SERVICES,** Denver, Colorado, and has bound itself to complete the project within the time or times specified or pay liquidated damages, all as designated, defined and described in the said Contract and Conditions thereof, and in accordance with the Plans and Technical Specifications therefore, a copy of said Contract being made a part hereof;

WHEREAS, the City has agreed to accept this Bond, this Bond shall be effective for the definite period of_____to _____. The Bond may be extended, at the sole option of the Surety by continuation certificate for additional periods from the expiry date hereof. However, neither: (a) the Surety's decision not to issue a continuation certificate, nor (b) the failure or inability of the Principal to file a replacement bond or other security in the event Surety exercises its right to not renew this Bond, shall itself constitute a loss to the City recoverable under this Bond or any extension thereof. Regardless of the decision of the existing Surety to not renew the bond, the Contractor shall maintain a bond for the duration of the contract as required by the terms and conditions found in **Contract No. 202683150.**

The above referenced Contract has a term ending ___. Regardless of the number of years this Bond is in force, or the number of continuation certificates issued, this Bond shall not be extended beyond , unless earlier non-renewed pursuant to the above paragraph.

NOW, THEREFORE, if the said Contractor shall and will, in all particulars well and truly and faithfully observe, perform and abide by each and every Covenant, Condition and part of said Contract, and the Conditions, Technical Specifications, Plans, and other Contract Documents thereto attached, or by reference made a part thereof and any alterations in and additions thereto, according to the true intent and meaning in such case, then this obligation shall be and become null and void; otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor shall satisfy all claims and demands incurred by the Contractor in the performance of said Contract, and shall fully indemnify and save harmless the City from all damages, claims, demands, expense and charge of every kind (including claims of patent infringement) arising from any act, omission, or neglect of said Contractor, its agents, or employees with relation to said work; and shall fully reimburse and repay to the City all costs, damages, and expenses which it may incur in making good any default based upon the failure of the Contractor to fulfill its obligation to furnish maintenance, repairs or replacements for the full guarantee period provided in the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if said Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools or equipment used or performed in the prosecution of work provided for in the above Contract and that if the Contractor will indemnify and save harmless the City for the extent of any and all payments in connection with the carrying out of such Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, gasoline, lubricating oils, fuel oils, grease, coal, or any other supplies or materials used or consumed by said Contractor or its subcontractors in performance of the work contracted to be done, or fails to pay any

person who supplies rental machinery, tools or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety will pay the same in any amount not exceeding the amount of this obligation, together with interest as provided by law.

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to contracts with others in connection with this project, or the work to be performed thereunder, or the Technical Specifications and Plans accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract, or contracts, or to the work, or to the Technical Specifications and Plans.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this _____ day of _____, 20__.

Servitech Inc.

Contractor

Attest:

By:_____

President

_____

Secretary

Merchants National Bonding, Inc.

Surety

By:_____

Wesley J. Butorac, **Attorney-In-Fact**

(Accompany this bond with Attorney-in-Fact's authority from the Surety to execute bond, certified to include the date of the bond).

[END OF PAGE]

MERCHANTS BONDING COMPANY™

POWER OF ATTORNEY

Know All Persons By These Presents, that MERCHANTS BONDING COMPANY (MUTUAL) and MERCHANTS NATIONAL BONDING, INC., both being corporations of the State of Iowa, and MERCHANTS NATIONAL INDEMNITY COMPANY , an assumed name of Merchants National Bonding, Inc., (herein collectively called the "Companies") do hereby make, constitute and appoint, individually,

Douglas J Rothey; Erik Ulibarri; Kimberly McAlexander; Wesley J Butorac; Zach Rothey

their true and lawful Attorney(s)-in-Fact, to sign its name as surety(ies) and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

This Power-of-Attorney is granted and is signed and sealed by facsimile under and by authority of the By-Laws adopted by the Board of Directors of the Companies.

"The President, Secretary, Treasurer, or any Assistant Treasurer or any Assistant Secretary or any Vice President shall have power and authority to appoint Attorneys-in-Fact, and to authorize them to execute on behalf of the Company, and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof."

"The signature of any authorized officer and the seal of the Company may be affixed by facsimile or electronic transmission to any Power of Attorney or Certification thereof authorizing the execution and delivery of any bond, undertaking, recognizance, or other suretyship o obligations of the Company, and such signature and seal when so used shall have the same force and effect as though manually fixed."

In connection with obligations in favor of the Florida Department of Transportation only, it is agreed that the power and authority hereby given to the Attorney-in-Fact includes any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts required by the State of Florida Department of Transportation. It is fully understood that consenting to the State of Florida Department of Transportation making payment of the final estimate to the Contractor and/or its assignee, shall not relieve this surety company of any of its obligations under its bond.

In connection with obligations in favor of the Kentucky Department of Highways only, it is agreed that the power and authority hereby given to the Attorney-in-Fact cannot be modified or revoked unless prior written personal notice of such intent has been given to the Commissioner - Department of Highways of the Commonwealth of Kentucky at least thirty (30) days prior to the modification or revocation.

In Witness Whereof, the Companies have caused this instrument to be signed and sealed this 1st day of July , 2025 .

MERCHANTS BONDING COMPANY (MUTUAL)
MERCHANTS NATIONAL BONDING, INC.
MERCHANTS NATIONAL INDEMNITY COMPANY

By Larry Taylor

STATE OF IOWA
COUNTY OF DALLAS ss.

On this 1st day of July 2025 , before me appeared Larry Taylor, to me personally known, who being by me duly sworn did say that he is President of MERCHANTS BONDING COMPANY (MUTUAL), MERCHANTS NATIONAL BONDING, INC., and MERCHANTS NATIONAL INDEMNITY COMPANY; and that the seals affixed to the foregoing instrument are the Corporate Seals of the Companies; and that the said instrument was signed and sealed in behalf of the Companies by authority of their respective Boards of Directors.

Penni Miller
Commission Number 787952
My Commission Expires
January 20, 2027

Notary Public

(Expiration of notary's commission does not invalidate this instrument)

I, Elisabeth Sandersfeld, Secretary of MERCHANTS BONDING COMPANY (MUTUAL), MERCHANTS NATIONAL BONDING, INC., and MERCHANTS NATIONAL INDEMNITY COMPANY do hereby certify that the above and foregoing is a true and correct copy of the POWER-OF-ATTORNEY executed by said Companies, which is still in full force and effect and has not been amended or revoked.

In Witness Whereof, I have hereunto set my hand and affixed the seal of the Companies on this day of , .

Secretary

Exhibit H

SERVITECH INC

SBE/DBE/WBE/MBE

RFP # 202579856

ON-CALL INSIDE/OUTSIDE PLANT TELECOMMUNICATIONS INFRASTRUCTURE PROFESSIONAL SERVICES

Servitech, Inc.
13892 E. Smith Drive
Aurora, CO 80011

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I. Cover Letter

October 17th, 2025

Denver International Airport
8500 Peña Boulevard
Denver, Colorado 80249

This letter is in response to the Notice of Invitation for Proposals first published on September 18, 2025, for Contract No. 202579856, Denver On-Call Inside/Outside Plant Telecom Infrastructure Professional Services Contract.

It will be a pleasure to have the opportunity of working together with the PWCS team once more. For the past twenty years, Servitech has demonstrated the strong capabilities of its employees by outstanding construction performance of the telecommunications infrastructure and technical professional services under several contracts at Denver International Airport.

The anticipated type of work related to this on-call contract includes: Providing inside/outside plant telecommunications infrastructure, engineering, construction and installation services at Denver International Airport. At times, this will include construction consisting of excavation, duct bank, direct-buried, directional boring, aerial, wireless, or other industry acceptable methods. Servitech has capabilities and knowledge to install high-capacity backbones of copper cable, fiber optic cables, as well as high voltage electric cables and equipment including pathways for new construction, construction upgrades, security, voice paging, closed circuit television (CCTV), communication, and other electrical and electronic systems related to airport PWCS. In addition to these systems, the work shall include minor architectural and electrical support work for the aforementioned systems at Denver International Airport in order to aid in the fast track design and construction of projects.

The work could involve all locations throughout the Denver International Airport facility. Projects will be incorporated into the contract through Task Orders.

Servitech makes the commitment to make available its resources to support the PWCS team for this work; specifically, the management team proposed in this proposal. Servitech is presently providing telecom construction services to DEN's Telecommunications group under various contracts at DEN, completing work on the A-East Ground-loading expansion and commencing construction on PACS project and several DAS upgrade projects, Manhole Survey project and the Ansbacher Hall project as both prime and subcontractor. Servitech's main scope of work in these projects will be the low voltage infrastructure.

If needed, Servitech can augment the contract with additional experienced personnel familiar with the DEN environment. This includes support for contract administration, CAD drafting, project management, design supplementation, specialized tasks, and research to address unique requirements.

We aspire to be a strategic partner to DEN's Technologies division, helping realize your vision of becoming the provider of choice by delivering customer-focused technology solutions that connect people to the world. We recognize the critical role of robust infrastructure in supporting cutting-edge technology.

Servitech is certified by the City and County of Denver as a Small Business Enterprise (SBE), Disadvantage Business Enterprise (DBE), Minority Business Enterprise (MBE) and as a Woman Owned Business Enterprise (WBE). We pride ourselves with our present association with DEN, and share the same goals of making Denver International Airport the most passenger friendly airport in the world and the number one connecting airport in America where the Rockies meet the world.

Sincerely,

Servitech, Inc.
Monika Stenger
President/CEO

I. Cost Effectiveness and Pricing

Ensuring Cost-Effectiveness and Efficiency

Servitech' s philosophy on cost-effectiveness and efficiency is rooted in our 20-year track record of delivering telecommunications infrastructure services that meet Denver International Airport's (DEN) exacting standards. Our approach hinges on three core principles: maximizing self-performance, leveraging institutional knowledge, and maintaining rigorous quality control. By self-performing at least 75% of the electrical, low-voltage, and specialty systems work outlined in the RFP, we eliminate subcontractor markups, reducing costs while ensuring seamless coordination. Our deep understanding of DEN's infrastructure, administrative processes, and operational nuances allows us to execute tasks efficiently, minimizing delays and costly rework. This institutional knowledge, combined with our ability to handle multiple installation components concurrently, delivers a streamlined, one-stop-shop solution that enhances efficiency without compromising quality.

Our current on-site team at DEN—consisting of 20 telecom technicians, 11 electricians, 2 radio techs, 4 project managers, 1 project engineer, 1 estimator and 1 general manager—brings proven expertise from projects like the Concourse expansions and ongoing work. This experienced workforce reduces onboarding time and costs, ensuring tasks are completed efficiently from the outset. We also strategically cross-train and badge select personnel from other projects, ensuring they are pre-vetted and familiar with DEN's unique requirements and environment, further enhancing task efficiency.

To optimize cost-effectiveness, we employ the PMBOK (Project Management Body of Knowledge) framework, which integrates cost, scope, time, and quality management. Our proactive cost management practices include detailed budget tracking, regular financial reporting, and strategic use of historical project data to inform bidding and scheduling. This data-driven approach ensures accurate cost projections and timely delivery, aligning with DEN's budgetary goals. Additionally, our risk management processes identify potential cost overruns early, allowing us to implement mitigation strategies that maintain project efficiency. Servitech has a track record of processing very few change orders, unless it's a customer driven change.

Meeting DEN's Project Budget Without Compromising Quality

Servitech is committed to helping DEN meet project budgets while upholding the highest quality standards. Our strategies include:

1. **Maximizing Self-Performance**: By self-performing at least 75% of the work, we eliminate subcontractor markups, which can inflate costs by 10-20%. This direct control over labor and materials ensures cost savings are passed on to DEN while maintaining quality through our in-house expertise.
2. **Leveraging Institutional Knowledge**: Our 20 Plus-years presence at DEN provides unparalleled familiarity with the airport's infrastructure, administrative processes (e.g., shutdown requests), and operational requirements. This eliminates the costly learning curve faced by new contractors, enabling us to deliver tasks on time and within budget.
3. **Strategic Workforce Management**: We prioritize quality by using dedicated, in-house technicians rather than temporary labor, ensuring accountability and high standards. Our deliberate approach to workforce expansion involves cross-training existing staff, minimizing training costs while maintaining DEN-specific expertise.
4. **Data-Driven Decision Making**: We leverage historical project data to inform cost estimates, schedules, and resource allocation. This allows us to anticipate challenges, optimize task sequencing, and avoid budget overruns, ensuring efficient delivery without sacrificing quality.
5. **Rigorous Quality Control**: Our quality management processes, aligned with PMBOK standards, ensure that all work meets DEN's specifications. We conduct regular quality audits and enforce strict standards for both employees and subcontractors, preventing costly rework while maintaining budget adherence.
6. **Efficient Subconsultant Management**: When subconsultants are needed, we rely on long-term alliances to foster collaboration, streamline decision-making, and reduce costs. These partnerships enhance efficiency while ensuring quality through established trust and shared goals.
7. **Competitive Rate Structure**: Our rate schedule (Exhibit B) reflects a modest 3 % annual increase for most roles, with fixed rates for program managers, overtime, and emergency work.

Our commitment to transparency and collaboration means that we engage regularly with DEN stakeholders to ensure all project objectives are met without unnecessary expenditures. Through continuous improvement initiatives and feedback loops, we refine our processes to further reduce inefficiencies and uphold best practices. This approach not only protects DEN's investment but also strengthens long-term value for the airport and its community.

Our 10% materials markup remains consistent throughout all years, ensuring predictable costs for DEN.

By integrating these strategies, Servitech guarantees cost-effective task execution while delivering the high-quality outcomes DEN expects. Our commitment to WMBE goals (self-performing at least 79% of the contract to meet the 21% requirement) further aligns with DEN's priorities, ensuring both cost efficiency and social responsibility.

Job Category	Year 1	Year 2	Year 3
	$82.82	$85.30	$87.86
	$82.82	$85.30	$87.86

ELECTRICIAN - Structured Cable Technician. (Includes low voltage wiring and installation of fire alarms, security systems, telephones, network devices, computers and temperature controls.			
ELECTRICIAN - High Voltage Power (Includes contract work - 120 /220 volts)			
Project Manager			
Program Manager			
Overtime rate	$107.00	$107.00	
Emergency rate	$129.00	$129.00	$129.00
Markup of Materials (Depending on order / job size)	10%	10%	10%

II. DEN Equity, Diversity, and Inclusion Plan (DEN EDI Plan)

Utilization Strategies

Explain strategies and tactics the submitter is currently using and plans to implement in the future to enhance participation of both new and established City and County of Denver WMBE certified small businesses in contracting opportunities.

List the anticipated scopes of work that may utilize WMBE certified businesses. If known, list specific WMBE certified firms that you may consider for certified contractor utilization.

ANSWER

Utilization Strategies

As a WMBE-certified firm with a proven track record of fostering inclusive contracting practices, Servitech is deeply committed to maximizing the participation of Women, Minority, and Business Enterprise (WMBE)-certified small businesses in City and County of Denver opportunities. We recognize the critical role that diverse suppliers play in driving equitable economic growth and innovation within the community. Historically, this contract achieved 100% WMBE participation, which declined to 35% in the prior cycle and is now targeted at 21% under the current RFP—a trend we attribute to evolving DSBO guidelines. Despite these reductions, we remain steadfast in our goal to exceed these thresholds by leveraging proactive strategies that support both new and established WMBE firms. Below, we outline our current tactics, future implementation plans, anticipated scopes of work suitable for WMBE utilization, and targeted certified firms.

Current Strategies and Tactics

We currently employ a multifaceted approach to WMBE engagement, emphasizing outreach, capacity building, and seamless integration into our project execution:

- **Certification Advocacy and Mentorship**: As a WMBE-certified entity ourselves, we actively encourage small businesses we encounter—through networking events, supplier forums, and daily operations—to pursue WMBE certification via DSBO resources. In the past year alone, we have referred over 3 non-certified firms to DSBO's certification workshops, resulting in at least 1 successful certification. We pair this with informal mentorship, sharing best practices on bidding processes, compliance, and scaling for City contracts.
- **Self-Performance with Targeted Subcontracting**: We self-perform approximately 75% of the contract scope to ensure quality control and efficiency. For the remaining 25%, we prioritize WMBE-certified subcontractors where scopes align.

These tactics have enabled us to sustain strong WMBE involvement even as participation goals have decreased, demonstrating our intrinsic commitment beyond contractual minimums.

Planned Future Strategies and Tactics

To further amplify WMBE participation—aiming for at least 21% in this contract—we plan to implement enhanced, forward-looking initiatives that build long-term ecosystems for new and established certified businesses:

- **Joint Venture and Teaming Incentives**: For future phases, we intend to form joint ventures with emerging WMBE firms, offering equity shares in subcontracts to build their experience and bonding capacity. This will prioritize new entrants, providing hands-on training in areas like safety compliance and digital project management.
- **Performance Incentives and Feedback Loops**: Subcontractors will receive performance bonuses tied to on-time delivery and sustainability metrics, with post-project surveys to refine our processes. We will also advocate for DSBO policy adjustments to stabilize participation goals across cycles.

Anticipated Scopes of Work for WMBE Utilization

The following scopes represent the 25% subcontracting portion of the contract, selected for their modularity and alignment with WMBE strengths in specialized, agile services. We anticipate allocating 10-15% of the total contract value to WMBE firms across these areas:

Scope of Work	Description	Estimated Value (% of Contract)	WMBE Utilization Rationale
Site Preparation and Logistics	Earthwork, temporary fencing, and material hauling.	8%	Leverages local WMBE firms with regional knowledge and fleet resources for quick mobilization.
Landscaping and Environmental Remediation	Planting, erosion control, and native species restoration.	5%	Ideal for established WMBE landscapers focused on eco-friendly practices and community hiring.
Specialized Consulting (e.g., Permitting Support)	Regulatory compliance reviews and stakeholder engagement.	4%	Suited for new WMBE consultants offering culturally responsive services to diverse Denver neighborhoods.
Miscellaneous Fabrication and Supplies	Custom signage, safety equipment, and minor fabrication.	2%	Entry-level scopes for emerging WMBE manufacturers to gain City contract experience.

Specific WMBE-Certified Firms Under Consideration

Based on prior collaborations, performance history, and DSBO certification verification, we have identified qualified WMBE firms for potential utilization. Selections will be finalized through competitive bidding to ensure best value:

We commit to documenting all WMBE engagements in our monthly progress reports to DSBO, ensuring transparency and continuous improvement. Through these strategies, Servitech not only meets but elevates Denver's vision for inclusive procurement, empowering WMBE businesses to thrive.

III. Understanding of the Project

UNDERSTANDING OF THE SCOPE OF WORK

This project encompasses the telecommunication infrastructure of the entire DEN Campus (53 square miles). We have been at DEN for many years and we understand the need for prompt response to be able to bring exceptional customer service to DEN and its tenants.

We understand that the main intent of the contract is to create scope-specific task order notices, with the ability to have direct access to a pre-negotiated rate contractor, and receive proposals and services in a timely manner.

Servitech has over 20 years of experience working with different departments (as a prime/sub-contractor) at DEN, as well as working directly and indirectly with many of the high-profile tenants on site. Servitech has a historical working familiarity with DEN project managers (and vice versa), and can claim a vast knowledge base of the entire DEN campus. Servitech also has office staff that can demonstrate extensive working knowledge of all internal and external airport processes, which will result in faster project completion and adherence to the DEN closeout processes. We have worked closely with DEN's project managers, electrical engineers, circuit design team, and technicians and we are confident in our abilities to perform all aspects of the Scopes of Work under this contract. Servitech also enjoys an excellent working relationship with several of DEN's on-call contractors, and can easily mobilize to engage in larger scale tasks. Servitech may be a small company, but it has demonstrated it has big capabilities and excellent safety record both at DEN and throughout Denver.

As a well-seasoned DEN contactor, Servitech understands the mechanisms of the execution of this contract. We are very familiar with how to manage work under Task Orders and the required airport processes and procedures, airfield driving, badging and security requirements to have minimal impact on airport operations and keep the public safe. We engage in extensive coordination with airport operations and tenants and pay close attention to detail in our schedule.

We follow all recommended practices for the installation and testing of structured cabling systems, including the pulling, routing, and suspending of cable trunk pathways, building of rack systems and cable management systems in communications closets. Installation of patch panels and field termination hardware, along with the proper cabling specifications, will be an integral part of the entire system. All cables and terminations will be labeled and certified to industry standards.

Servitech uses Fluke DSX 8000 fiber and cable testers with the most current software upgrades to ensure proper cable performance. All cabling installed by us is meticulously tested to industry standards, and documentation of all test results is provided to the customer at completion of each phase or project.

COMPLEXITY, CHALLENGES, AND PROBLEMS. PLANNING AND PERFORMING SCOPE OF WORK

Servitech will ensure that cost loading will be implemented and utilized for projects that require analysis for cash flow management, over-under billings, resource tracking, and scheduled performance. Utilization of cost loading allows for the tracking of milestone activities and linear labor resources over time. Milestone tasks create constraints that can affect the scheduled progress of the project. Cost loading helps identify the progress of the schedule and can facilitate the need for remedial action plans when progress and completion dates are at risk.

At Servitech, we compare the time required to perform a task against the resources available. An analysis of schedule and constraints can then be performed in order to achieve a knowledgeable path to success for the task or project. We focus on high-priority tasks and milestones that need special tracking. We evaluate contingencies and the relationship of tasks to scheduled predecessors and successors in order to develop alternative action plans. We test the schedule to determine and understand the sensitivity of the critical path to the successful completion of the project.

APPROACHES AND PHILOSOPHY FOR DEALING WITH PROBLEMS

Servitech's solution-oriented philosophy mandates that our technicians carefully plan and review their work and utilize our in-depth understanding of DEN's systems and facilities to develop value engineering opportunities where it makes sense. As a result, our approach to conducting business has resulted in satisfied clients and repeat business from DEN.

Solving problems on the job and making sure the customer is satisfied with the job largely comes down to the management we have on staff and their ability to empathetically communicate with the customer they are performing work for. Our tenure at DEN and the retention of our employees speaks to our ability to keep our customers satisfied. We are a small company who prides itself in its work. Part of our service offering is to make sure the job is complete to our customer's satisfaction.

IV. Proposed Work Plan and Approach

We understand that nearly all of the cable and wire at DEN **must** be installed in conduit. For years we've been installing such infrastructure to meet DEN's standards and specifications. The advantage Servitech provides for performing this scope of work is its efficiency and timely execution of the work. Our teams of electricians and low-voltage technicians work in tandem for this installation, as we can do both components at the same time resulting in a seamless/cost efficient execution of the work. In the past, Servitech has been hired to do this work through general contractors or structured cable contractors adding a mark-up to our pricing. With this set-up, Servitech can perform the electrical work and structured cable work simultaneously.

The bulk of the scope of this contract falls within the Inside/Outside Plant work; hence the title of the RFP. We can self- perform 75% of the inside plant work, technicians, staff augmentation and field research/design assist, eliminating another tier mark-up in the bulk of the work. There will be occasions when we will have to bring additional resources through our subcontractors to support us. We have hand-picked the best team of vendors and resources to make available to DEN through this contract.

For the large outside plant work, we may need to subcontract out the directional boring and trenching, utilities locate, traffic signaling, etc.… We will choose from the city's extensive WMBE database and will reach out to certified firms that will fit best, depending on the scope of the task order. We are committed to bring in small companies to mentor them to navigate the DEN landscape.

For the utilities locate, boring and traffic controls we are proposing to use Paonia Inc. For the GC scope of work (concrete, foundation, framing, drywall, etc.) we will reach out to the existing DEN On-Call Construction contractors at the time. By doing so, we will limit the risks and cost impact to the project by mobilization/demobilization fees and the hurdle of a steep learning curve at DEN. We have worked with past and current contract holders and have an excellent working relationship with them.

For the engineering component we are making resources available for the RCDD/EE/PE per request via task order. The companies we chose for these tasks are PKE and AECOM since we know the extent of the knowledge of these teams.

PROJECT MANAGEMENT AND ORGANIZATIONAL APPROACH

Servitech has a thorough understanding of the scope of work requested. To ensure that the work is completed in a timely manner and with a high degree of quality, the Servitech Team will default to one of the main topics discussed in this RFP response:

Project Controls. Our extensive project controls regimen ensures that everyone is integrated into the overall project schedule and reporting requirements are uniform. Schedule management and manpower loading helps us to forecast required staff assets. Plus, we believe that our outstanding performance on multiple DEN projects since 2001 has earned us the reputation of being one of the most reliable contractors at the Airport. Demonstrated past results show our current ability to successfully manage concurrent tasks in multiple facilities and deliver a quality product in a timely manner.

Our project controls include, but are not limited to, the following:

- Project Management, Scheduling, and Quality Assurance
- Permits, Licenses, and Inspection Scheduling
- Documenting all installation activities
- Periodic field observations reports
- Inspections and tests
- Final acceptance and work closeout
- Warranty for hardware and systems as installed
- Safety
- Quality Control
- Provide types and locations of Hazardous Material
- Deliverables – (i.e. red line drawings, test reports, and schedules)
- Integrated Product Team (IPT) weekly conference call updates
- Coordination of work with other offerors on-site

We understand that winning the RFP process is only the first step to obtaining work under PWCS; being competitive and controlling costs, is what can set Servitech apart within this contract.

Our management team has extensive experience with the overall DEN airport-wide processes; even better, they are very well versed in the specific PWCS internal processes. The learning curve will be virtually non-existent.

We focus our energies on serving the needs of DEN and delivering upon our promises. We adhere to maintaining clear channels of communications and expectations to our teams – and settle for nothing short of perfection.

PROJECT SCHEDULE AND COORDINATION WITH OTHER ENTITIES

We strive to accurately project and track schedules, develop accurate budgets, complete the work within the agreed time/budget, and take a proactive approach in identifying potential

issues that could affect the schedule or the cost. We utilize the following software programs for scheduling, estimating and project management. Our strict design and construction Quality Control/Quality Assurance processes allow us to identify and react to potential problems before they impact a project.

The Servitech team has developed a comprehensive set of tools that support the completion of work as required in the scope of work. Servitech understands that timely execution of work requires a thorough understanding of the specific assignment and a working knowledge of DEN's processes and expectations. Our team will develop a unique project identifier; prepare a project schedule with work breakdown structure and manpower loading projections; prepare a detailed scope of work; and develop a detailed cost estimate. All of these will be tailored to meet the size of the project and scope of work. Database tracking tools will be utilized to ensure that action items, related project coordination activities, submittals, project design requirements and all other critical project elements are documented and tracked on a daily basis. Tools that the Servitech team will utilize in the daily course of business include:

- A pro-active project management approach
- Scheduling software including MS Project
- ConEst cost estimating software

To successfully manage, management control processes and tracking procedures will be established up front with the DEN Project Manager. Key areas to be defined and agreed upon include frequency of meetings with stakeholders, internal meetings, development of meeting minutes, and project reporting requirements. A detailed schedule will be agreed upon and developed, and will include all design and construction phases.

We have discussed several tools that the Servitech team uses which are critical in the day-to-day execution of this project. However, as good as the tools are, you must have competent and proactive project management to ensure that the tools are used and continually updated. The Servitech team's experienced project professionals will monitor each task to avoid being in a reactive mode regarding budget, schedule, personnel, materials issues, or other conditions that can lead to serious problems for a project and DEN.

Servitech and its team of sub-consultants and subcontractors are all local companies. All of the firms that comprise the Team are presently doing business at DEN or have recently worked at DEN. We understand DEN's business processes, operational requirements, and staff. We possess an in-depth knowledge of DEN's facilities, suite of specialty electronic, IT, security, infrastructure networks, and electrical systems.

The Servitech team members have previously worked together. All of those factors and our employees' badged status allow us to hit the ground running with respect to proposal preparation and project execution. There is no learning curve with the Servitech team. We have the staff resources to respond immediately to task order requests. Our familiarity with DEN and our team's dedication will ensure a quick and accurate response.

V. Key Personnel and Ability to Respond

We have extensive knowledge of the campus and DEN's structured cable protocol for installation, testing, and labeling.

- Key Personnel: Personnel are badged and well versed with DEN's standards and regulations. We have a General manager, 3 project managers, RCDD, estimator, access control supervisor, distributed antenna system (DAS) supervisor.
- Manpower: We have 20 badged telecom technicians and 11 badged journeyman electricians, 2 radio techs, on site.
- Contractor furnished Equipment: (4) DSX 8000 Fluke with OTDR, (4) Fujikura Fusion splicers, (2) CommScope fusion splicers, (18) golf carts, and (4) Passenger vans to move personnel in and out of DEN via the airfield gates. We have company owned vehicles that are registered to drive airside at DEN, which include: (1) flatbed truck, (4) work vans, (2) pickup trucks,1 box truck and (1) bucket truck.
- Certifications: BICSI RCDD, BICSI Technician and BISCI Installer, CommScope, Panduit, AFL, Dura-Line Enterprise/eABF solution, Sumitomo Air-Blown fiber Solution, Confined Space, OSHA10, OSHA 30.

We only use DEN approved cable and materials, and we are very familiar with the submittal process; we know what will be approved or rejected and will work with the designers to be able to reduce turnaround submittal time.

ABILITY TO RESPOND

We are performing work under different contracts within the DEN fence at any given time. We have been around for years, and we understand the DEN business model very well. We have extensive experience in the contracting processes, especially the On-Call model. We are currently working on the PACS project as well as various other projects throughout the airport.

We are a financially sound company that can bond $25 million single and $30 million aggregate.

We have a management team that has over 100 years of combined experience working at DEN and we understand very well how to manage work at DEN. Their coordination skills are excellent. They understand that behind any successful project we must have uninterrupted communication with all the stakeholders and the team members.

Servitech headquarters are located near the airport at 13892 E Smith Drive in Aurora, a 15 minute drive from DEN. We have 6,000 square feet building with a small warehouse attached, which facilitates the delivery of materials off site and easy access for logistics and storage. We are also staffed on-site at DEN in proximity to the PWCS and Technologies offices, allowing for facilitated communication, efficient project coordination, weekly meetings, and the ability to be on-site during regular working hours.

We already carry the $10 million umbrella insurance to be able to drive in the tunnels and airfield, and we are engaging subcontractors that can provide the same. Currently we have 33 DEN badged electricians/technicians on-site, and a fleet of (5) vans and (20) golf carts that provide immediate response to any situations and challenges that arise. Work can quickly be engaged anywhere on the DEN campus, and the on-site project management staff will be available to provide immediate assistance whenever needed.

The Servitech Team has the necessary equipment and tools to be able to perform 100% of the work described in the Scope of Work area of the RFP document.

Over the past 20 plus years, Servitech has been a part of numerous changes at DEN and has responded successfully to the change in administrative planning and funding as well as the modifications in Airport Security and Operations. Servitech has adapted to the alteration of budgets, work restrictions, rules and regulations that are necessary to the airline industry and for public safety.

The reason for our success is culture driven from the top down. While strength in scheduling is a part of the core of every project, we at Servitech also understand the need for flexibility as circumstances arise.

Because technology changes so quickly in today's world, we often find that the requirements we had at the beginning of a project are not the same at the end of the project. We've learned to adapt to and anticipate possible changes because of technology changes such as "end of life" equipment notifications, for example. Creating "what if" scenarios has helped us avoid total redesign on elements of installations.

In the fast-paced airport environment, changing codes and administrative modifications affect us at every turn. Although we don't have control over code issue agreements, we have had to respond to budgets and scheduling changes, equipment changes, and installation changes as a result.

One of the more complex issues that we must deal with on a regular basis is the owner's request for time. Projects must be expedited in order for the owner to meet other challenging demands that they are confronted with. Something as simple as a series of snowstorms suddenly changes airport

demands for resources and forces us to adapt and to modify our processes in order to achieve our goals. The owner's priorities are always our priorities.

Adapting to funding processes can be challenging. Processes are designed to be transparent but often involve "time delays". Long lead items and complicated schedules are affected by these time challenges. Synergy between all participants and proactive planning helps avoid conflict and helps to have minimal effect on the project.

Our management team has extensive experience with the overall DEN airport-wide processes; even better, they are very well versed in specific internal processes. A lack of learning curve for this contract should be a competitive advantage for Servitech for this RFP.

Servitech will be responsible for contracting, billing, scope of work verification, and authorization. We will issue documentation for additions, moves and changes, as well as material and personnel requirements. DEN will be responsible for providing points of contact that will be able to make day-to-day decisions as necessary to assist in timing and coordination with all stakeholders. Servitech can provide project management, electricians, cable technicians, scheduling documentation, and coordination to perform projects in a safe environment. We focus our energies on serving the needs of DEN and delivering upon our promises. We adhere to maintaining clear channels of communications and expectations to our teams and settle for nothing short of the unprecedented teamwork you have come to expect from Servitech.

KEY PERSONNEL

Our management team for this contract is listed below and has been working with DEN for many years on other ON Call contracts.

Robert Kimber- Project Manager/General Manager:

Robert is a 25-year veteran at DEN. He is highly respected, not only from the team he supervises, but from DEN personnel and fellow contractors/subcontractors alike. He understands the communication and coordination protocols necessary to assess and accelerate issues to the correct people. Robert coordinates a vast array of projects for DEN, including electrical, wireless, telecom, CCTV, and access control. He provides design support and field research for designers, supervises electrical projects, and has ample knowledge of DEN standards and the National Electrical Code. He readily and proactively seeks solutions by having a thorough knowledge of the DEN campus. As Project Manager for this contract, Robert will continue to have the project performance capabilities that drive him to look for cost and schedule savings opportunities for maximum efficiency.

Dusty Thompson- Project Manager-RCDD

Dusty has been working at DIA for over 10 years and knows the campus very well. Dusty's role in this project will be to create a cohesive working relationship with all suppliers, service providers, and subcontractors to facilitate a project in such a fashion as to accommodate the technical goals required by DEN. Dusty will be responsible for staffing and coordination of projects as well as interfacing site personnel for project updates. He also has the experience to insure that stringent quality measures are in place. Dusty is a 20- year veteran of the AEC industry and has considerable expertise in the design, coordination and installation of telecommunication and network data systems. This includes CCTV, security systems, public address systems, and structured cabling systems for voice, data and video systems.

TJ Brown- Project Manager

As project manager, TJ's role will be to integrate task order work with DEN PWCS personnel and Servitech' s field services team. TJ has been a successful project manager with Servitech for the past 6 years on several projects, including Concourse expansion projects, Interim Ticketing, and UAL clubs, and has seamlessly coordinated with DEN PWCS, DEN PPS, DEN NOC and other DEN personnel over the years. TJ will also be responsible for project/task order closeout and working with Tom Gill for project billing.

Tom Gill- Project Coordinator:

Tom's role will be to facilitate a cohesive working relationship will all CCD personnel, suppliers, service providers, and subcontractors to efficiently assist with all aspects of project coordination. He has worked in this role for the past 13 years over the course of two previous PWCS Inside/Outside Plant contracts and is very familiar with City and County of Denver procurement and administrative processes. Tom will manage all task order billings, submittals, pay applications, professional services contracts, and closeout procedures.

Jim Barker- Operations Manager

Jim has been a key part of Servitech's management team. He oversees high-level HR duties, such as hand picking the technicians that will be assigned to this contract, setting training standards, and keeping all required certifications up to date. He is also constantly analyzing and coming up with new way to improve quality, productivity, and efficiency. Jim has been working at DEN for the past 15 years. He has been in the telecom industry for 25 years as an owner or Director of Operations or Vice President of Sales. Jim's duties include estimating, bid solicitation, contract negotiation with customers and vendors, project management, and scheduling.

VI. Company Experience and Qualifications

Servitech is a Woman/Minority Owned Business certified by City and County of Denver with over **20 years** of experience working at DEN with the Premises Wire Communication Systems team as a prime contractor as well as a subcontractor to many other companies, and we have completed extensive projects through the years.

Servitech has consistently demonstrated a solid working partnership with PWCS and the Technologies group, with regards to all areas of the Scope of Work. Hundreds of jobs have been completed in tandem with PWCS, ranging all the way from small MAC-related power and conduit installations to large scale infrastructure build-outs and project assistance.

Servitech has successfully completed numerous projects at Denver International Airport. We strive to accurately project and track schedules, develop accurate budgets and complete the work within the agreed budget, and take a proactive approach in identifying potential issues that could affect the schedule or the cost. Our strict Quality Control/Quality Assurance processes allow us to identify and react to potential problems before they impact a project.

Servitech's solution-oriented philosophy mandates that our technicians carefully plan and review their work and utilize our in-depth understanding of DEN's systems and facilities to develop value engineering opportunities where it makes sense. As a result, our approach to conducting business has resulted in satisfied clients and repeat business.

Servitech offers a complete range of communications design and construction services for inside and outside plant copper, fiber, and coaxial communications network infrastructure systems abiding by DEN's ordinances, rules, policies, and procedures.

Full service offerings for inside plant special systems installations include voice/data/video structured cabling systems, wi-fi systems, CATV systems, CCTV/video surveillance systems, healthcare communications systems, public announcement (P.A.) systems, distributed antenna systems (DAS), security systems/intrusion detection/video surveillance systems/access control (including biometrics), intelligent infrastructure management (IIM) systems, data centers: DCIM, hot and cold isle containment systems, phone systems /VOIP, audio/video, and fire alarm systems, telecommunication systems such as copper and coaxial cable, network/computer/storage equipment, airfield lighting control, vehicle gate controllers, UHF/VHF radio systems, computers and computer networks, PLC control and signaling systems, and other electronic and electrical DEN legacy systems.

We have a historical working familiarity with DEN project managers (and vice versa) and can claim a vast knowledge base of the entire DEN campus. Servitech also has a former PWCS employee on the staff who can demonstrate extensive working knowledge of all internal and external processes, which will result in faster project completion and adherence to the PWCS closeout processes.

Servitech technicians are manufacturers and BICSI certified; they have performed all aspects of telecommunications installations and cable terminations (both copper and fiber, inside and outside), communication room infrastructure build outs, and troubleshooting and testing with the usage of our company-owned Fluke DSX8000. Servitech has both journeyman electricians and low-voltage technicians on staff. We install the conduit/pathway and the cable, and we also often install the equipment, making us a turn-key solution for most of our clients.

Consistency with DEN-approved materials is important, and Servitech staff has experience with the procurement and installation of the brands and parts that DEN uses, Servitech is certified with the following brands: Panduit, CommScope, AFL, Duraline and Sumitomo, and has experience with all brands of fiber and copper. We have worked closely with the PWCS project managers, circuit design team, and technicians and we are confident in our abilities to perform all aspects of the Scope of Work in this contract. Servitech also has an excellent working relationship with several of the on-call contractors, and can easily mobilize to engage in larger scale tasks. Servitech may be a small company, but it has demonstrated it has big capabilities along with the knowledge to complete the task within the DEN fence.

Outside plant services include underground and overhead long-haul copper and fiber optic cable installations.

A sample of Servitech's expertise is outlined (but not limited to) the following:

• Cable Runs	Conduit Routing	Termination of fiber and copper
• Inner Duct-	Labeling	Fiber Installations
• Fiber Splicing	Networks	Racks
• Cabinets	Electrical Closets	VOIP Phone Systems
• Project Management	As-Built Documentation	Cable Raceway
• CCTV	Intrusion Detection	Video Monitors
• Testing	Video Monitors	Blown Fiber Installations

Servitech is certified as a Small Business Enterprise (SBE), Disadvantage Business Enterprise (DBE), Minority Business Enterprise (MBE) and as Woman Owned Business Enterprise (WBE)

Servitech feels we can compete with anyone when it comes to understanding the specialty work at DEN. We not only hold several different contracts at DEN, but we also perform several types of work that have synergies to the Inside/Outside Plant Telecom Infrastructure on-call contract and have a very knowledgeable workforce who has an unprecedented number of years of experience with the airport infrastructure.

Servitech is committed to making available its resources to support the DEN team for this contract. We have our team already on-site ready to immediately respond to DEN's needs. The key personnel highlighted in this proposal is committed for the full term of this contract and for any time extensions granted beyond the original term, We are providing infrastructure construction services to DEN's Technologies group under the PWCS Inside/Outside Plant Telecom Infrastructure on-call contract. We are also working under several of the On-Call Construction Services contracts and the PACS project.

We want to continue to be a strategic partner for DEN and we understand the importance of DEN's infrastructure build out to support airport operations; we are very excited to have the opportunity to utilize our engaged workforce to serve those needs.

COMPANY PROJECT REFERENCES

Project Name: Concourse A East – Ground Loading Expansion

• Project Description: A East Grounding Loading Expansion Low Voltage Design assist is a multiphase remodel project of existing ground loading space AEGL 01 & 2A and AEGL 2B addition of specifically for the relocation on Frontier Airlines

• Contract Value: $5,281,318.00

• Scope of Work: Design assist of telecommunications backbone, station cabling, DEN and Frontier communications rooms buildout, special systems including, but not limited to…Access Control, Wi-Fi, cameras, and Distributed Antenna system. Access Control design assist and coordination with Moye Consulting for a complete delegated design/permit.

• Location: Denver International Airport

• Owner name, address, current contact person, and telephone number

- City and County of Denver – Turner-Flatiron
- 8500 Pena Blvd Denver CO 80249
- Dan Perozzi
- 720-693-0736

• List any subconsultants and percentage of work performed: N/A

• Gross Fees: N/A

• Outcome/Result: While this design assist project had many challenges due to the restrictions of ceiling space in the existing building, it took many hours of research, sketches, BIM coordination, meetings with team members and stakeholders, DEN, and Frontier Airlines, to assist with designing systems to accommodate all trades and meet the needs of stakeholders. The hard work of all parties concluded in a successful project within time and budget.

Project Name: CDAS-Prism Replacement

• Project Description: Replace the existing CDAS/Prism Systems in the Train, Baggage, and Utility Tunnels.

• Contract Value: $1,642,468.00

• Scope of Work:
Statement of Work (SOW) for the Denver International Airport (DIA) Distributed Antenna Syste m Installation in Phase 1 of the CDAS/Prism Replacement Project. This SOW will contain Design and installation requirements including electrical conduit, wiring, and power; CDAS antennas, structures, cabling, and equipment; coordination for train tunnel access and baggage tunnel requirements. CDAS design assists and coordinate with AECOM for a complete delegated design/permit.

• Location: Denver International Airport

• Owner name, address, current contact person, and telephone number

- City and County of Denver – BT/PWCS
- 8500 Pena Blvd Denver CO 80249
- Kader Khalif
- 303-342-2826

• List any subconsultants and percentage of work performed: N/A

• Gross Fees: N/A

• Outcome/Result: This project is ongoing with completion anticipated in December 2025.

Project Name: City and County-Webb Building Restack Project

• Project Description: Replace the existing Cat 5 cable with Cat 6 cable in the entire Building 11-floors

• Contract Value: $5,671,800.00

• Scope of Work: Statement of Work (SOW) for the Webb Building Restack project. Upgrade 11 story Webb Building with Cat 6 cable over 7000 Cat 6 cables. Upgrade and added Access Control Card Readers to over 40 doors. Upgraded 40 IDF with new racks and wire managers. Upgraded 40 IDF with new backbone fiber.

• Location: Webb Building 201 Colfax Ave. Denver CO

• Owner name, address, current contact person, and telephone number

- City and County of Denver – BT/PWCS
- 201 Colfax Ave. Denver CO
- Mathew Synovic
- 720-337-6158

• List any subconsultants and percentage of work performed: N/A

• Gross Fees: N/A

• Outcome/Result: This project is ongoing with completion anticipated in December 2025.

Exhibit I – Servitech Rate Schedule
Contract 202683150 - On-Call Inside/Outside Plant Telecommunications Infrastructure

Job Category	Year 1	Year 2	Year 3	Year 4	Year 5
Electrician – Structured Cable Technician. (Includes low voltage wiring and installation of fire alarms, security systems, telephones, network devices, computers and temperature controls.)	$82.82	$85.30	$87.86	$90.50	$93.21
Electrician – High Voltage Power (Includes contract work – 120/220 volts)	$82.82	$85.30	$87.86	$90.50	$93.21
Project Manager	$99.82	$102.81	$105.90	$109.08	$112.35
Program Manager	$107.00	$107.00	$107.00	$107.00	$107.00
Overtime Rate	$107.00	$107.00	$107.00	$107.00	$107.00
Emergency Rate	$129.00	$129.00	$129.00	$129.00	$129.00
Markup of Materials (Depending on order/job size)	10%	10%	10%	10%	10%

ON-CALL CONSTRUCTION TASK ORDER PROPOSALS AND EXECUTION PROCESS

Contents

1.0. INTRODUCTION

1.0.1. THE FACILITY DESCRIPTION

A. The Denver International Airport Terminal Complex consists of the main terminal, north terminal support facility, airport office building, modular parking structures with integral vehicle curbsides, three airside concourses, hotel and transit center, central utility plant, and numerous ancillary support facilities including mechanical and electrical systems located below grade which serve these above grade facilities.

1.0.2. TASK ORDER OVERVIEW

A. The Airport maintains on-call construction contracts to provide various construction work on an as needed basis. The Task Order scopes of work are defined on an individual basis and may include modifications and additions to existing airport facilities and systems and may involve various disciplines depending on the scope of the contract, including structural; mechanical; electrical; plumbing; life safety; fire alarm; fire protection; controls and automation; telecommunications; interior finishes; demolition; site surveying; site preparation, and materials testing. Conducting this construction work may include pre-construction planning; scheduling; cost estimating; permitting; mobilization; self-performance of work; subcontractor management; site supervision; quality control planning and management; safety planning and management; coordination with DEN stakeholders; participation in construction update meetings; and closeout activities. In addition to the types of projects described above,

the Contractor may be tasked to participate in the design phase of a project by providing pre-construction services.

B. Should a Task Order scope of work require a discipline that is not currently represented on the Contractor's team, the Contractor will be requested to add that discipline as part of the team for that specific Task Order scope of work. Contractor will identify a specialty subcontractor for the required discipline and will submit the subcontractor's qualifications, personnel pay classifications, and agreed hourly billing rates for approval by DEN.

C. The term "Task Order" when it is used in this Agreement includes all of the work associated with the proposal preparation and construction management for any and all construction services as requested by the Senior Vice President (SVP) of Design, Engineering and Construction (DEC) or the designated DEN representative.

1.1. CONTRACTOR'S SPECIFIC SCOPE OF WORK

1.1.1. CONTRACTOR SERVICES

A. The Contractor, as deemed necessary by the SVP of DEC or the designated DEN representative, will be required to provide construction work for specific task scopes of work. The Contractor must be a licensed general contractor in the State of Colorado and City and County of Denver. The Contractor's work performance requirements are detailed in, and its activities will comply with, the Agreement, the Denver Standard Specifications for Construction General Contract Conditions (referred to here as the General Conditions) and any other applicable Federal, state, and local Executive Orders, rules, regulations, or standards as specified in the Task Order.

B. Specific task scopes of work, which will be issued with a Task Notice for Proposal (TNP), may include but are not limited to the following:

a) Pre-construction services and/or planning
b) Scheduling
c) Cost estimating
d) Permitting
e) Mobilization
f) Self-performance of work
g) Subcontractor management
h) Site supervision
i) Quality control planning and management
j) Safety planning and management
k) Coordination with DEN stakeholders
l) Participation in construction update meetings
m) Closeout activities

1.1.2. TASK ORDER SCOPE OF WORK

A. The SVP of DEC, or the designated DEN representative, will issue to the Contractor, either via electronic delivery or hard copy, a Request for Proposal (RFP) or Task Notice for Proposal (TNP) for each specific Task Order. The Contractor will prepare and submit a proposal, in the format specified in the RFP/TNP, within 14 days of receipt

of the signed RFP/TNP, unless an alternate delivery duration is defined by the DEN. The RFP/TNPs may not always result in an executed Task Order.

B. The standard proposal method by the Contractor shall include the following as part of the comprehensive proposal:

a) A narrative of the understanding of the requested Task Order scope including all assumptions, exclusions, constraints, sequencing, method of delivery, expenses, and breakdown of scope of work performed by prime contractor and all subcontractors.

b) A completed Standard On-Call Cost Proposal. Including the following supporting documentation:

a. Proposals by all subcontractors, material vendors, and professional service vendors performing work on the Task Order identifying the scope of work or services to be provided, inclusions, exclusions, and a cost breakdown by labor, material, and equipment.

b. Proposals for all company-owned or third-party provided equipment performing work on the project, identifying the equipment rental rate.

c. A schedule incorporating the method of delivery, the full scope of work and sequencing which will then be baselined for performance assessment and payment applications.

d. Identification of a lump sum not-to-exceed Task Order value.

A. DEN may require the Contractor to submit a proposal using other methods or with additional requirements as specified within the RFP/TNP.

B. DEN may issue the same TNP to multiple on-call contractors to compete the work among multiple companies. Any competitively bid Task Orders shall follow all proposal requirements as listed above.

C. The Contractor will be provided those specifications and criteria, or other applicable criteria, for the execution of each assigned Task Order(s). Technical specifications shall not be used between multiple tasks without written approval of the DEN Project Manager.

D. With respect to any work that is authorized by a Task Order issued prior to the contract completion date, but not completed by that date, the City shall have the option to terminate the work in progress and pay only for that portion of the work satisfactorily completed within the period of performance specified herein or to provide for, in writing, a limited extension of the contract completion date to complete the remaining work. In the event the completion date for a particular Task Order extends beyond the Expiration Date and the Agreement is thereby extended, the Task Orders still being performed shall be performed on the previously-issued terms and Contractor shall not be entitled to any modifications to the unit prices or other amounts except those required by Prevailing Wage law, approved hourly rate increases pursuant to the Agreement, or any additional compensation for extended overhead or added costs.

1.1.3. CONTRACTOR'S PERSONNEL ASSIGNED TO THIS AGREEMENT

A. The Contractor will assign a lead project manager to this Agreement who has experience and knowledge of construction industry standards. The project manager will be the contact person in dealing with the City on matters concerning this Agreement and will have the full authority to act for the Contractor's organization and at the direction of the SVP of DEC or the designated DEN representative. This project manager will remain on this Agreement during the entire Agreement term, while in the employ of the Contractor, or until such time that his / her performance is deemed unsatisfactory by the City and a formal written request is submitted which requests the removal of the project manager.

B. Should the City request the removal of a project manager, the Contractor will replace that project manager with a person of similar or equal experience and qualifications. The replacement project manager is subject to the approval of the SVP of DEC or the designated DEN representative.

C. The Contractor may submit, and the City will consider a request for reassignment of a project manager, should the Contractor deem it to be in the best interest of the Contractor's organization or for that project manager's career development or in the best interest of the City. Reassignment will be subject to the approval of the SVP of DEC or the designated DEN representative.

D. If the City allows the removal of a project manager, the replacement project manager must have similar or equal experience and qualifications to that of the original project manager. The replacement project manager's assignment to this Agreement is subject to the approval of the SVP of DEC or the designated DEN representative. The hourly rate for the new project manager shall be approved by DEC, and it will not exceed the rate for the outgoing project manager. DEN will not pay for work not related to DEN or that DEN deems is not necessary for the scope of work required of Contractor or its project manager.

1.1.4. DILIGENCE

A. The Contractor will perform the work defined by the individual Task Order scope of work in a timely manner and as directed by the SVP of DEC or the designated DEN representative.

B. The Contractor shall submit status update report of the project per Task Order at any time requested by the DEN Project Manager.

1.2. MISCELLANEOUS REQUIREMENTS

1.2.1. EXISTING FACILITY INFORMATION

A. City Supplied Documents: As tasks are defined, DEN may make available, documents when they exist, related to that specific Task Order scope of work. These documents, when provided for a Task Order scope of work, will be considered by the Contractor as 'For Information Only' and will not represent any guarantee of existing conditions. The Contractor maintains the responsibility to their own due diligence in assessing existing conditions to the degree that they may accurately present a proposal with all stated inclusions and exclusions as required by the General Conditions. These documents include items such as:

a) Electronic files of Construction Drawings (Task Order Specific)

b) Available BIM files for areas of work (Task Order Specific)

c) Electronic copies of available Technical Specifications (Task Order Specific)

d) 3-D Scans of spaces (Task Order Specific)

1.3. TASK ORDER EXECUTION

1.3.1. PRECONSTRUCTION MEETING

A. Individual pre-construction meetings will be held at the City's discretion on each issued Task Order prior to the issuance of each Notice to Proceed (NTP) with that Task Order.

1.3.2. TASK ORDER NOTICE TO PROCEED (NTP)

A. Following the issuance of any fully executed Task Order hereunder, the Contractor shall commence Work in accordance with the NTP date established in the Task Order. In the event the Task Order does not include a NTP

date, the City will issue a separate NTP, and the Contractor shall commence Work within ten (10) consecutive calendar days of the date of the Task Order NTP; however, no work will commence on any project until such time as the Contractor has complied with all administrative requirements for that particular Project and the Contractor has satisfied all bonding requirements for the particular Task Order. Thereafter the Contractor shall perform the Work to be accomplished under the Task Order at such time and place as the Task Order directs and shall fully complete in every detail all specified Work in accordance with the terms and conditions of the Task Order and the provisions of these General Contract Conditions and Special Contract Conditions.

B. Notification: The City will provide written notification to the Contractor to proceed with a Task Order scope of work. This written notification will come in the form of a NTP letter through DEN's PMIS. The Contractor will not be authorized to proceed with the work described in this Agreement, including a particular TNP and the City will not be obligated to fund any work performed by the Contractor, until the City has provided signed, written notification to the Contractor that the work is to be performed.

C. Kick-off meeting: Upon written notification to the Contractor to proceed with a Task Order scope of work, the City will schedule and hold a meeting with the Contractor and all stakeholders to review the scope of work and schedule, familiarize the Contractor with all internal processes, establish invoicing requirements, and establish required meetings dates. The City will provide bi-weekly training for the PMIS to Contractors as necessary.

D. Schedules: Immediately following the kick-off meeting, the Contractor shall submit to DEN's Project Manager, a rolling three-week, look-ahead schedule, for the following three week's work.

1.3.3. CONSTRUCTION

A. Required Documentation: Unless specifically identified in the TNP, the Contractor will abide by DEC's reporting requirements and technical specifications for cost, schedule and change management.

B. Submittals: Upon receipt of the executed Task Order and NTP letter, the Contractor will proceed with Task Order scope of work on all Task Order deliverables, submittals, meeting minutes, change requests, and shall be managed through the PMIS. All submittals shall include forms as directed by the Project Manager.

1.3.4. TASK ORDER CLOSEOUT

A. After all Work performed under each Task Order has been accepted hereunder, final payment and Task Order closeout shall be made in accordance with the terms and conditions of General Contract Condition 910 FINAL ESTIMATE AND PAYMENT. Except that, with the consent of the Contractor, legal advertisement, pursuant to Article 26, Colorado Revised Statutes as amended may be held for Task Orders which do not exceed Fifteen Thousand Dollars ($15,000.00) until such time as several such projects are completed and eligible for legal advertisement.

B. Task Order Closeout Initiation: Task Order closeout will not begin without written approval from the DEN Project Manager.

C. Task Order Closeout Checklist: The Contractor will work with the Project Manager to address all items on the Closeout Checklist.

D. Task Order Final Payment: Final payment and Task Order closeout shall be made in accordance with the terms and conditions of General Conditions 910.

1.4. REFERENCED FORMS

The following is an example list of forms that may be required for execution of Task Orders. It is not all inclusive.

A. Standard On-Call Cost Proposal Form: CM-81

B. Daily Quality Control Inspector Report

C. Daily DEN Time and Materials Report

D. Request for Substitution

E. Request for Information

F. Final Pay Application

G. Checklist Certificate of Substantial Completion

H. Certificate of Final Completion and Acceptance of Work

I. Contractor Change Request (CCR), Change Directive Response (CDR), and Change Notice (CN) Checklist

J. Task Notice for Proposal (TNP) Closeout Checklist

K. Shutdown Request Form

II. DEN Equity, Diversity, and Inclusion Plan (DEN EDI Plan)

Utilization Strategies

Explain strategies and tactics the submitter is currently using and plans to implement in the future to enhance participation of both new and established City and County of Denver WMBE certified small businesses in contracting opportunities.

List the anticipated scopes of work that may utilize WMBE certified businesses. If known, list specific WMBE certified firms that you may consider for certified contractor utilization.

ANSWER

Utilization Strategies

As a WMBE-certified firm with a proven track record of fostering inclusive contracting practices, Servitech is deeply committed to maximizing the participation of Women, Minority, and Business Enterprise (WMBE)-certified small businesses in City and County of Denver opportunities. We recognize the critical role that diverse suppliers play in driving equitable economic growth and innovation within the community. Historically, this contract achieved 100% WMBE participation, which declined to 35% in the prior cycle and is now targeted at 21% under the current RFP—a trend we attribute to evolving DSBO guidelines. Despite these reductions, we remain steadfast in our goal to exceed these thresholds by leveraging proactive strategies that support both new and established WMBE firms. Below, we outline our current tactics, future implementation plans, anticipated scopes of work suitable for WMBE utilization, and targeted certified firms.

Current Strategies and Tactics

We currently employ a multifaceted approach to WMBE engagement, emphasizing outreach, capacity building, and seamless integration into our project execution:

- **Certification Advocacy and Mentorship**: As a WMBE-certified entity ourselves, we actively encourage small businesses we encounter—through networking events, supplier forums, and daily operations—to pursue WMBE certification via DSBO resources. In the past year alone, we have referred over 3 non-certified firms to DSBO's certification workshops, resulting in at least 1 successful certification. We pair this with informal mentorship, sharing best practices on bidding processes, compliance, and scaling for City contracts.
- **Self-Performance with Targeted Subcontracting**: We self-perform approximately 75% of the contract scope to ensure quality control and efficiency. For the remaining 25%, we prioritize WMBE-certified subcontractors where scopes align.

These tactics have enabled us to sustain strong WMBE involvement even as participation goals have decreased, demonstrating our intrinsic commitment beyond contractual minimums.

Planned Future Strategies and Tactics

To further amplify WMBE participation—aiming for at least 21% in this contract—we plan to implement enhanced, forward-looking initiatives that build long-term ecosystems for new and established certified businesses:

- **Joint Venture and Teaming Incentives**: For future phases, we intend to form joint ventures with emerging WMBE firms, offering equity shares in subcontracts to build their experience and bonding capacity. This will prioritize new entrants, providing hands-on training in areas like safety compliance and digital project management.
- **Performance Incentives and Feedback Loops**: Subcontractors will receive performance bonuses tied to on-time delivery and sustainability metrics, with post-project surveys to refine our processes. We will also advocate for DSBO policy adjustments to stabilize participation goals across cycles.

Anticipated Scopes of Work for WMBE Utilization

The following scopes represent the 25% subcontracting portion of the contract, selected for their modularity and alignment with WMBE strengths in specialized, agile services. We anticipate allocating 10-15% of the total contract value to WMBE firms across these areas:

Scope of Work	Description	Estimated Value (% of Contract)	WMBE Utilization Rationale
Site Preparation and Logistics	Earthwork, temporary fencing, and material hauling.	8%	Leverages local WMBE firms with regional knowledge and fleet resources for quick mobilization.
Landscaping and Environmental Remediation	Planting, erosion control, and native species restoration.	5%	Ideal for established WMBE landscapers focused on eco-friendly practices and community hiring.
Specialized Consulting (e.g., Permitting Support)	Regulatory compliance reviews and stakeholder engagement.	4%	Suited for new WMBE consultants offering culturally responsive services to diverse Denver neighborhoods.
Miscellaneous Fabrication and Supplies	Custom signage, safety equipment, and minor fabrication.	2%	Entry-level scopes for emerging WMBE manufacturers to gain City contract experience.

Specific WMBE-Certified Firms Under Consideration

Based on prior collaborations, performance history, and DSBO certification verification, we have identified qualified WMBE firms for potential utilization. Selections will be finalized through competitive bidding to ensure best value:

We commit to documenting all WMBE engagements in our monthly progress reports to DSBO, ensuring transparency and continuous improvement. Through these strategies, Servitech not only meets but elevates Denver's vision for inclusive procurement, empowering WMBE businesses to thrive.

Exhibit L

DENVER INTERNATIONAL AIRPORT

DESIGN STANDARDS MANUAL

Communication & Electronic Systems

Design, Engineering and Construction

Revised: Q4 2024

Content has been reviewed and edited by Design, Engineering and Construction.

Printed in the United States of America

Table of Contents

Summary of Revisions

The following tables list the revisions made to the Communications and Electronic Systems DSM.

2024 Revisions

Fourth Quarter

Reference	Revision Description
1.0.2 ORAT Requirements	New ORAT Requirements section
Throughout	Accessibility improvements

Second Quarter

Reference	Revision Description
13.2 Design Criteria	Updated general network requirements
Section 270528: Pathways for Communication System	Updated Pathway Application: Minimum pathway size for all telecommunications pathways
Section 271300: Communications Backbone Cabling	Updated system description
Section 271500: Communication Horizontal Ceiling	Updated DEN telecommunications horizontal cabling policy and UTB cable hardware

2023 Revisions

Fourth Quarter

Reference	Revision Description
Throughout	Minor punctuation and grammar changes.
13.2.1 General Network Requirements	Updated information

Second Quarter

Reference	Revision Description
Throughout	Minor punctuation and grammar changes.
13.2.1 General Network Requirements	Added HVAC Control Network requirements.
13.4.2 Metasys UI Graphics	Revised graphic development information.

Revision Notation: Revisions made to this Manual during this revision cycle are annotated as shown in the example below:

> A vertical line in the left-hand margin is used to annotate paragraphs that have been added or revised in the current publication. Revisions may include items such as new requirements, clarification of existing requirements, or removal of requirements that no longer apply to projects. Revision annotation is applied to each publication individually; revisions made in past publications are not annotated in subsequent publications.

Purpose of Design Standards Manuals

The DEN Design Standards have been developed to ensure a unified and consistent approach to the thematic and technical design for DEN. These standards are for use and strict implementation by all consultants under contract to DEN, to tenants, and all other consultants under contract to any other entity for the design of projects at DEN.

The Standards Manuals are working documents, which will be revised and updated, as required, to address the general, conceptual, design, and technical standards for all areas of design for DEN.

This Design Standards Manuals (DSM) for DEN has been prepared for use by competent, professionally licensed architectural and engineering consultants under the direction of DEN Maintenance and Engineering or tenants of DEN.

The Design Standards shall not be quoted, copied, or referenced in any bidding or construction contract documents. Content contained in this Manual shall not be copied in any bidding or construction documents, except where specifically instructed to do so. All information contained in these standards must be fully explained and shown in all bidding and contract documents.

The Design Standards Manuals are intended to be used as a whole, as each manual is complimentary to the other DSMs. To understand the overall thematic and design standards for DEN, the applicable manuals must be utilized together and not separated from the Design Standards Manuals.

The Consultant shall not reproduce, duplicate in any manner, transmit to other consultants or other entities, or use in conjunction with other projects without the express written consent of DEN.

NOTE: This document is optimized for duplex (double-sided) printing.

VARIANCE FROM DEN DESIGN STANDARDS MANUALS

Requests for non-conformance or variance from DEN Design Standards manuals, for any DEN or Tenant Projects, must be formally submitted using the online DSM Variance Request form at the following website:

DEN DSM Variance Request Form

Variance requests may or may not be approved by DEN and response will be communicated to the requestor.

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Chapter 1 - General System Information

1.0 Communication and Electronic System Information

1.0.1 Systems Information and Requirements

This chapter provides engineers and designers performing design work for DEN with systems overviews, configurations, and specific design requirements. Communications and Electronic Systems addressed in this Design Standards Manual include:

A. Premise Wiring Communication System (PWCS)
B. Telecommunication, Local Area networks (LAN), and Networking Systems
C. Time Synchronization
D. DEN Television
E. Physical Access Control System (PACS)
F. Closed Circuit Television System (CCTV) / Video Management System (VMS)
G. Voice Paging System (VPS) - ECS
H. Parking/Ground Transportation Revenue Control System (PGTS)
I. Flight and Baggage Information Display System (FIDS/BIDS/MUFIDS)
J. Radio Frequency (RF) Systems
K. Public Safety Distributed Antenna System
L. Energy Management and Control Systems
M. Multilateration (MLAT)
N. 2-Way Communications
O. Wireless Local Area Networks (WLAN) and Wi-Fi
P. Wireless Communication Systems

1.0.2 ORAT Requirements

The Operational Readiness, Activation, and Transition (ORAT) team at DEN plays a critical role in ensuring that DEN's Design Standards Manuals integrate operational requirements throughout the design and construction phases. By collaborating closely with project teams, architects, and engineers, ORAT ensures that the DSMs align with the airport's functional and operational needs. This alignment is achieved by gathering feedback based on operational expertise, identifying potential challenges in facility layouts, and ensuring that the final design facilitates a seamless transition to full-scale operations. Program and project design teams are expected to be familiar with the DEN ORAT Standards Manual (OSM) and actively participate in ORAT-led meetings, charrettes, workshops, trials, and testing at the request of the DEN Project Manager.

1.1 Drawing Requirements

1.1.1 Drawings

The communications and electronic systems described in this chapter shall be designed and drawings shall be prepared as applicable, based upon the characteristics, and complexity of the projects involved and as determined by each system narrative contained in these design standards. Drawings shall be provided when essential in the planning, procurement, construction, evaluation, recording, and use of the projects. All drawings shall indicate the complete design.

1.1.2 Definition

Facility communications and electronic systems drawings are graphic representations of the facility's design requirements.

1.1.3 Completeness

Facility communications and electronic systems drawings, when interpreted in association with the construction specifications, shall:

A. Furnish sufficient information for the contractor to facilitate permit drawings installation of manufactured equipment that satisfies the design requirements.

B. Furnish sufficient information to manufacture equipment that is of special design, made exclusively to meet the requirement of the project. Components, assemblies, and systems shall be UL listed.

C. Describe items so that they may be procured. If PMT is on the project, PMT is to procure a responsibility matrix and asset schedule.

D. Furnish sufficient information to permit planning, construction, evaluation, recording, repair, and maintenance of facilities.

1.1.4 Drawing Sequence

Construction documents are divided into specific groups per NCS. The group number shall always remain the same, no matter how large the project is. Refer to the DFI DSM.

Numbered sheets for areas for plan views shall remain consistent across disciplines. For example, sheets A2.01, S2.01, M2.01, P2.01, F2.01, E2.01, and T2.01 shall all show work in the same area.

1.1.5 General Notes, Drawing Index, Symbols, and Abbreviations

These sheets shall contain Notes that are applicable (or general) to all sheets in the set of drawings and, in addition, contain the drawing symbology as required in 1.1.14 Communications and Electronic Systems. These sheets shall also contain a complete drawing index for the document set.

1.1.6 Site Plan

The site plan shall identify, where applicable, all site facilities required in support of the specified communications and electronic systems, including conduits and their interconnection to existing conduits (duct banks), resources, and cabling systems. In addition, the site plan shall indicate all existing utilities and all communications and electronic systems devices and conduits that are located external to the building and indicate connections (penetrations methods) to internal systems. Where applicable, external devices and equipment, e.g., towers, antennas, etc., shall be shown, including all internal and external connections. Keyed symbology shall be shown, which directs the contractor to specific installation, provisioning, and configuration details that shall be included in the detail sheets. All required connections to the grounding system shall be indicated.

1.1.7 Floor, Roof, and Reflected Ceiling Plans

Plan drawings shall be provided which indicate all communications and electronic systems devices and equipment locations and include conduit interconnection between devices. All device locations shall be coordinated with all disciplines, including architectural finishes and features. Keyed symbology shall be shown, which directs the contractor to specific installation, provisioning, and configuration details which shall be included in the detail sheets.

When more than one system is shown on a plan, each shall be made clearly discernible by the system. Conduits indicated on the plans shall either be shown as routed to their specific termination location (Equipment or Terminal cabinet) or be indicated by a schedule for the termination location. All conduits shall be coordinated with the requirements of the conduit riser diagram. Devices indicated on plans shall be coordinated with the requirements as indicated in point-to-point diagrams.

1.1.8 Equipment Room Layouts and Elevations (DEN and Tenant)

Coordinated equipment room layouts, rack elevations, and wall elevations shall be provided, which indicate the scaled layout of the equipment room and all Communications and Electronic Systems and facilities co-located

within the equipment room. Equipment rooms and layouts shall provide sufficient detail that permits coordinated construction and include the following elements:

A. Interconnection between equipment
B. Conduit terminations
C. Grounding and bonding connections
D. Electrical connections, bonding bus bars, and grounding bars
E. Floor-mounted and wall-hung equipment placement, including equipment racks
F. Cable tray configurations
G. All penetration and fire sealant/safing details
H. Clearance zones for servicing equipment
I. Locations and sizing of cooling equipment required and shall be coordinated with the mechanical designer
J. Coordinate electrical requirements with the electrical designer

Where new equipment and/or facilities are specified/required for installation in an existing equipment room, layouts shall be provided that coordinate the placement of new equipment with existing equipment. The detail provided shall be as indicated above. New equipment shall be delineated by a different line type from existing equipment so that positive identification between new and existing equipment is assured.

1.1.9 Functional Block Interconnection Diagrams

A block diagram describes the concepts and/or organization of equipment or facility using rectangular blocks, representing functions or groups of functions. Interconnecting lines establish the relationships between blocks and indicate the direction of information flow. A block diagram is used to give a quick overall picture of a system and the general interrelationships between components of that system. It may be used for general arrangement studies, functional explanations, systematization of facilities, or for design discussion purposes.

1.1.9.1 Diagrams

A. A block diagram shall be presented in as simple a form as possible. Rectangular blocks shall be used to represent functional electrical systems or parts thereof and/or major elements of an electrical system or circuit. Various other symbols may be used as supplementary information to increase the utility of the diagram.
B. Identifying nomenclature shall be included within the blocks.
C. Block diagrams may be made for any level of project activity. For example, a block diagram at the highest level may be made for a complete project or any lower-order stage.
D. Related mechanical, electro-mechanical, or optional apparatus may be included on block diagrams in rectangular form.
E. Mechanical connections between such elements shall be illustrated with dashed lines connecting the applicable blocks.
F. If the form of the circuit involves multiple sources and common or similar circuits, or variations thereof, tabulations may be used.
G. If a block diagram must be divided and placed on more than one drawing, the division of the circuit should be made in a logical manner that will eliminate confusion and at a point of minimum information transfer.
H. When abbreviations or symbols are used on any drawing, provide that same drawing keynote, abbreviation, and symbol legend.

1.1.9.2 Connecting Lines

A. Lines connecting blocks shall indicate the relationships, direction of flow of the system, the sequence of operation, etc. The arrangement of lines and blocks shall show action or energy flow in functional

sequence from top to bottom and/or left to right of the diagram, starting at the top left or top center and ending at the bottom right of the diagram.

B. Connection lines shall be labeled, where necessary, to make the meaning clear and unmistakable. When dashed lines are used for more than one purpose on a block diagram, these purposes shall be made clear by label, legend, or note.
C. Connecting lines shall include arrows to further define the circuit flow.

1.1.10 Point-to Point Wiring Diagrams

Point-to-point wiring diagrams describe the detailed wiring configuration and arrangement of the specific system utilizing lines connected to specific equipment terminals and equipment pieces. Point-to-point wiring diagrams indicate the required system color-coded interconnection details at the component level. Point-to-point wiring diagrams shall be required at the design level only for those electronic and communications systems where interconnection to existing equipment is required. Point-to-point shall be provided only for the specific interface location and configuration. In the cases where new systems are designed and do not require interconnection to existing systems, system concepts and intent shall be conveyed through the functional block diagram, riser diagrams, floor plans, elevations, and project specifications. When required, point-to-point wiring diagrams shall contain the following detail.

A. All wiring by type and size required between all system components
B. Indicate wire color coding
C. Indicate terminal strip numbers and positions
D. Indicate current, signal, and data flow

1.1.11 Systems Riser Diagrams

Communications and electronic systems riser diagrams indicate the distribution of major systems components, wiring systems, and their interconnection requirements. Riser diagrams shall always be provided for cabling systems and indicate the following:

A. Equipment rooms
B. Cable quantities
C. Cable types
D. Termination locations
E. Keyed reference to related details
F. In multi-floor facilities, riser diagrams shall be organized by level

For simpler designs not containing cabling distribution systems, specific riser diagram information (e.g., major component location information may be incorporated into the Functional Block Diagram).

1.1.12 Conduit/Cable Tray Riser Diagrams

Conduit riser diagrams are provided to indicate the configuration, location, quantity, and size of the conduit/cable tray infrastructure required in support of the specified communications or electronic system. In multi-level facilities, conduit riser diagrams shall be organized by level. All conduit riser diagrams shall indicate the following information:

A. Equipment rooms (or conduit termination locations)
B. Conduit quantities
C. Conduit sizes
D. Conduit identification schemes
E. Interfaces to cable trays
F. Grounding and bonding requirements
G. Cable tray systems

Conduits that are specified or scheduled for installation of fiber optic cables shall be a minimum of 1" in size and configured with appropriate bending radii and bend requirements. All conduit shall have not more than 180 degrees of bend between pull locations. All conduits and cable tray systems shall be installed in compliance with applicable codes and DEN Standards. Review sizing and bends with Project Manager at Design Development Phase.

Terminal cabinets, equipment backboards, and other conduit termination facilities and locations are considered part of an integrated conduit riser diagram and shall be shown on the conduit riser diagram. Branch conduits installed in support of devices need not be shown on the conduit riser diagram.

The conduit riser diagram shall be coordinated with the system riser diagram, such that cross-reference between systems cables and conduit/tray infrastructure are achievable. Minimum height requirements of the cable tray and conduit systems will be included in the Architectural section so the building may be built to accommodate them. All conduit and cable tray systems shall be configured and suitably sized to permit the segregation of cables by conduit/tray segment by signal level as follows:

A. Less than 10V
B. 10V - 70.7V
C. Greater than 70.7 volts
D. Telecommunications cabling (voice and data) cables shall never be mixed with dissimilar resources.

1.1.13 System Details

Systems details are provided to indicate specific installation techniques and systems configurations. System details shall be provided in support of the design and installation intent indicated on other sheets and call attention to the specific conditions and requirements necessary to ensure that the installed system configuration is compliant with the design intent and requirements. Details shall be provided for all conditions where specific direction cannot be properly conveyed or is indicated on other sheets.

1.1.14 Communications and Electronic Systems

Communications and Electronic Systems and electronic symbols, when used, shall be in accordance with ANSI standards in accordance with this section. Other symbols, if devised by the consultant, shall be shown in the **ITEM** column and explained in the **DESCRIPTION** column of the **LEGEND** with an indication **FOR THIS PROJECTONLY**.

1.1.15 Symbols for Other Functional Disciplines

Symbols for functional disciplines other than Communications and Electronic Systems shall be as specified in the respective sub-sections of this manual.

1.1.16 Functional Designations

Functional designations, when used, shall be in accordance with the appropriate functional designations.

1.1.17 Drawing Delineation Types

Communications and Electronic Systems drawings shall generally include the following types of delineations:

A. Block diagrams
B. One-line diagrams
C. Schematic diagrams
D. Connection diagrams
E. Facility communications and electronic systems power requirements plans
F. Facility communications plans and risers
G. Facility grounding plans and risers
H. Facility security plans and risers
I. Facility lightning protection plans

J. Fire alarm plans and risers
K. Panel, circuit, security system, data outlets, and other schedules
L. Detail drawings

The number of delineation drawings for a project shall be adequate to describe the entire system, including existing system and device locations, demolition of systems, reuse of systems or devices, and new work.

1.1.18 Delineation Drawings

Subject to the Project Manager's acceptance, the drawings for projects need not contain all delineation types. For example, projects consisting only of a single building and relatively simple communications and electronic systems may not need block diagrams or single-line diagrams if the information normally found in them is effectively conveyed by other delineation types. Each delineation shall be identified by its type below the area where it is displayed, e.g., SCHEMATIC DIAGRAM. These delineations shall not be included in architectural, structural, civil, mechanical, or electrical drawings. If delineation drawings are different from those outlined herein, then the Drawing Index shall clearly show a combination of delineation.

1.1.19 Specification Relationship

Specifications that are a portion of a contract package shall include communications and electronic systems technical specifications sections. Each communication or electronic system section shall have its own General Requirements section, which is specifically tailored to the requirements of the electronic and communications system requirements. The communications and electronic systems drawings, together with the specifications, shall describe specifically and adequately all the communications and electronic systems design requirements of the project. Vendor information drawings may be included as reference drawings subject to written approval from the manufacturer. Communications and electronic systems drawings that may form a part of a purchase specification drawing may be included as reference drawings. Prior written acceptance is required for any design-build component.

Communication and Electronic System Designers shall contact individual DEN Subject Matter Experts prior to final designs to make sure all manufactures and latest model numbers and part numbers are used for the given system and to confer that the individual division specifications are up to date or tailored correctly to meet the project needs along with DEN standards. This includes designs for systems called out in this DSM as well as those systems that are not covered herein.

Design/build efforts should also discuss with the DEN Project Manager and DEN Subject Matter Experts in regard to a sparing plan for a new or expanded system that is installed in the scope of the project. In general, design/build projects, unless specified differently in the associated Division Specification, should plan on providing a 10% level (or as directed by the DEN Project Manager) of equipment components on all communications and electronic systems installed in the project. A sparing plan shall exist for Division Specifications that do not make mention of a sparing plan requirement. In addition, warranty transfer should occur from the design/build entity to DEN at the end of the project (if required).

This Design Standards Manual will be the governing and order of precedent document where discrepancies exist between the relevant Division Specification and this DSM. Designers are encouraged to identify and resolve any discovered discrepancies with the DEN Project Manager, with input from the DEN Subject Matter Experts, as they undertake their design efforts on a given project.

End of Chapter

Chapter 2 - Premise Wire and Communications

2.0 System Overview

2.0.1 Description

The Premise Wire and Communications System (PWCS) at DEN is a universal structured wiring system consisting of multiple cable types that are service location oriented and transmission electronics, including Optical and 802.3 compliant networks. For new or remodeled installations, the PWCS predominantly utilizes Category 6 and Category 6A Unshielded Twisted Pair (UTP), Category 6 Shielded Twisted Pairs (STP), single and multimode fiber optic strands, composite Category 6 STP/UTP copper and fiber optic cable construction types, and coaxial cable for broadband video applications. Services that cannot be extended on the copper facility may be injected into the DEN Optical transport solution for delivery over fiber-based solutions between endpoints.

All cables are extended to their end locations via conduit and/or cable trays. All structured wiring system cables are terminated on universal wall plates (Panduit) that support modular connectivity of all cable types identified above.

All cabling additions (provisioning, configuration, and installation) to the existing infrastructure to satisfy local, site, and inter-building connectivity requirements must be performed by the DEN PWCS Technicians or their Inside/Outside Plant Maintenance contractor. A tenant requiring cable installation is directed to contact the DEN Service Desk to order services for any cabling needs outside of their leasehold space.

Tenants are not permitted to install their own copper or fiber cabling between leasehold locations or utilize DEN-managed PWCS pathways for their own cabling. Tenants should coordinate copper and fiber cabling requirements for their leasehold space and connectivity between spaces with DEN Business Technologies at the time of design and throughout the term of their contract. Only DEN PWCS copper and fiber cabling is allowed to be installed in DEN pathways and spaces. Airlines that require their own Communications Room shall utilize a unique pathway when traversing other leasehold spaces and pass horizontal cabling through the DEN communications room such that horizontal cabling could be re-terminated in the DEN communications room if the space is reconfigured for different tenants.

2.0.2 Addition of Telecommunications Facilities

When a consultant's scope requires the addition of telecommunications outlets as part of a design, the consultant's scope shall include the following elements.

A. Location and specification of the outlet locations and quantities.
B. Specification of conduit and outlet box size with pull string.
C. Extension of outlet conduit to the nearest communications room or cable tray providing access to the nearest communications room.
   NOTE: This room may vary depending on the available resources within the nearest communications room. The consultant is required to coordinate with DEN Planning and Development to establish the proper conduit termination location.
D. Proper sealing of all openings (penetrations) created or resulting from the installation of telecommunications conduits.
E. Use of approved products as reviewed by subject matter expert prior to design completion.

2.1 Conduit Requirements

The following text includes the minimum requirements for conduit sizing and configuration to be utilized in the installation of telecommunications facilities.

2.1.1 Telecommunications Outlet

A telecommunications outlet is defined as a voice, data, fiber, or television outlet. The telecommunications outlet is wall mounted, typically at the same height as an electrical outlet, and serves desktop devices.

A. Conduit size: 1" minimum
B. Outlet box size: 4-11/16" x 2-1/2" deep equipped with a 2-gang device ring. This conduit shall be extended to the nearest telecommunications cable tray. Where a tray is not present, the addition of a tray shall be required, or an extension of the conduit to the nearest Intermediate Distribution Frame (IDF) (Communications Room).
C. Junction boxes in a conduit run shall be a minimum of 6" square.
D. Looping between telecommunications outlets shall not be permitted.
E. Gathering of telecommunications conduits to an intermediate (Large) box and extending a single larger conduit to the nearest communications room shall not be permitted unless submitted to and approved by DEN telecommunications.
F. When a conduit is extended to an existing cable tray, it shall be secured (clamped) and properly bonded (grounded) to the tray system.
G. All conduit ends shall be equipped with a plastic bushing.
H. Where a new cable tray is specified in a consultant's design, its type, size, and configuration shall comply with the requirements as indicated in the electrical specification telecommunications subsection for cable trays.
I. The DEN cable tray system, which is utilized for telecommunications, is subdivided into segments, where services are subdivided by service type and signal level. In those cases where telecommunications facilities include a cable tray segment between the outlet and the serving telecommunications room, the consultant shall be mindful of and coordinate the conduit termination requirements into the proper cable tray segment to ensure code, signal level, and service type compliance.
J. Installation of a conduit to the cable tray system shall be made so as not to interfere with the future installation of cabling systems.
K. All conduit installation shall comply with applicable requirements in this and other Manuals, as well as the National Electric Code (NEC) for the number of bends (in degrees) between pull boxes and distances between pull boxes.
L. Telecommunications conduits may contain fiber optic cable; therefore, the specified bending radius of a telecommunications conduit shall be 2" ID minimum.
M. Any deviation from these requirements is not acceptable without the written approval of the DEN telecommunication department.

2.1.2 Telecommunications Outlet – Wall-Mounted Telephones

A. Wall-mounted telephone outlets typically serve above-counter single-line sets and courtesy phones and serve as the rough-in for pay stations. Typical mounting height is 54" AFF. In all cases, the final height must be coordinated with the architect based on function.
B. Outlet box size: Single-gang x 1-7/8 D with a single-gang device ring. This conduit shall be extended to the nearest telecommunications cable tray. Where a tray is not present, the addition of a tray or an extension of the conduit to the nearest Intermediate Distribution Frame (IFD) (Communications Room) may be required.
C. Junction boxes in a conduit run shall be a minimum of 4" square.
D. All the requirements as indicated in items D – K above in Telecommunications Outlet shall apply to wall-mounted telephone outlets.

E. Wall-mounted telephone outlets will not receive fiber optic cable; therefore, the minimum bending radius required in item 1, l. above does not apply.

2.1.3 Modular Furniture

Because of the varying connection configurations of modular furniture and the quantities of units that may be fed from a single communications source point, a standard physical interface is not provided. The consultant, when specifying/designing spaces that contain modular furniture, shall be required to initiate a coordination meeting with DEN Telecommunications to develop an interface that supports the connectivity requirements of the space.

2.1.4 Building Service Conduits

A. Conduit size: 4" minimum
B. Conduit quantity: The quantity is dependent on the size and functionality of the facility. The contractor shall be required to coordinate with DEN Telecommunications to establish the exact quantities of telecommunication service conduits required, including fiber and copper facilities.
C. Bending radius
D. Pull boxes
E. Distance between pull boxes
F. Burial depth

2.1.5 Duct Bank Systems

A. Conduit size: 4" minimum
B. Conduit quantity: The quantity is dependent on the size and functionality of the facility. The contractor shall be required to coordinate with DEN Telecommunications to establish the exact quantities of telecommunication service conduits required, including fiber and copper facilities.
C. Burial Depth
D. Marker tape
E. Ground
F. Conduit bending radius

2.1.6 System Color Coding

ECS conduits installed to serve systems specified in Section 275123, “Emergency Communications System,” shall have “GREEN” bands, 5' on centers for the entire length of a conduit run. All junction or pull boxes shall have the cover painted green with the associated zone number written neatly on the box cover with a permanent marker.

EMCS conduits serving temperature control, metering data cabling, lighting control BACnet cabling, and other EMCS integration cabling systems shall have “BROWN” bands, 5' on centers for the entire length. All junction or pull boxes shall have the cover painted brown.

2.2 As-builts

As-built documentation for all systems: All as-built documentation shall comply with the requirements identified in DFI DSM.

End of Chapter

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Chapter 3 - Telecommunication and Networking

3.0 System Overview

3.0.1 Scope

This chapter provides guidance to the Design Consultant in telecommunication and network systems design for specific DEN use.

3.0.2 Criteria

General criteria are set forth below, as well as drawing and design requirements. Options available to the Design Consultant are also indicated. In addition to the requirements set forth herein, all telecommunications designs shall meet the requirements of accepted industry standards, as well as the following reference standards:

A. IEEE
   a. C62.41: Recommended Practice on Surge Voltage in Low-Voltage AC Power Circuits
   b. 802.3: Information Technology – Local and Metropolitan Area Networks

B. Telecommunications Industry Association/Electronics Industry Association (TIA/EIA)
   a. EIA-310-D: Cabinets, Racks, Panels, and Associated Equipment
   b. TIA/EIA-568-B: Commercial Building Telecommunications Cabling Standard

C. NFPA
   a. 70: NEC
   b. 70E: Standard for Electrical Safety in the Workplace

3.1 Networks and Services

3.1.1 Telecommunications Service

Basic telecommunications service is currently provided to the airport by the regulated provider CenturyLink. These services are delivered to the airport from multiple feeds. These services are extended over the airport Premise Wiring and Communications System (PWCS) to demarcations at airport locations and tenant leasehold spaces throughout the airport. These services range from basic 1FB business lines, frame relay, and data circuits to higher capacity DS-1 (T1) – DS-3 level services.

3.1.2 Local Area Networks

DEN operates three Local Area Networks (LANs).

3.1.2.1 Enterprise Network

This is the largest network, supporting services ranging from DEN-managed desktops, flight information displays, common-use departure control equipment, building automation systems, and in some cases, tenant networks. The enterprise network is a large, layer three network consisting of core switches, pairs of distribution switches in each major building, and access layer switches located in Intermediate Distribution Frame (IDF) rooms throughout DEN.

3.1.2.2 Emergency Communications System

The Emergency Communications System (ECS) is a standalone network that supports PA communications and audible emergency notification. It utilizes switches in a three-layer configuration (core, distribution, and access) that allows public address CobraNet audio to traverse locally in each network region while allowing client-server and audio communications to traverse between buildings to reach the system servers. The ECS network utilizes Real-time Transport Protocol (RTP) to allow inter-building audio to traverse between buildings, including the Hotel and Transit Center (HTC), Main Terminal, Airport Office Building (AOB), and Concourses.

The ECS loudspeakers serve as the audible portion of the Fire and Emergency Notification System. These loudspeakers must be installed in all tenant spaces. Coordinate with DEN Life Safety to obtain information on the ECS system and proposal submittals for any new equipment.

3.1.2.3 Security Access Control Network

This is also a separate network. Security Access Control Network (SACN) is dedicated exclusively to security access control, including communications to door controllers, door-related intercom, and door security cameras.

3.1.3 Wireless Networking

DEN operates a wireless 802.11a/b/g/n LAN system throughout all public areas of the airport for public use. The existing network is integrated with the DEN enterprise network and consists of a distributed system of Wi-Fi controllers, access points, and antennas.

DEN does not require or prohibit tenant Wi-Fi networks. However, any proposed private Wi-Fi networks to be installed in tenant spaces are subject to the review and approval of DEN Business Technologies.

3.2 Design Criteria

3.2.1 Telecommunications Service

Telecommunications shall be provided in each facility to serve the specific communications needs of that facility. This would include the special communications needs of the building or system function as well as the needs of tenants and users of the facility and may include voice, data, and/or video communications services. Space allocations and design, mechanical and electrical services, and premises wiring system shall all meet the requirements of the telecommunications system installed. Raceways to accommodate the required premises wiring shall be installed as part of the construction of the facility and shall meet the requirements called out here-in or within other Design Standards Manuals or Division Specifications. The power requirements of the system and power requirements of all pay telephone credit card readers shall be coordinated with the telephone supplier.

The DEN-managed PABX system provides telephony services to DEN offices and facilities across the entire DEN campus. It can provide both analog and Voice over IP service to endpoints. In addition, some tenants are served telephony service from this system under the DEN Business Technologies Tenant Services program.

Airlines and other tenants may elect to utilize a private PABX or key system to support telephone service within their leasehold space. Tenants with multiple leasehold spaces (such as airlines, who may have a presence at the terminal, concourses, and remote locations such as cargo) will be required to utilize PWCS circuits between these leasehold spaces.

Power requirements for all communications rooms at DEN are addressed in the Electrical DSM, Chapter 2.

3.2.2 Local Area Networks

In new construction areas, Intermediate Distribution Frame (IDF) rooms are normally constructed in directly adjacent pairs. One room is dedicated for DEN communications equipment. The second room is dedicated for tenant equipment. Horizontal cabling shall be routed through the DEN room to the tenant IDF room to allow cabling to be pulled back and re-terminated in the DEN room if the tenant vacates the tenant room.

Designers are required to meet with the DEN Business Technologies PWCS group to define copper and fiber backbone cabling requirements for any new IDF facility. DEN will provide pair and strand count information as well as tie points in the existing PWCS system for any new cabling.

3.2.3 Public Wi-Fi Network

Designers shall coordinate the specific location and configuration of Wi-Fi access points and pods with the DEN Business Technologies Wi-Fi group during the design development phase of each project. Contact the DEN Project Manager to coordinate a meeting after a preliminary layout is selected.

All public areas shall be fully covered by the public Wi-Fi network. In addition, Wi-Fi is provided on the roof or side of buildings for the working side of aircraft. Back office spaces on all building levels shall also have Wi-Fi coverage.

Each access point requires two (2) CAT 6A-rated cables to be extended from the nearest DEN communications room when within a 90-meter distance. Single-mode fiber and 120VAC power shall be available at Access Point locations that are beyond a 90-meter distance from the nearest DEN communications room. External antennas may be utilized to keep the install clean aesthetically. Extensions to the existing airport public wireless LAN system shall be physically complete and fully functional. All new equipment shall fully integrate with the DEN Enterprise Network and the existing Wi-Fi controllers.

3.2.4 Telephones

Elevator telephones, courtesy telephones, garage blue light telephones, hands-free telephones at gated parking locations, and utility metering phone lines are generally connected as analog lines on the DEN-managed PABX system. Airline and tenant telephones will generally connect to the airline or tenant PABX.

3.2.4.1 Elevator Telephones

Elevator telephones at DEN are Talk-A-Phone ETP-103V OEM analog units that are installed behind the stainless control panel in each elevator cab. These telephones connect to the PABX as analog telephones on circuits that ring down when the telephone is in an off-hook condition. The telephones utilize a microphone, loudspeaker, and call-placed LED indicator. A braille placard is affixed to the control panel. Phone dialing is triggered by an auxiliary normally open contact on the alarm bell button in each car. Elevator phones are polled at least once a day using Viking PB-500 polling software. Phone connections are made at the elevator machine rooms. Installation of an elevator phone is generally performed by the DEN elevator support contractor.

3.2.4.2 Loading Bridge Telephones

Telephone cables within loading bridges shall be protected from damage. For telephone cables to run externally, Aan SO-type cord must be used between the building and rotunda/aircraft end telephone junction boxes. The cord must be a four-strand #14 wire with water-tight / strain-relief fittings on both ends as they terminate into the junction boxes. Additionally, the cable must be 600V rated and be cold, sunlight, and petroleum resistant. The intent is to minimize telephone cable failures and let it share a common path with adjacent power cables in the “pantograph” or scissor arm, which is external to the bridge.

3.2.4.3 Courtesy Telephones

Courtesy telephones used at DEN are flush mount Ceeco model SSP-361F units with a DTMF stainless steel dial pad and hearing aid compatible handset. All courtesy phones shall be provided with an armored cord and a white handset to align with the standard *Please pick up a white courtesy phone* announcement.

3.2.4.4 Blue Light Telephones

Blue Light telephones used at DEN are Talk-a-Phone model ETP-500 dual button, hands-free phones. The red button on the phone is marked **Emergency** with an ADA-compliant braille label placard. This button is programmed to call the Denver Police position in the airport communications center. The black button on the phones is marked **Info** with an ADA-compliant braille placard. This button is programmed to call the parking operator operations office. Phones connect to a standard analog PABX circuit. These telephones are polled at least once per day with DEN’s existing polling software.

Blue Light phones are located adjacent to each stairwell. On lower levels of the garage, Blue Light phones are installed in a Talk-a-Phone ETP-WM wall-mount blue light enclosure. On the upper level of the garage, phones are mounted in a Talk-a-Phone ETP-MTE-72 tower enclosure. All phones will require both a telephone line connection and 120VAC power to power the blue light and strobe.

3.2.4.5 Emergency Telephones (Two-Way Communication)

Area of Refuge Telephones, or elevator vestibule telephones, where required by code, shall be Talk-a-Phone ETP-500 units with either a flush or surface-mounted MS-500 backbox. These phones shall be mounted with the top of the push-button at 48 inches above the finished floor, and the phone cord length should be at least 39 inches. Appropriate ADA-compliant and Denver Building Code Amendment signage shall be installed where applicable.

These units connect to the DEN PABX as analog telephones and are programmed in the PABX for ring-down operation. These telephones are polled at least once per day with DEN's existing polling software.

3.2.4.6 Parking AVI Hands-Free Telephones

Hands-free telephones at gated parking and employee parking locations shall be Gaitronics model 393-001AD units. These telephones connect to the DEN PABX as analog stations and are programmed in the PABX to ring down to the parking operations office.

3.3 Design Requirements

3.3.1 Design Development Coordination

NOTE: All communications with DEN personnel shall be routed via the DEN Project Manager unless the Project Manager gives explicit permission to do otherwise.

During design development, consultants shall coordinate their designs with DEN Business Technologies.

Designers are required to produce a spreadsheet for each of the three networks that include the following information for each item of network-connected equipment:

A. Item number
B. System name
C. Device type
D. Device name, adhering to DEN Business Technologies naming standard
E. Room number
F. Outlet and jack number
G. Serving IDF room
H. Network (Enterprise, ECS, or SACN)
I. Power over Ethernet required in Watts

After the information above is compiled, designers are required to meet with the DEN Business Technologies network staff. The DEN staff will compile a detailed bill of materials (BOM) for inclusion in the project specifications based on the equipment that is currently being procured. Designers shall include this bill of material in the network specifications for each of the three networks.

DEN Business Technologies will also complete the network spreadsheet for each of the three networks, including the following for each item of network-connected equipment:

A. Circuit ID number
B. Switch name, adhering to DEN Business Technologies naming standard
C. Switch port assignment
D. VLAN ID
E. IP address
F. Subnet mask
G. Default gateway
H. Port speed and duplex
I. Circuit cut sheet

With this information, the Designer may then produce a completed BOM for the project to be included in the design drawings.

3.3.2 Design Analysis Report

The Design Consultant shall include in the design analysis report a high-level description of the network design, including the following:

A. A single-line diagram showing the proposed network topology, including points of connection to the existing networks.
B. A listing of existing networks affected by the project, as well as an analysis of the effects and required support equipment.
C. Bandwidth requirements for new equipment.

3.3.3 Design Drawings

The Design Consultant shall show all telecommunications system requirements in the contract documents. As a minimum, the drawing shall show the following:

A. A single-line diagram to depict the network switching equipment, telephone instruments, network outlets, terminal cabinets, premises wiring, and other system components.
B. Each system component shall be identified as to its type and location. Floor plan drawings shall include a unique numerical identifier adjacent to each outlet to associate drawings with PWCS equipment spreadsheets.
C. A completed, project-specific BOM, as coordinated with DEN Business Technologies.
D. Floor plan drawings shall show the location of each system component, outlet, instrument, and distribution wiring.

End of Chapter

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Chapter 4 - Time Synchronization

4.0 General Information

This chapter provides guidance to the Design Consultant in the area of master timekeeping system design. Adherence to this standard ensures that all DEN systems maintain time synchronization for the purposes of system log correlation or for the display of uniform time on systems that are public facing.

4.0.1 Criteria

A. DEN was constructed with a Simplex Time Recorder master clock system. Over the years slave clocks have subsequently been removed, due to the prevalence of time displayed on flight information monitors and passenger cell phones. Once the last of the slave clocks are removed the legacy master clock and subsequent architecture will be retired.

B. DEN operates two Stratum One GPS time servers which are both connected to the DEN networks for Network Time Protocol services. These servers synchronize time with the US GPS constellation.

C. DEN systems connecting to the DEN enterprise network, Emergency Communications System network, or Security Access Control Network shall obtain time synchronization by periodically forwarding a Network Time Protocol (NTP) request to the default gateway on their respective subnets. The networks have been configured to relay NTP requests and responses to and from the NTP servers.

D. Systems and Computers that are not network-connected may also receive time synchronization directly from the time servers. The primary and secondary time servers at DEN are equipped to provide an Inter-Range Instrumentation Group Protocol B (IRIG-B output). IRIG-B is a 1000 hertz modulated tone that can be amplified and extended to various locations in the airport over copper telephone pairs. IRIG-B interface cards are available from several manufacturers for various bus configurations and operating systems.

End of Chapter

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Chapter 5 - DEN Television

5.0 System Overview

5.0.1 Scope

This chapter provides guidance to the Design Consultant in the area of television system design for DEN.

5.0.2 Criteria

General criteria are set forth, as well as drawing and design requirements. Options available to the Design Consultant are also indicated. All communications with DEN personnel such as DEN Business Technologies shall be routed via the DEN Project Manager unless the Project Manager gives explicit permission to do otherwise.

During design development, DEN Business Technologies will provide specific guidance to designers relevant to each project. Depending on the scope of the project, designers may only be required to provide simple drop cable. On larger projects, designers shall request a coordination meeting with the DEN Project Manager, DEN Business Technologies, and relevant stakeholders to determine project requirements. Depending on the scope, designers may be required to specify new optical nodes, RF splitters, and optical dividing networks located in DEN comm rooms to provide support for DEN and tenants television drops.

Optical nodes may be required to be shunted in the event of an Emergency Communication System (ECS) announcement. Designers shall coordinate this feature with the subject matter expert of the ECS system at the time of design.

In addition to the requirements set forth herein, all television systems shall meet the requirements of accepted industry standards, as well as the following reference standards:

A. IEEE – C62.41: Recommended practice on Surge Voltage in Low-Voltage AC Power Circuits
B. TIA/EIA – EIA-310-D: Cabinets, Racks, Panels, and Associated Equipment
C. NFPA – 70: NEC

5.1 Television Service

5.1.1 Head End Service

The DEN Television System (DEN TV) utilizes a head-end system that connects the satellite signal origination, local over-the-air antenna signal, and local insertion channels to produce a composite signal which propagates throughout the campus via a fiber/coaxial hybrid transport system. The lower tier on this system contains approximately sixty (60) unencrypted, standard-definition television channels in the 54-450MHz spectrum. The upper tier on the system (from approximately 450-860MHz) contains encrypted Dish Network standard definition, high definition, and premium content that can only be viewed by tenants using Dish Network receivers.

5.1.2 Network Topology

Upper and lower-tier channels are combined into a single RF stream and fed to a Harmonic HLT optical transmitter. The transmitter provides two 1550nm optical outputs at +10.5dBm, which, in turn, feed two Harmonic HOA series Erbium Doped Fiber Amplifiers (EDFAs). Each EDFA provides eight optical outputs at +21dBm.

Outputs from the EDFA amplifiers are fed via single-strand, single-mode APC terminated fiber circuits to 1 x 16 optical dividing networks at the following locations:

A. Terminal East (1)
B. Terminal West (1)
C. Concourse A (1)
D. Concourse B (2)
E. Concourse C (1)

F. North Terminal/AOB (1)
G. North Hut (1)
H. South Hut (1)
I. Southeast Hut (1)
J. Miscellaneous Site (1)

Outputs from the dividing networks are patched over single-strand, single-mode APC terminated fiber circuits to ATX model QFHPN-D44 optical nodes located in various DEN IDF rooms throughout the buildings and campus. Optical inputs at the nodes are padded with SC/APC inline optical attenuators to a level of 0dBm. There is an LED bar graph on the face of each node that displays a green bar when a level of 0dBm is achieved, with red bars above and below 0dBm.

Gain and slope controls on each node are adjusted to provide a sloped RF output of +37dBmV at 54MHz and +45dBmV at 860MHz. This output shall be run through an 8dB RF pad into a 16-way splitter. At IDF rooms that support more than sixteen drops, the pad shall be removed and replaced with a four-way splitter (also 8dB loss) which in turn shall connect to up to four 16-way splitters.

The calculated output from the 16-way splitters is +13.5dBmV at 54MHz and +20.5dBmV at 860MHz. This allows for acceptable signal strength at television receivers while accounting for overall distance and losses in either RG-6 quad-shielded drops or RG-11 quad-shielded drops. Unused splitter outputs shall be equipped with Regal tamper-resistant 75-ohm terminators to guard against pirated drops.

The QFHPN-D44 optical nodes are bi-directional with a reverse path optical transmitter. However, reverse path transmission is not currently in use at DEN.

ATX QFHPN-D44 optical nodes that feed public spaces must be shunted to remove distraction from television service to occupants in an emergency initiated by the fire alarm system. Typically, this is performed through a shunting power module and interface to the Simplex Fire Alarm System.

5.1.3 Tenant Drops

Subscription-based television service is available to all tenants. Tenant locations include, but are not limited to, the following:

A. Bars and restaurants
B. Retail establishments
C. Any non-public tenant-leased locations
D. Airline-leased spaces such as break rooms and offices

Drops to all tenants shall be equipped with 450MHz high-pass filters at the DEN IDF rooms to block the unencrypted lower-tier service. The standard receiver required to view Dish Network content is the VIP222k or the Wally. Coordinate exact equipment requirements with DEN Business Technologies. (Dish Network may change the receiver model at any time.)

Termination locations and details of tenant drops are dependent on the number of drops required and facilities available in the area. For multiple drops, such as in bars and restaurants, additional equipment required to support the drops shall be included in the project. Coordinate the exact requirements for each project with the DEN Project Manager. Tenants are not allowed to insert splitters into the drops provided by the transport system. Drops are to be installed by a DEN PWCS-approved contractor.

Tenants may utilize mounts for their television receivers that accommodate a Dish VIP222k or Wally receiver behind each television receiver, or they may elect to centralize these receivers at a back-of-house location. In the latter case, HDMI video extenders will be required from the centralized receivers to the television receivers. The Dish VIP 222k receivers operate with either an infrared remote control or a UHF RF control, allowing remotes to be used with centralized receiver configurations.

5.1.4 DEN and Public Drops

Non-tenant drops include the following:

A. DEN offices

B. DEN break rooms
C. Non-public, DEN-owned locations
D. Hold room televisions (transport only - tuned to Airport Revenue concession channel – e.g., CNN Airport)

Non-tenant television drops are not provided with high pass filters, allowing the unencrypted lower-tier channels to be viewed. Non-tenant drops shall be run to the nearest DEN IDF room. During design development, designers shall coordinate with DEN Technologies to ensure that the serving IDF room is equipped with an optical node and adequate splitter ports to support the required number of DEN TV drops. These drops will not be provided with high pass filters allowing viewing of both unencrypted standard definition channels and over-the-air high definition channels.

5.2 Design Criteria

5.2.1 Cabling and Conduit

All horizontal television cabling shall be contained within an accepted raceway or cable tray.

Drop cables used for DEN TV service shall be quad-shielded RG-6 or RG-11 75-ohm cables. Cables enclosed in metallic raceways shall utilize an overall PVC jacket. Cables run in cable trays shall be plenum rated.

Coaxial cable connectors shall be compression-type and designed for the specific cable type being used. Crimp connectors shall not be permitted.

4-way and 16-way RF splitters shall provide a bandpass of 5-1000 MHz. Loss for four-way splitters shall not exceed 8dB, and sixteen-way splitters shall not exceed 16.5dB.

A. When a consultant's design scope identifies a requirement for the addition of a television outlet, the consultant's design shall include a conduit and pull string between the nearest equipment room containing a passive device and the outlets location. Wiring and outlet commissioning shall be arranged between the tenant/occupant and DEN.
B. All conduits specified for the installation of DEN TV facilities shall comply with the following requirements:
    a. Conduit size: 1" minimum
    b. Outlet box size: 4" square x 2-1/2" deep equipped with a 2-gang device ring
    c. Looping between DEN TV outlets shall not be permitted
    d. Gathering of DEN TV conduits to an intermediate (Large) box and extending a single larger conduit to the nearest communications room containing a passive device shall not be permitted.
    e. When a conduit is extended to an existing cable tray, it shall be secured (clamped) and properly bonded to the tray system.
    f. All conduit ends shall be equipped with a plastic bushing.
    g. Where a new cable tray is specified in a consultant's design, its type, size, and configuration shall comply with the requirements as indicated in the electrical specification.
    h. Proper sealing of all openings (penetrations) created or resulting from the installation of DEN TV conduits.
    i. DEN's cable tray system is subdivided into segments, where services are subdivided by service type and signal level. In those cases where extension DEN TV facilities include a cable tray segment between the outlet and the serving communications room, the consultant shall be mindful of and coordinate the conduit termination requirements into the proper cable tray segment to ensure code, signal level, and service type compliance.
    j. Installation of a conduit to the cable tray system shall be made so as not to interfere with the future installation of cabling systems.

5.2.2 Equipment

Where required, new optical nodes shall be ATX Networks QFHPN-D44 nodes. Optical input shall be padded with an SC/APC male-to-female optical attenuator to provide an input level of 0dBm to the node. Each node requires an ATX network #951 120VAC to 26VAC 50VA power transformer.

5.2.3 Fiber

DEN Technologies may assign the Designer ports on an existing optical dividing network. In the case of a new building with multiple nodes, the Designer may be required to provide a new Blonder Tongue model FOC116U-FA optical dividing network. These are one input/16-output dividing networks.

Fiber connectivity to new nodes will need to be coordinated with DEN Business Technologies. In the terminal, concourses, and most site locations, DEN has implemented a single-mode ring cable system where a high strand count, single-mode cable originates at one network distribution switch location and terminates at a second physically diverse distribution switch location. At each intermediate IDF location, a different 12-strand buffer is broken and terminated in each direction while other buffers express through. Strands 11 and 12 in each buffer are terminated with FC/APC connectors to support DEN TV service.

5.3 Drawing Requirements

The Design Consultant shall show all entertainment television system requirements in the contract documents. As a minimum, the drawings shall show the following:

A. A single-line diagram to depict the entertainment television system, including all optical and RF components with RF and optical level calculations. DEN Technologies will utilize this information to update the master DEN Television System diagrams.

B. Each system component shall be identified with its type and location.

C. Floor plan drawings to show the location of each system component, outlet, and the distribution raceways.

End of Chapter

Chapter 6 - Security Card Access

6.0 System Overview

6.0.1 Description

The security environment at DEN is FAA Regulation 107.14 compliant and is comprised of two (2) specific secure areas, Sterile and Secured.

6.0.1.1 Sterile Area

Sterile areas are those areas in the terminal, concourses, and other facilities where the occupants have been screened.

6.0.1.2 Secured Area

The secured area is comprised of the Airport Operating Area (AOA). Individuals with badged access to the secured area must enter or leave the AOA environment through an access control door.

Access control doors are required at all points that provide access from public or sterile locations to the AOA, regardless of building type or location.

6.0.2 Controlled Area Access

A third access control area is defined at DEN. Controlled areas are those areas where access control is required by DEN rather than by the FAA. These areas and requirements shall be defined by the Project Manager.

6.0.3 Security Card

The Security Card Physical Access Control system (PACS) at DEN interfaces two (2) external systems. These include the Closed Circuit Television System (CCTV) and an interface to an audio system that provides 2-way communications between certain door types and the DEN operation center.

6.0.4 PACS

The PACS at DEN is an airport-wide integrated system. All-access control doors and the systems-related functionality are maintained from a single system. The PACS utilizes multiple door-type configurations that require different conduit rough-in schemes and doorframe and door hardware configurations. DEN Planning and Development maintains a library of the various conduit rough-ins, doorframe types, and hardware configurations.

6.0.5 Consultant Design and Contract Document Requirements

Whenever a consultant's design scope meets the criteria for FAR 107.14, administrative requirements, or external system interface, and the addition of a security door is required, the consultant shall be required to initiate a meeting with the DEN Planning and Development Project Manager and DEN Access Services to review the specific access requirements. Design decisions with respect to access control door types, quantities, and interfaces will be made. In support of the consultants' design activities, DEN maintains a comprehensive set of as-built documentation, which upon request, will be made available to the consultant for review in the development of the design. The Design consultant shall be responsible for the coordination of, specifying, and drawing preparation of the following design elements, which will comprise a functional extension of the PACS.

6.0.5.1 Security Door Conduit Rough-In Details

The applicable details to be used shall be provided to the Design consultant once the specific details are identified. The appropriate CADD files of the details shall be given to the consultant for inclusion in the construction documents.

6.0.5.2 Security Doorframe Details

The applicable details to be used shall be provided to the Design consultant once the specific details are identified. The appropriate details shall be given to the consultant for inclusion in the construction documents. Security door rough-in details are not considered to be SSI information.

6.0.5.3 Door Hardware

The applicable hardware types and details to be used shall be provided to the Design consultant once the specific details are identified. An appropriate hardware list shall be given to the consultant for inclusion in the construction documents.

6.0.5.4 PACS Interconnecting Conduits

Conduits and raceways that tie the new access control doors or devices to the existing system shall be required. The Design consultant shall be required to conduct a building and site investigation to establish the exact inner-/inter-building and/or site conduit configuration. All conduit specifications provided by the Design consultant for PACS work shall be suitably sized for the cabling to be installed. Where the installation of fiber optic cables is indicated by DEN, the consultant's specifications shall be representative of those requirements.

6.0.5.5 External Systems Interconnecting Conduits

Where identified by DEN and tie-ins to external systems are required, the Design consultant shall be required to include in the design all necessary conduit systems and wires. These requirements shall be coordinated with the Project Manager.

All other PACS components, including electronic interfaces to external systems, wiring, and software, shall be installed by DEN Maintenance unless the Project Manager requires the consultant to design and specify this work. Verify with the Project Manager the scope requirements during the Programming Phase of Design. The design consultant shall require in the door hardware specifications that a coordinated commissioning test of all PACS doors installed as part of the work be jointly tested by the contractor supplying the door hardware system and DEN Maintenance. This will ensure proper hardware/electronic systems interface and operation. This testing shall be coordinated by the DEN Project Manager and the commissioning agent, if applicable.

End of Chapter

Chapter 7 - Closed Circuit Television/Video Management

7.0 System Overview

7.0.1 Description

The CCTV/VMS system is utilized for general surveillance throughout DEN and for PACS door monitoring. The system consists of IP-based cameras. All new installations shall be approved IP cameras as directed and reviewed by the DEN subject matter expert. New camera installations at DEN also need to be reviewed and approved by the Video Management (VMS) committee. IP cameras utilize the Enterprise Network for Ethernet transport, except Audio/Visual enclosure cameras located at some PACS doors, which utilize the Security Access Control Network for Ethernet transport. IP cameras are integrated with a Genetec Security Center Video Management system for remote viewing and archiving. A variety of camera configurations are utilized, including indoor and outdoor, fixed, pan/tilt/zoom, 180-degree, 360-degree, and remote controllable types. Designers shall coordinate specific type and model numbers with DEN Project Manager and subject matter expert as part of design efforts. Designers shall provide the initial layout per direction from the VMS Committee Design Guidelines provided by the Project Manager/SME.

7.0.2 Requirements

Quantity and general location of CCTV cameras shall be provided by the DEN Project Manager and subject matter experts on a project-by-project basis. All new camera installations shall be IP cameras from an approved manufacturer/model list. The Design consultant shall be required to review the requirements provided by the Project Manager to validate the functionality and direction provided by the Project Manager. The Design consultant shall be responsible for the design and specification of all CCTV system components, wiring systems (both fiber optic or CAT6A as applicable), and interfaces to the headend system. Each camera location shall be fed by two (2) CAT6A cables. For camera locations outside of the 90-meter range from the nearest communications room, single-mode fiber connections from the nearest communications room will be used with 120VAC power available at the camera site. All cabling shall reside in a conduit between the camera location and the nearest communications room. Final system connection and system software programming at the headend shall be completed by the DEN subject matter expert.

7.0.3 Infrastructure

DEN has in place an extensive site, intra-building, and inner-building copper and fiber optic infrastructure that is utilized in the transport of various signals (including CCTV) throughout DEN. This infrastructure is maintained by DEN Business Technologies. The consultant's design shall be coordinated with those resources and include all work required (including costs) by DEN Business Technologies to implement the transport of signals between CCTV cameras and the system headend. Network devices, digital storage, and software licensing for additional camera installations shall be assessed as part of new camera installations as part of the design effort. The project may be required to support the procurement of these items for new cameras in accordance with design specifications provided by DEN subject matter experts.

7.0.4 Installation Details and Parts

DEN maintains a library of CCTV installation details and parts lists that are utilized at DEN. The Design consultant shall be responsible for initiating a meeting with the Project Manager to obtain appropriate details to ensure that all designs provided are compliant and compatible with existing systems and components. In support of the consultant's design activities, DEN maintains a comprehensive set of as-built documentation, which upon request, will be made available to the consultant for review in the development of the design.

7.0.5 Specification

The design specifications shall require that an integrated CCTV/VMS system test be conducted by the installing contractor and the DEN subject matter experts. This test will be conducted to ensure proper operation and approved Field of View of contractor-supplied and installed equipment and work performed by the DEN subject

matter expert. Under no circumstances shall the consultant's specifications and project requirements allow the contractor to make connections to existing equipment without direct supervision by DEN subject matter experts.

End of Chapter

Chapter 8 - Voice Paging

8.0 System Overview

Refer to the Emergency Communication System chapter in the Life Safety DSM for the voice paging system description and requirements.

End of Chapter

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Chapter 9 - Parking & Ground Transportation Automatic Revenue Control

9.0 System Overview

9.0.1 Description

The Parking and Ground Transportation Automatic Revenue Control System (PGTS) consists of several individual elements, when integrated, comprise a fully functional system. The elements that make up this system include:

A. The public parking revenue control system
B. License Plate Inventory (LPI) system
C. Access control system for employee parking
D. Automatic Vehicle Identification System (AVI)

The public parking revenue control system is a distributed PC-based system. Review the requirements with the Project Manager and the DEN subject matter expert.

End of Chapter

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Chapter 10 - Flight & Baggage Information Display

10.0 System Overview

10.0.1 Description

The Flight, Baggage, and Gate Information Display System (FIDS/BIDS/GIDS), otherwise referred to as Multi-User Flight Information System (MUFIDS), at DEN, is a distributed server/client-based system that provides flight schedule and baggage location text information to video monitors throughout the terminal and concourses. The system signals are distributed throughout the facilities on the DEN PWCS and DEN Enterprise 802.3-compliant network. Signals are IP based between the system servers and the media players at the display devices. After conversion to a video format at the media player device, video cables are extended to the individual display monitors. The software supporting this system is based on the SITA-Dayton AirportVision software. Any hardware additions to the FIDS/BIDS/GIDS system shall be compliant with this software and approved by the DEN subject matter expert. Designers shall design to authorized video displays by manufacturer and model number as provided by the DEN subject matter expert. The design shall also account for required network components, PWCS cabling, Ethernet-enabled Power Distribution Units (ePDUs) at the FIDS/BIDS/GIDS location, and required power for the displays and media players. In addition, the project may need to procure software licenses as part of the project and support any required airline data integrations. Designers shall coordinate complete design with DEN subject matter experts to account for all system components and integrations and to validate all current manufacturer and model numbers as part of the design effort. Designers shall coordinate with the Project Architect for specific mounting and infrastructure requirements.

DEN has in place a service and maintenance agreement that is utilized in day-to-day system maintenance, implementation of system configuration changes, and system expansions. Therefore, when a consultant's scope includes the addition, deletion, or modification of the existing system, the consultant's scope is limited to the specification of the correct physical characteristics and facilities in support of the installation of equipment and facilities by others. The consultant shall be responsible for the correct specification and configuration of kiosks and millwork, communications conduit systems, electrical provisions, and cooling and ventilation requirements.

Because the FIDS/BIDS/GIDS system utilizes the Premise Wiring and Communications System (PWCS) and infrastructure as the transportation media for system signals, all conduit, cabling, and infrastructure components specified for the FIDS/BIDS system shall be typical of those requirements identified below for the PWCS system.

The FIDS/BIDS/GIDS system is also connected to the Emergency Communication System and will display emergency messages as controlled by the Simplex Grinnell Fire Alarm system. This integration happens at the SITA-Dayton AirportVision software level via physical integrations between the two systems. Visual paging is also integrated with this system at the software head end. Only DEN subject matter experts or their approved contractors are allowed to configure the software head end to account for any new FIDS/BIDS display locations.

Although displays can display emergency messaging, they do not require UPS backup.

End of Chapter

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Chapter 11 - Radio Frequency

11.0 General

These technical RF standards, as may be amended from time to time by the Manager of Aviation, are intended to apply to all cases where transmission of signals of any type are contemplated by a user. DEN reserves the right to review any and all proposed technologies and to reject any or all proposed installations if, in its own judgment, a proposed user's use or activity would limit, restrict, interfere with, prevent, or otherwise damage any present or proposed telecommunications use by DEN, other tenants' or users.

There is no intent whatsoever to limit the scope of application of these standards to radio technologies presently known or available. These standards are intended to include the entire electromagnetic radiation spectrum. Technologies not contemplated at the date of this instrument and including non-RF bands (e.g., lightwave, infra-red, laser, etc.) are all subject to DEN's approval and must be demonstrated to be free of all harmful interference and to pose no threat to people, or equipment or activities of DEN and its other users. DEN may, at its discretion, require testing of the user's equipment to determine compliance with these standards or to determine a source of interference.

11.0.1 RF Definitions

Table 11-1: RF Definitions

Term	Definition
Radio Interference	Any emission, radiation, or induction that endangers the function, degrades, obstructs, or repeatedly interrupts the telecommunications of Airport Operations, Public Safety, Federal Aviation Administration (FAA), Airline, or other users and users of RF communications. All wireless systems must operate in a shared environment with regard to the needs of other DEN communications and wireless operators.
Harmful Radio Interference	Interference causes circuit outages and/or message losses, as opposed to interference that is merely a nuisance or annoyance that can be overcome by appropriate measures. In order for radio interference to be considered harmful interference, it must degrade the performance of a communications system or other passive or active electronic systems.
Effective Radiated Power (ERP)	Antenna input power (in decibels referenced to a milliwatt (dBm) plus the gain of the transmitting antenna in decibels (dB) relative to a dipole (dBd).
User	Any tenant, person, or organization operating a wireless device(s) at DEN is a user. This includes all licensed or unlicensed frequency bands.
Unlicensed Devices	Unlicensed transmitters are typically low-power transmitters and are regulated by the Federal Communications Commission (FCC) Code of Federal Regulations 47 CFR §15. Unlicensed transmitters include but are not limited to; wireless headsets, WiFi access points, Family Radio Service (FRS) radios, low power broadcast, and Bluetooth devices. DEN reserves the right to restrict the use of these devices in all tenant agreements under section 40.20-2 -- Radio/Wireless Communications Systems of Rules and Regulations for The Management, Operation, Control, and Use of The Denver Municipal Airport System.

11.0.2 Transmitter Power Limit

11.0.2.1 Personnel Exposure

RF Transmitters shall NOT be allowed to exceed the maximum level for public exposure to non-ionizing RF radiation for any continuous interval, as set by the FCC's Office of Engineering and Technology, without specific prior written approval by the DEN Business Technologies Division and properly installed signs. See 11.5 RF Safety for proper signage and guidelines.

11.0.2.2 Aircraft Operation Area (AOA)

RF Transmitters are limited to 25 watts ERP without specific prior written approval by the DEN Business Technologies Division (special antenna or filtering may be required).

11.0.2.3 Indoors

RF Transmitters are limited to 5 watts ERP. Mobile radios used with a power supply for indoor operation must be limited to 5 watts or have an attenuator installed to effectively limit ERP to 5 watts.

11.1 Adding New and Modifying Existing RF Systems

11.1.1 Application for Proposed Wireless Systems at DEN

Users who propose to add channels to an existing radio system, change the configuration of an existing radio system, or construct new radio systems at DEN must submit a RF Application to the DEN Technologies Division – RF Systems Manager and receive written approval from the Business Technologies Division RF Manager before proceeding. Applications may be obtained from the DEN Business Technologies Division upon request. Such applications shall be reviewed, and a written response shall be given no later than thirty (30) business days from the date plans and specifications are submitted. If the applicant does not receive a written response within the time period set forth herein, such application is deemed denied. The RF Application shall, at a minimum, shall meet the requirements detailed in the following paragraphs:

Frequency Band and Specific Frequencies

The specific frequency band or bands within which the system will operate, as well as all the specific transmit and receive frequencies to be used.

11.1.1.1 Power

The actual transmitter output power, antenna gain, and ERP.

11.1.1.2 Transmission Line and Antenna Information

The specific type and length of the transmission line to be used and the specific type of connectors to be used. The transmission line can be listed as a specific manufacturer's type number or generically (e.g., 1/2-inch solid outer conductor foam dielectric line). Antenna type, manufacturer, model number, and gain relative to a dipole should be specified for both transmit and receive antennas. Directional antennas should include a diagram of the antenna's radiating pattern.

11.1.1.3 Modulation/Multiple Access Method

The specific type of modulation used in the system (e.g., AM, SSB, FM, ACSSB, CDMA, TDMA, etc.). For digital modulation techniques such as TDMA and CDMA, the channel bandwidth occupied by the system should be specified.

11.1.1.4 Coverage Requirements

Provide a general description of the area the system is designed to cover. Distinguish between systems that require wide area coverage over much of the airport and systems which require coverage only in limited areas, such as in the immediate vicinity of the Concourses or underground areas.

11.1.1.5 Underground Coverage

Specify the requirements for underground coverage so that the addition of the proposed system to the Radio Frequency Distribution System (RFDS) can be evaluated.

Other applications for existing sites where specific antenna mounting locations are available (e.g., on a tower at the antenna farm or rooftop of a building), the specific mounting location and methods shall be specified by DEN. This determination will be based on the results of the interference study performed on the proposed system per the user's RF Application. See 11.7 Antenna Plan Views, 11.8 NFPA-178 Example and 11.9 RF Application.

FAA Form 7460 may be required by users constructing towers for antennas or other structures that infringe on the airspace regulations at DEN. It is up to the applicant to determine if an FAA Form 7460 is required and to provide a copy of the FAA Form 7460 with the RF Application.

The Business Technologies Division RF Manager and RF Engineer are the final approving authorities for all RF Applications and site approvals.

11.1.2 Modification and Existing Systems

Modifications to existing systems require an RF Application to be submitted as detailed in 11.1 Adding New and Modifying Existing RF Systems.

11.1.2.1 Modifications

Additional capacity at a proposed site is limited by potential interference considerations, physical space limitations, and/or RF radiation exposure limits. DEN reserves the right to evaluate different distributions of channel capacity among the various service providers operating at a site to ensure that physical capacity is distributed equitably.

11.1.2.2 Capacity

Limitations for each provider operating a transmitter/receiver shall be restricted by:

A. Non-Ionizing Electromagnetic Radiation limits
B. Physical space limitations for antennas or base station equipment
C. Potential for interference from additional users or from additional channels
D. Requirements for maintenance of space for future users

11.1.2.3 Previously Approved Frequencies

Previously approved frequencies can be turned on/off at any time.

11.2 RF Operational Requirements

11.2.1 Pre-Operational Standards

All users shall furnish the following to the DEN Site Project Manager prior to the installation of any equipment:

A. Executed Lease, License Agreement, Temporary Site Access Permit, or other approved permit/contract.
B. Copy of the current FCC license or pending application, and construction permit, as appropriate.
C. Accurate block diagrams showing all system interface components with (active or passive) gains and losses in dB, along with power levels.
D. Detailed construction drawings.
E. Antenna type and mounting arrangements. DEN shall coordinate the equipment location for all potential users.

An intermodulation (IM) study may be required at the discretion of the DEN Business Technologies Division's RF Engineer prior to the installation of any equipment. In such cases, the IM study shall be performed by DEN or its approved consultant. The results of the IM study shall determine whether a potential transmitter is permitted to

operate on the site or whether additional interference protection devices are required. Payment of all costs associated with any IM study shall be the full responsibility of the applicant.

11.2.2 User Maintenance

User shall not make alterations, changes, or modifications to any installation in terms of the number of transmitters, type of equipment, antennas or antenna height, frequencies used, the power output of transmitters, or alter any other technical parameters without prior written approval by DEN, as detailed in 11.1 Adding New and Modifying Existing RF Systems.

User equipment approved for operation shall be properly maintained in accordance with the manufacturer's specifications to prevent it from becoming a source of interference or from becoming a safety hazard.

11.2.3 Disputes Between Users

The DEN Business Technologies Division, RF Manager, and the RF Engineer have final authority with respect to technical parameters, equipment placement, antenna location, as well as installation workmanship. Recommendations and decisions of the RF Manager and the RF Engineer shall be final and binding.

The DEN Business Technologies Division, RF Manager, and the RF Engineer shall be the final authority between users in the interpretation of these RF Technical Standards.

11.2.4 Facility Regulations

All areas in and around the user's equipment and work area shall always be kept clean and neat. Exterior areas on the Property, including roads and parking lots, shall be kept clean. User's trash and other unused materials shall be removed immediately from the property and not stored on the premises in any manner.

Tools, test equipment, and work materials shall be stored only in areas with prior approval by the DEN Business Technologies - RF Manager. It shall be the user's responsibility to secure stored materials against theft and vandalism. All stored materials other than small tools and parts are to be tagged with the owner's name.

Food and drink shall be permitted on the premises. However, all trash related to the same shall be removed. Care shall be taken not to spill or litter equipment on the premises with food or drink.

No alcoholic beverages shall be taken on the premises by the user, its agents, or employees.

Users shall not use or permit the use of the premises for lodging or sleeping.

Smoking, open flame, or welding shall not be permitted inside buildings.

Users shall not allow or authorize entry into the premises for any purpose whatsoever to any person performing maintenance work for the user without following DEN Security processes and procedures.

11.3 RF Site Technical Standards

11.3.1 Posting of Information

The following information must be posted by the user on or near equipment cabinets:

A. Copy of the current FCC station license and an Identifier Card with the following information:
    a. Name of the licensee and contact information
    b. Name and telephone number of the responsible technician or engineer
    c. FCC call sign
    d. Transmit and receive frequencies
    e. Authorized output power and ERP
    f. Type of emission
    g. Antenna type, gain, and location installed
    h. Transmission line type

B. Unidentified equipment shall be considered unauthorized and may be shut- down or possibly removed from the site.

11.3.2 Changes

Changes are not permitted to any RF installation without submitting an RF Application to the DEN Business Technologies Division and receiving prior written approval by the DEN Business Technologies Division RF Manager and RF Engineer before proceeding. Unauthorized changes to frequencies, antennas, ERP, or approved configuration may be punishable as set forth in Section 7.01 (B) below.s

11.3.3 Transmitters

As a minimum, each transmitter shall employ a dual-stage isolator followed by a single cavity bandpass filter. All transmitters must have external harmonic (low pass) filters. Low pass filters shall attenuate the second harmonic by at least 60 dB and the third harmonic by at least 50 dB. The following minimum specifications apply:

A. 30-76 MHz:
    a. Isolators - minimum of 60 dB
    b. TX cavity - minimum of 20 dB rejection at + 1 MHz
B. 118-174 MHz:
    a. Dual Stage Isolators - minimum of 60 dB
    b. TX cavity - minimum of 25 dB rejection at + 1 MHz
C. 406-512 MHz:
    a. Dual Stage Isolators - minimum of 60 dB
    b. TX cavity - minimum of 20 dB rejection at + 5 MHz
D. 851-940 MHz:
    a. Dual Stage Isolators - minimum of 60 dB
    b. TX cavity - minimum of 20 dB rejection at + 5 MHz
E. Cellular, PCS, and 220 MHz combiners: These systems require special consideration. Additional details and engineering specifications may be required.

Bandpass filters shall follow the isolator because ferrite isolators are nonlinear and can create harmonics. Please note that most bandpass cavity filters pass odd harmonics of the tuned frequency, so an external low pass filter is required. Transmitter combiners shall be considered on a case-by-case basis. Please submit all combiner technical information with the RF application to the DEN Business Technologies Division.

11.3.4 Additional Protective Devices

Additional protective devices may be required based upon an evaluation by the DEN Business Technologies RF Engineer. This evaluation is performed based on the following information derived from the submitted RF Application:

A. TX and RX IM products, particularly second and third-order mixes
B. Antenna location and type
C. Combiner/multicoupler configurations
D. Transmitter specifications
E. Receiver specifications
F. Historical problems
G. Transmitter-to-transmitter isolation
H. Transmitter-to-antenna isolation
I. Transmitter-to-receiver isolation
J. Calculated and measured the level of IM products
K. Transmitter output power
L. Transmit ERP
M. Spectrum analyzer measurements

N. Standing Wave Ratio (SWR) measurements
O. Existing cavity filter selectivity
P. Antenna-to-antenna proximity

11.3.5 Base Station Mobile Radio Receivers

DEN has high RF levels in all mobile radio bands. Receiver amplifiers must have good IM rejection, high compression points, and high third-order intercept. If interference is encountered and it is determined the receiver is not performing according to manufacture specifications, DEN will require receiver improvements before requesting changes to other user equipment or configurations.

Filters are required for base stations using mobile radio receivers. Single receivers must employ a minimum of a single cavity bandpass filter (use TX filter performance in 4.03 A 1 through 5 for RX filter performance). Additional filter isolation may be required in special cases. Receiver multi-couplers must use a bandpass filter prior to the multi-coupler amplifier. Duplexed systems should meet both the TX and RX filter specifications.

11.3.6 Antennas

Select antennas designed to minimize passive intermodulation generation. Unless the antenna is configured for simplex or duplex operation, transmit and receive antennas should be separated vertically on the tower or other support structure. Antenna locations shall be designated by the RF Engineer. All antennas must be DC grounded to the tower or supporting structure unless otherwise approved by the RF Engineer.

Antennas proposed for installation on DEN buildings shall provide an approved antenna mount per RF Technical Standards specifications. See 11.7 Antenna Plan Views No ballast mount antenna or roof penetrations are permitted on the bonded membrane roofing system. If penetrations are unavoidable, penetrations shall be made by a DEN-approved roofing contractor in order to maintain the warranty on the roof.

DEN maintains a map of potential antenna locations on each major facility. Users proposing the installation of antennas and mounts shall obtain a copy of the map for the proposed facility. The user may indicate the preferred locations and submit this with the RF Application. See 11.1 Adding New and Modifying Existing RF Systems and 11.9 RF Application.s

11.3.7 Transmission Lines

The coaxial cable should be grounded at the top and bottom of the cable run with an Andrew ground kit or approved equivalent. Ground conductors must run straight down with no sharp bends (bends increase the impedance of the line; low impedance is required for good lightning protection). DEN requires that the line be marked for identification purposes. Bands of colored electrical tape at the bottom, middle, and top of the run (similar to a resistor color code) are required. Installation of a coaxial surge arrestor at the bulkhead is also required. Transmit and receive lines should be separated by at least one foot from the cabinet to the antenna. All transmission lines must meet or exceed accepted industry standards.

Transmission lines must be labeled at the antenna with a stainless-steel stamped identification tag permanently affixed to the transmission line. The tag will contain the following minimum information:

A. Owner
B. Contact Number
C. Frequency or frequencies of operation
D. Date of installation
E. DEN permit number
F. FCC Call Sign (if applicable)

11.3.8 Connectors

Connectors are often sources of RF leakage and passive intermodulation. UHF connectors (PL259) are not allowed. 7/16 DIN connectors should be used at 800 MHz and above; N connectors are authorized at 800 MHz. Connectors using dissimilar metal contacts or ferrous materials (e.g., nickel plating) are not allowed. The preferred

connector uses a silver-plated body with gold plated inner conductor. Any exception to the above must be approved by RF Manager or RF Engineer in writing.

11.3.9 Grounding - General

Equipment grounding and bonding shall be accomplished in accordance with National Electrical Codes, NFPA-178, and Lightning protection code. See 11.8 NFPA-178 Example Properly installed transmission line outer-conductor grounding kits and center-conductor surge- suppressors such as a polyphaser or equivalent are required at the building entry point (bulkhead). Coordinate with the DEN Site Project Manager for guidance on grounding and bonding at a particular facility. Note that DEN has specifications for grounding and bonding at the airport.

11.3.10 Shielding

RF interference can pass directly into the electronics of a receiver or transmitter. Cabinet doors and all stock RF shielding must be in place and maintained to the manufacturer's specifications. Transmitters determined to be emitting spurious emissions will be considered a violation. See11.6.1 Compliance with DEN Technical Standards.

11.3.11 Power Limits

Cellular, ESMR, and PCS/PCN facilities operating on DEN property shall limit their ERP to 25 Watts (+ 44dBm) per RF channel at all locations, without specific prior written approval by the DEN RF Manager, except the West Antenna Farm, Old Toll Plaza Site, and Pena Blvd. sites. For wideband systems, this power limit applies to the equivalent power over the entire bandwidth occupied by the RF channel discussed in 4.11 B. below.

Due to frequency spreading with wideband systems, there is less power density in each piece of spectrum, equivalent to narrow-band analog use. For a wideband carrier bandwidth of 1.25 MHz or greater, the total channel power limit is 200 Watts (+53 dBm). These maximum ERP levels are to help reduce intermodulation and receiver desensitization in portable or mobile radios authorized for use at DEN. In some locations, additional transmitter filtering or lower power limits may be required of the user by DEN. This concept applies to broader bandwidth UMTS, LTE, and other broadband transmissions.

11.3.12 Unlicensed Devices

Unlicensed devices, as defined by FCC 47 CFR §15, shall be subject to the RF application process and all guidelines as noted above. No approved unlicensed device shall be modified to increase RF power output or modifications to the antenna radiating element. Any unlicensed device shall be maintained in good working order with no physical or electrical damage. In addition, unlicensed devices are subject to the following requirements:

A. Unintentional Transmitters: Unintentional transmitters such as personal computers or other computing devices shall be Class A devices.
B. Intentional Transmitters Broadcast Band: Intentional radiators in the broadcast band are discouraged for use on Airport property.
C. Intentional Transmitters All Other Bands: FCC Part 15, Intentional transmitters in all other bands, shall be subject to the RF application process and the requirements as noted above.
D. In-House Broadband Over Power Line: In-house broadband over a power line is not allowed in airport facilities.

11.3.12.1 2.4 and 5 GHz Unlicensed Band Channel Plan.

Wireless Fidelity (WiFi) is a growing wireless connection medium able to handle high data rates in relatively small areas, typically within a 300-foot radius. The FCC allocated two bands for this service, 2.4 GHz and 5 GHz. Because of the recent growth of devices utilizing WiFi technology, tenants are encouraged to use channel 1 in the 2.4 GHz band and channels 36, 40, 92, and 96 in the 5 GHz band. Coordinate new installations with the DEN WiFi group.

11.4 RF Installation and Construction Standards

All installations shall be completed in a professional manner by qualified technical personnel and are subject to approval by the RF Manager and the RF Engineer prior to rendering any system operational. All construction must

follow practices described in the DEN Tenant Development Guidelines (TDGs) as provided by the Engineering Division and applicable standards.

11.4.1 Cabinets

A. All RF devices, including duplexers, isolators, cavities, switches, etc., shall be located inside grounded cabinets.
B. Properly shielded devices may be mounted on grounded relay racks with prior written approval by DEN.
C. All cabinets must be bonded together and to the ground system with at least #6 copper wire or 1" copper strap.
D. All doors must be on and closed.
E. All holes larger than 1" must be covered with copper screen or solid metal plates.
F. Cabinets shall be spaced with no less than three ft of front and back clearance for maintenance access.

11.4.2 Cabling

All cables exiting through a building bulkhead must use approved weatherproof seals and fasteners (NO tape). All antenna cables must be jacketed Heliax™ or equivalent. Kinked or cracked cable shall NOT be permitted and may be considered a violation.

Antenna cables must be tagged at building bulkhead entry/exit points in the same manner as at the antenna with weatherproof identification tags. See 11.6.1 Compliance with DEN Technical Standards. An additional tag is required in the equipment room if the building bulkhead entry/exit point is not in the equipment room.

Any unused cable must be terminated or removed. The unused cable includes RF cable that is no longer part of the transmitting/receiving system. Fiber optic, telephone, or network cables need not be removed.

All antenna transmission lines shall be grounded at the tower top (50 Ft. or above) and bottom and at the building entrance with approved grounding kits.

All coaxial cables shall be individually attached to the tower legs or wave-guide hangers. This location shall be assigned by DEN. Attachment of coaxial cable shall be by insulated stainless steel clamps and hangers or ultra-violet-stabilized nylon ties spaced a maximum of four (4) feet apart for both towers and rooftops.

All transmit interconnecting cables/jumpers must be a solid copper outer conductor (e.g., Superflex™ or equivalent) or double-braided silver (RG-214/U or equivalent).

All receiver cabling must be 100% shielded coaxial cable or double-shielded silver cable.

All rooftop cable must be run on the antenna mounting structure and/or cable trays.

All inside cable must be run in troughs or cable trays.

All AC line cords must be three conductor with grounding plugs.

Where no troughs or cable trays exist, all cable must be tied at least 3' intervals.

Power and phone line cables shall be protected by grommets where they enter cabinets. The cable shall not be wrapped with black tape.

Lightning protection must be provided for the antenna, power, and control lines.

The cable between an equipment cabinet and the building exit must be an uninterrupted, continuous length without splices or adapters.

11.4.2.1 Connectors

Connectors must be 50-ohm type, including chassis/bulkhead connectors. Connectors must comply with all manufacturers' instructions. Connectors must be properly fabricated (soldered if applicable) if field installed.

Connectors must be taped and coated with a sealing agent at least 4" onto the jacket if exposed to the weather.

Connectors must be pliers tight as opposed to hand-tight.

Connectors must be silver-plated or brass.

Connectors must be electrically and mechanically equivalent to OEM connectors.

11.4.3 Antennas and Mounts

No welding to any portion of the tower structures. All antenna mounts or supporting structures shall be stainless steel or hot-dipped galvanized steel. Any hot dipped galvanized pipes or brackets that have been field cut must be sprayed with a minimum of two coats of cold galvanizing paint or stainless steel paint.

All antennas should be fiberglass or ABS plastic enclosed. Exposed metal antennas shall not be permitted on the site unless treated by chromate conversion (irridite).

All antennas that become corroded or damaged must be replaced in a timely fashion.

No ballast mount antennas are permitted.

Applicant must comply with EIA-222G (or most recent revision) for a basic wind speed of 85 miles per hour dry (Uniform Building Code for Denver County) or 0.866 times 85 miles per hour with ½ inch radial solid ice (56 lbs/cubic foot). This requirement is critical to applications at DEN antenna towers 1 through 4.

The applicant will provide the results of the study (5.04 (E) above), and will be at the applicant's expense. The study must be stamped by a licensed professional engineer in the State of Colorado. In some cases, a study may not be required if previous studies have identified antenna locations that are vacant but considered in the most recent studies as available or filled.

11.4.4 Prevention of Passive Intermodulation

To help prevent passive intermodulation, the following practices shall be followed at DEN sites:

A. 7/16 DIN connectors are required for new systems with a transmitter power of 100 watts or greater.
B. All connectors shall be non-ferrous (no nickel).
C. Do not use UHF connectors (PL259) at any frequency.
D. All coaxial cables shall be a solid shield (e.g., Heliax↗, Flexwell↗ or equivalent).
E. Transmission lines shall be grounded at the top and bottom of each run.
F. All bonds shall be clean, tight, free of corrosion, and have no dissimilar metals.
G. Transmit and receive lines will be physically separated.
H. Use antennas designed to prevent passive intermodulation.

11.4.5 RF Distribution System Interface

Users shall be responsible for all equipment necessary to interface with the RF Distribution System (RFDS). Input to the RFDS downlink (base-to-mobile) is a type N connection with a maximum input of +18 dBm per carrier. The output of the RFDS uplink (mobile-to-base) shall provide the base-station receiver with all in-band signals from portable and mobile radios in the distributed areas of coverage via the respective band (450, 460, 800, cellular, 900). The receive port connection is through a type N connector on the tower RFDS rack, assigned to the user by DEN upon RF Application/Installation approval.

User installations requiring RFDS connections to couple signals from antenna lines must provide adequate isolation between the RFDS and antennas. Coupling or summing devices must have 20 dB minimum port-to-port isolation.

11.5 RF Safety

11.5.1 RF Safety Standards and Guidelines

The engineering, design, configuration, installation, and maintenance of radio facilities on the site shall be accomplished in a manner that minimizes downward radiation. Changes to proposed systems may be directed by DEN to comply with this objective. The following guidelines are applicable:

A. All personnel entering the site must be authorized.

B. Obey all posted signs.
C. Assume all antennas are active unless proven otherwise.
D. Before working on an antenna, notify the owner and disable the transmitter. In collocated sites, all users and owners must be notified to disable all transmitters.
E. Use an RF personal monitor when working near antennas.
F. Never operate transmitters without shields.
G. Post a warning sign at the base of your tower. A warning sign shall contain the following information:
    - CAUTION – OVERHEAD WORK IN PROGRESS

Power densities on towers can be much higher than at ground level. For this reason, tower climbers shall request power reductions from high-power users and carry RF personal monitors when climbing towers. The Site Manager can tell you which transmitters should be turned down before climbing your tower.

Federal Government guidelines regarding environmental impacts from RF energy are found in the Code of Federal Regulations (CFR) Title 47, Parts 1.1307-1.1310.

Available sources for warning signage are TESSCO or

Radhaz

11.6 Section 7 - Compliance with RF Standards

11.6.1 Compliance with DEN Technical Standards

DEN reserves the right to inspect all systems to ensure compliance with installation and technical standards. Users must cooperate with DEN if requested to demonstrate proper operation of filters and other protective devices installed in the user's system.

A. Violation Notice:
User (system owner and/or operator) shall respond as directed to any notice by DEN that a suspected offense and violation of these RF Technical Standards herein exists. Per the revised DEN Rules and Regulations (Section 1.13.8, General Penalty), violations confirmed by DEN are subject to:
    a. Possible fines (penalty) of up to $999 per day; each day an offense or violation continues shall constitute a separate offense or violation.
    b. Possible revocation of any privilege shall be in addition to any penalty.
    c. Possible disconnection and/or removal of systems.
B. Disconnection and/or removal of systems and/or equipment:
Any system or equipment installed or operating at DEN that does not have an approved RF Application associated on file approving the installation and operation will be considered in violation of these standards. Every attempt will be made to determine the user/owner of the system and/or equipment. If the RF Manager is unable to determine the user/owner, DEN reserves the right to disconnect and/or remove and may even dispose of the equipment at the discretion of the RF Manager.

11.7 Antenna Plan Views

For specific drawings at the desired location, contact DEN Business Technologies Division.

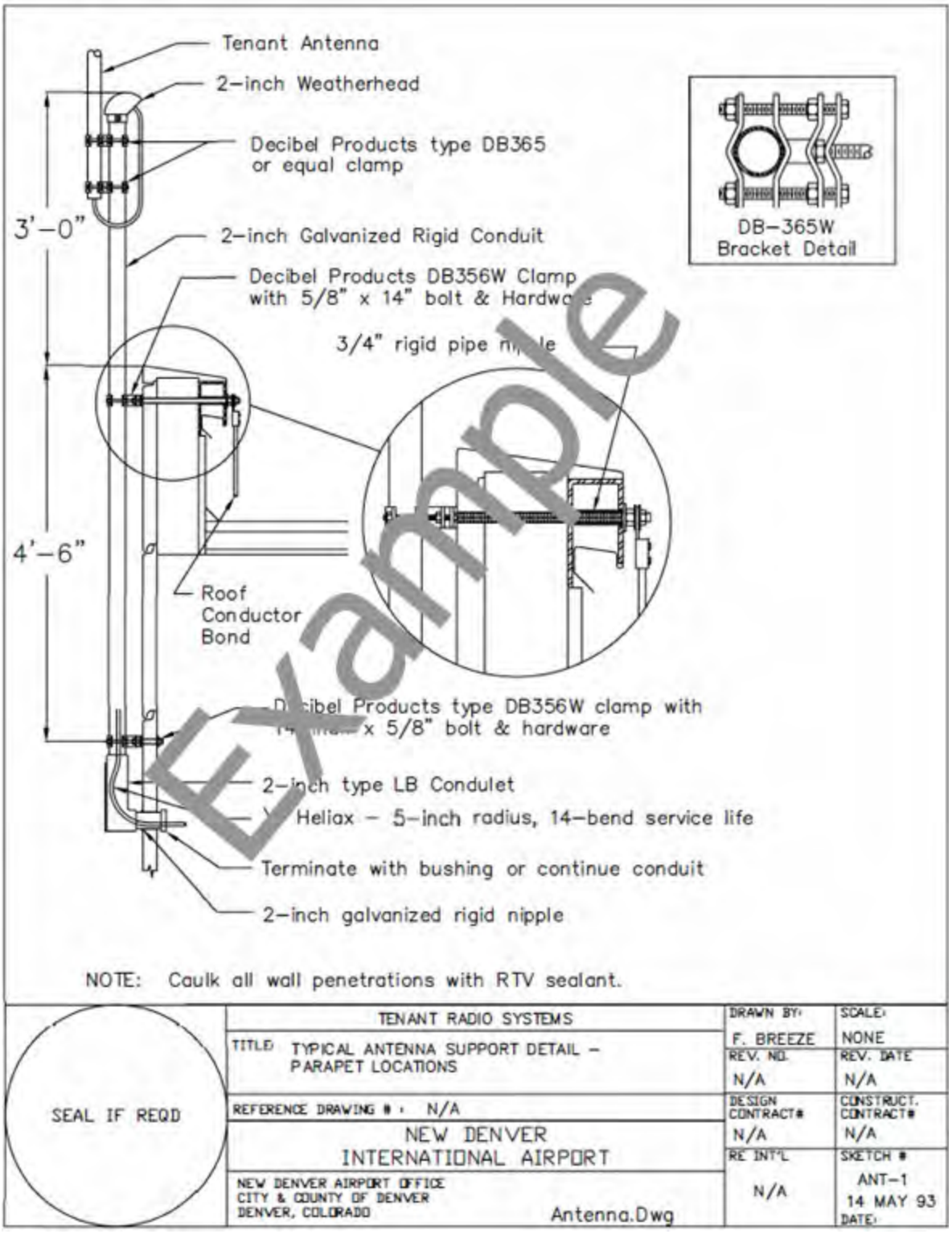

Figure 11-1: Antenna Plan View

11.8 NFPA-178 Example

An ordinary structure shall be any structure that is used for ordinary purposes, whether commercial, industrial, farm, institutional, or residential. Ordinary structures not exceeding 75 ft (23 m) in height shall be protected with Class I materials, as shown in Table 3-1.1(a). Ordinary structures greater than 75 ft (23 m) in height shall be protected with Class II materials, as shown in Table 3-1.1(b). If part of a structure is over 75 ft (23 m) in height (e.g.,

steeple) and the remaining portion does not exceed 75 ft (23 m) in height, the requirements for Class II air terminals and conductors shall apply only to that portion exceeding 75 ft (23 m) in height. Class II conductors from the higher portion shall be extended to the ground and shall be interconnected with the balance of the system.

Table 11-2: Minimum Class I Material Requirements

Type of Conductor		Copper		Aluminum	
		Std	Metric	Std	Metric
Air Terminal, Solid	Diameter	3/8 in	9.5 mm	1/2 in	12.7 mm
Air Terminal, Tubular	Diameter Wall thickness Size each strand	5/8 in 0.033 in 17 AWG	15.9 mm 0.8 mm	5/8 in 0/064 in 14 AWG	15.9 mm 1.6 mm
Main Conductor, Cable	Weight per length Cross Section Area	187 lb/1000 ft 57,400 CM	278 g/m 29 mm2	95 lb/1000 ft 98,600 CM	141 g/m 50 mm2
Main Conductor, Solid Strip	Thickness Width	0.051 in 1 in	1.30 mm 25.4 mm	0.064 in 1 in	1.63 mm 25.4
Bonding Conductor, Cable (solid or stranded)	Size each Strand Cross Section Area	17 AWG 26,240 CM		14 AWG 41,100 CM	
Bonding Conductor, Solid strip	Thickness Width	0.051 in 1/2 in	1.30 mm 12.7 mm	0.064 in 1/2 in	1.63 mm 12.7 mm

Table 11-3: Minimum Class II Material Requirements

Type of Conductor		Copper		Aluminum	
		Std	Metric	Std	Metric
Air Terminal, Solid	Diameter	1/2in	12.7 mm	5/8 in	15.9 mm
Main Conductor, Cable	Size each stand Wight per length Cross section area	15 AWG 375 lb/1000 ft 115,000 CM	558 g/m 58 mm2	13 AWG 190 lb / 1000 ft 192,000 CM	283 g/m 97 mm2
Bonding Conductor, Cable	Size each strand Cross section area	17 AWG 26,240 CM		14 AWG 41,100 CM	
Bonding Conductor, Cable	Thickness Width	0.051 in 1/2 in	1.30 mm 12.7 mm	0.064 in 1/2 in	1.63 mm 12.7 mm

11.8.1 Materials

Protection systems shall be made of materials that are resistant to corrosion or acceptably protected against corrosion. Combinations of materials that form electrolytic couples of such a nature that, in the presence of moisture, corrosion is accelerated shall not be used. One or more of the following materials shall be used:

11.8.1.1 Copper

Where copper is used, it shall be of the grade ordinarily required for commercial electrical work, generally designated as being of 95 percent conductivity when annealed. Copper lightning protection materials shall not be installed on aluminum roofing, siding, or other aluminum surfaces.

11.8.1.2 Copper Alloys

Where alloys of copper are used, they shall be as substantially resistant to corrosion as copper under similar conditions.

11.8.1.3 Aluminum

Where aluminum is used, care shall be taken not to use it where contact could be made with the earth, or anywhere it could rapidly deteriorate. Conductors shall be of electrical grade aluminum. Aluminum lightning protection materials shall not be installed on copper surfaces.

11.8.2 Corrosion Protection

Precautions shall be taken to provide the necessary protection against any potential deterioration of any lightning protection component due to local conditions. Copper components installed within 24 in. (600 mm) of the top of a chimney or vent emitting corrosive gases shall be protected by a hot-dipped lead coating or equivalent.

11.8.3 Mechanical Damage or Displacement

Any part of a lightning protection system that is subject to mechanical damage or displacement shall be protected with protective molding or covering. If metal pipe or tubing is used around the conductor, the conductor shall be electrically connected to the pipe or tubing at both ends.

11.8.4 Use of Aluminum

Aluminum systems shall be installed in accordance with other applicable sections and with the following:

A. Aluminum lightning protection equipment shall not be installed on copper roofing materials or other copper surfaces or where exposed to runoff from copper surfaces.

B. Aluminum materials shall not be used where they come into direct contact with the earth. Fittings used for the connection of aluminum-down conductors to copper or copper-clad grounding equipment shall be of the bimetallic type. Bimetallic connectors shall be installed not less than 18 in. (457 mm) above earth level.

C. Connectors and fittings shall be suitable for use with the conductor and the surfaces on which they are installed. Bimetallic connectors and fittings shall be used for splicing or bonding dissimilar metals.

D. An aluminum conductor shall not be attached to a surface coated with alkaline-base paint, embedded in concrete or masonry, or installed in a location subject to excessive moisture.

11.8.5 Strike Termination Devices

Strike termination devices shall be provided for all parts of a structure that are likely to be damaged by direct lightning flashes. Metal parts of a structure that are exposed to direct lightning flashes and that have a metal thickness of 3/16 in. (4.8 mm) or greater shall only require connection to the lightning protection system. Such connections

shall provide a minimum of two paths to the ground. Strike termination devices shall not be required for those parts of a structure located within a zone of protection.

11.8.6 Conductor Bends

No bend of a conductor shall form an included angle of less than 90 degrees, nor shall it have a radius of bend less than 8 in. (203 mm). Refer to Figure 11-2: Conductor Bend.

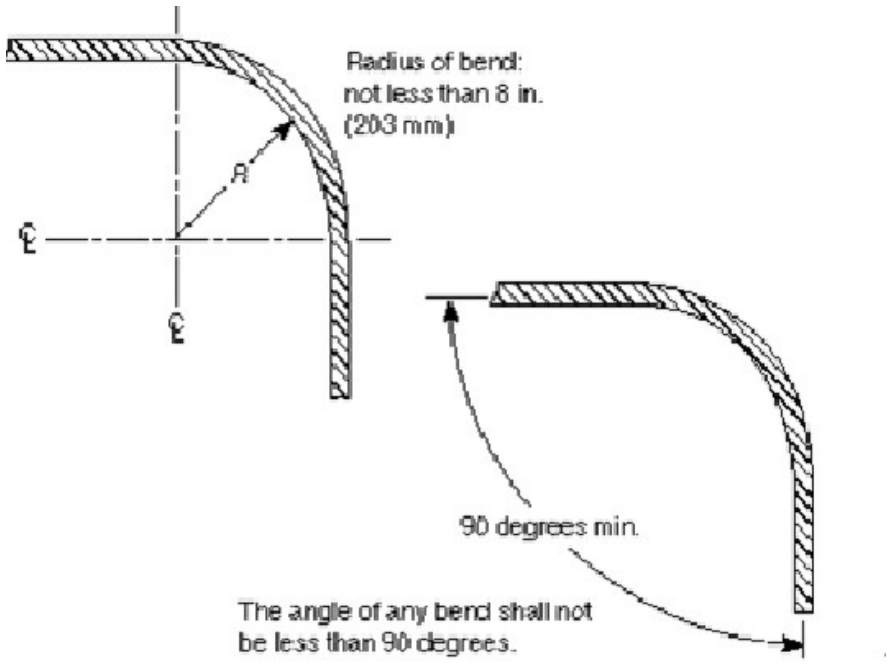

Figure 11-2: Conductor Bend

11.8.6.1 Conductor Supports

Conductors shall be permitted to be coursed through the air without support for a distance of 3 ft (0.9 m) or less. Conductors that must be coursed through the air for longer distances shall be provided with a positive means of support that will prevent damage or displacement of the conductor.

11.8.7 Conductor Fasteners

Conductors shall be securely fastened to the structure upon which they are placed at intervals not exceeding 3 ft (1 m). Attached by nails, screws, bolts, or adhesives as necessary, the fasteners shall not be subject to breakage and shall be of the same material as the conductor or of a material equally resistant to corrosion as that of the conductor. No combination of materials shall be used that will form an electrolytic couple of such a nature that, in the presence of moisture, corrosion will be accelerated.

11.8.8 Masonry Anchors

Masonry anchors used to secure lightning protection materials shall have a minimum outside diameter of 1/4 in. (6.4 mm) and shall be set with care. Holes made to receive the body of the anchor shall be of the correct size, made with the proper tools, and preferably made in the brick, stone, or other masonry unit rather than in mortar joints. When the anchors are installed, the fit shall be tight against moisture, thus reducing the possibility of damage due to freezing.

11.8.9 Connector Fittings

Connector fittings shall be used at all “end-to-end,” “tee,” or “Y” splices of lightning conductors. They shall be attached so as to withstand a pull test of 200 lb (890 N). Fittings used for required connections to metal bodies in or on a structure shall be secured to the metal body by bolting, brazing, welding, or using high-compression connectors listed for the purpose. Conductor connections shall be bolted, welded, high compression, or crimp-type.

Crimp-type connections shall not be used with Class II conductors.

11.8.10 Metal Antenna Masts and Supports

Metal antenna masts or supports located on a protected structure shall be connected to the lightning protection system using main-size conductors and listed fittings unless they are within a zone of protection.

11.9 RF Application

See Figure 11-3: RF Application (Page 1 of 2) and Figure 11-4: RF Application (Page 2 of 2) for an example of the RF application. Contact the DEN Project Manager for a fillable version of this application.

Administrative Information

	Proposing Agency or Organization (User)		
1	Name:	Req	
2	Phone:	Req	
3	Street Address:	Req	
4	City, State & ZIP:	Req	

	Administrative Contacts Information		Construction Administration	Project Manager
5	Agency or Organization Name:	Req		
6	Contact Individual & Title:	Req		
7	Phone:	Req		
8	Mobile:			
9	E-Mail:	Req		

	Technical, Construction or Field Contacts		Equipment Installer	RF Engineer Contact
10	Agency or Organization Name:	Req		
11	Contact Individual & Title:	Req		
12	Phone:	Req		
13	Mobile:			
14	E-Mail:	Req		

General System Information

1	Type of System (VHF, UHF, ETC):	Req		
2	Type of Action (Add, Modify or Remove):	Req		
3	Proposed Antenna Location at DIA:			
4	Structure or Site Name:	Req		
5	Geographic Coordinates (D-M-S NAD83):	Req	Latitude:	Longitude:
6	Ground Elevation (Feet AMSL):			
7	Number of Antenna Locations Needed	Req		
8	Floor Space Needed (L x W in feet)			
9	AC Power Needed (Volts, Amps, Phases)			
10	Coverage Requirement			
11	On RF Distribution System (Underground)?	Req		

Regulatory Information (See Notes 1 &2)

1	FCC Call Sign(s):		
2	FCC Radio Service(s):		
3	FCC Authorization Grant Date(s):		
4	FCC Authorization Expiration Date(s):		
5	FCC authorization or application attached?		
6	FAA Aeronautical Study Number (ASN): (See RF Standard Section 2.01G3)		

Applicant may be required to provide additional information before approval.
For questions, contact Leonard Spomer at: 303-342-2879. Return completed form via e-mail to leonard.spomer@flydenver.com

NOTES & COMMENTS:

1. This information is required for licensed services only.
2. Use the FAA OE/AAA website to see if an Air-space study is required. Attach a copy of the submitted study request (Form 7460-1) if one is.
3. Use FCC emission designator & modulation type for non-commercial services. (LMR, MW, etc.) Use technology for commercial (CDMA, UMTS, LTE).
4. Use the FCC frequency number, industry standard channel number, or user assigned channel number.)
5. Attach a scaled plan view of the platform or roof showing the location of each antenna by antenna number if the system uses more than one antenna.
6. Sort Antennas by Antenna Number from lowest to highest
7. Multiple channel labels and frequencies should be entered where they have the same emission designator, or use the same technology and bandwidth.
8. Where multiple signal formats use the same antenna, a separate antenna entry is needed for each format. The antenna number should not change.
9. If the same antenna is used for transmit and receive, enter the antenna number used for Tx. No further Rx antenna or transmission line data is needed.
10. Include All Antennna Patterns for all used Frequencies in MSI/Planet Format either in a separate excel or notepad file

Req = required field.

APPLICANT NOTES & COMMENT AREA

For Denver International Airport Use Only

Application Number:	
Application Received:	
Review Completed:	
Approved/Rejected:	
Planning & Engineering Submittals:	
Planning & Engineering Project Number:	
Engineering Approval:	
Response Sent To Applicant:	

Figure 11-3: RF Application (Page 1 of 2)

Frequencies 1-6								
RF Characteristics								
Transmit RF								
1	Transmit Antenna Number: (notes 5 & 6)	Req						
2	Action (Existing, New, Modify or Remove):	Req						
3	Transmit Carrier Label: (notes 4 & 7)	Req						
4	Transmit Carrier Center Freq. (MHz): (note 7)	Req						
5	Transmit Carrier Bandwidth (kHz):	Req						
6	Transmitter Output Power (Watts):	Req						
7	Transmitter Filter Loss (dB):							
8	Other Transmit Losses (dB):							
9	Transmit Line Loss (dB):	Req						
10	Transmit Antenna Gain (dBi):	Req						
11	Transmit Antenna Azimuth (°T):	Req						
12	Transmit Antenna HPBW (°):	Req						
13	Calculated EIRP (dBW):	Req						
14	FCC Emission Designator (note 3):							
15	Transmitter Modulation Type (note 3):	Req						
Receive RF								
16	Receive Antenna Number: (notes 5, 6 & 9)	Req						
17	Action (Existing, New, Modify or Remove):	Req						
18	Receive Carrier Label: (notes 4 & 7)	Req						
19	Receive Carrier Center Freq. (MHz): (note 7)	Req						
20	Receive Carrier Bandwidth (kHz):	Req						
21	Receiver Filter Loss (dB):							
22	Other Receive Losses (dB):							
23	Receiver Line Loss (dB):							
24	Receive Antenna Gain (dBi)							
25	Receive Antenna Azimuth (°T):							
26	Recieve Antenna HPBW (°):							
27	FCC Emission Designator (note 3):							
28	Receiver Modulation Type (note 3):	Req						
29	Receiver Sensitivity at threshold (dBm):	Req						
30	Receiver IM Signal Rejection (dB)	Req						
31	Receiver IM Signal Margin (dB)	Req						
Equipment Characteristics								
Transmitter Equipment								
32	Transmitter Make:	Req						
33	Transmitter Model:	Req						
34	Transmitter Output Isolator & Filter Types:							
35	Transmitter Output Isolator & Filter Make:							
36	Transmitter Output Isolator & Filter Model:							
37	Analysis Isolator Type (DIA Internal Use Only)							
38	Analysis Tx Filter Curve (DIA Internal Use Only)							
39	Transmit Antenna Type:	Req						
40	Transmit Antenna Make:	Req						
41	Transmit Antenna Model:	Req						
42	Transmit Antenna Horizontal Pattern Attached	Req						
43	Transmit Antenna Height (feet AGL)							
44	Transmit Antenna support structure hgt (AGL):							
45	Transmit Line Manufacturer:	Req						
46	Transmit Line Type:	Req						
47	Transmit Line Length (ft):	Req						
48	Transmit Line Connector Type:							
Receiver Equipment								
49	Receiver Make:	Req						
50	Receiver Model:	Req						
51	Receiver Selectivity or ACIPR:	Req						
52	Receiver IM Rejection (EIA SINAD, dB):	Req						
53	Receiver Spurious & Image Rejection (dB)	Req						
54	External Receiver Filter or Duplexer Type:	Req						
55	External Receiver Filter or Duplexer Make:	Req						
56	External Receiver Filter or Duplexer Model:	Req						
57	Analysis Rx Filter Curve (DIA Internal Use Only)							
58	Receive Antenna Type: (note 6)							
59	Receive Antenna Make: (note 6)							
60	Receive Antenna Model: (note 6)							
61	Receive Antenna Horizontal Pattern Attached							
62	Receive Antenna Height (feet AGL)							
63	Receive Antenna support structure hgt (AGL):							
64	Receive Line Manufacturer:							
65	Receive Line Type:							
66	Receive Line Length (ft):							
67	Receive Line Connector Type:							
68	Receiver Multicoupler Block Diagram Attached:							
(Attach block diagram of multicoupler with amps/splits)								

Figure 11-4: RF Application (Page 2 of 2)

11.9.1 Administrative

A. Proposing Agency

a. Applicant Information

b. Final RF Approval Letter will be sent to the address listed here

B. Administrative Contact Information

a. Construction Administration

- Manager or contractor responsible for equipment installation

b. Project Manager

C. Construction Technical Contact Information

c. Equipment Installer

d. RF Engineer Contact

11.9.2 General System Information

A. Type of Systems requested to be installed

B. Type of action on proposed systems

C. General Antenna Location

D. Structure Name

E. Antenna Coordinates

F. Ground Elevation of Antenna

G. Number of Antenna Locations Needed

H. Floor Space Needed

a. Generally, will be used if a new radio room is being constructed

I. AC Power Needed

J. Coverage Requirement

a. Fill this in if RF Coverage Study is needed

K. RF Distribution

a. Indicate if the system needs to be hooked into DEN's distributed antenna network.

11.9.3 Regulatory Information

A. Fill out the information in this section if a separate FCC License sheet is not available or included in the application.

11.9.4 Notes

A. Attach all FCC Licenses as a PDF or Image in a separate worksheet or Excel File.

B. Provide, at a minimum, an image of the vertical and horizontal radiation pattern of the proposed antennas at the operational frequencies. If data is available, please provide gain and azimuth data on a separate worksheet.

C. Provide Construction Diagrams indicating antenna location and antenna numbers that will correspond to the TX and RX antenna numbers used later in the RF Application.

11.9.5 RF Characteristics (Required)

A. Transmit Antenna Number

a. Ensure this number corresponds with the indicated antenna on the CDs.

B. Action

a. Indicate Add, New, Modify, or Remove for each antenna/frequency on application.

C. Transmit Carrier Label

a. Use the FCC frequency number, industry-standard channel number, or user-assigned channel number.

b. Multiple channel labels and frequencies should be entered where they have the same emission designator or use the same technology and bandwidth.

D. Transmit Carrier Center Frequency in MHz
E. Transmit Carrier Bandwidth in KHz
F. Transmitter output power in Watts
G. Transmit Filter Loss in dB
H. Other Transmit Losses
    a. Indicate any additional loss not covered by the TX line or Filter in dB.
I. Transmit Line Loss in dB
J. Transmit Antenna Gain in dBi
K. Transmit Antenna Azimuth
    a. Direction of the main lob of a directional antenna is referred to North as 0°.
L. Transmit Antenna HPBW
    a. Half Power beam width of main lobe of antenna
M. Calculated EIRP (Effective Isotropic Radiated Power
    a. EIRP = Power Transmitted – Loss + Gain of Antenna
N. FCC Emission Designator
    a. Use FCC emission designator and modulation type for non-commercial services. (LMR, MW, etc.) Use technology for commercial (CDMA, UMTS, LTE).
O. Transmitter Modulation Type
    a. Use FCC emission designator and modulation type for non-commercial services (LMR, MW, etc.) Use technology for commercial (CDMA, UMTS, LTE).
P. Receive Antenna Number
    a. Ensure this number corresponds with the indicated antenna on the CD's
Q. Action
    a. Existing, New, Modify, Remove
R. Receive Carrier Label
    a. Use FCC frequency number, industry standard channel number, or user assigned channel number.
    b. Multiple channel labels and frequencies should be entered where they have the same emission designator or use the same technology and bandwidth.
S. Receive Carrier Center Frequency in MHz
T. Receive Carrier Bandwidth in KHz
U. Receiver Filter Loss in dB
V. Other Receiver Losses in dB
W. Receiver Line Loss in dB
X. Receive Antenna Gain
Y. Receive Antenna Azimuth
Z. Receive Antenna HPBW
AA. FCC Emission Designator
    a. Use FCC emission designator and modulation type for non-commercial services. (LMR, MW, etc.) Use technology for commercial (CDMA, UMTS, LTE).
AB. Receiver Modulation Type

a. Use FCC emission designator and modulation type for non-commercial services. (LMR, MW, etc.) Use technology for commercial (CDMA, UMTS, LTE).

AC. Receiver Sensitivity

a. Receiver Equipment Sensitivity in dBm

AD. Receiver IM Signal Rejection

a. Intermodulation Signal Rejection in dB

AE. Receiver IM Signal margin

a. Desired safety margin away from equipment's IM Signal Rejection in dBs

11.9.6 Transmitter Equipment

A. Make
B. Model
C. Antenna Type
D. Antenna Model
E. Horizontal Pattern
F. TX Line MFG
G. TX Line Type
H. TX Line Length

11.9.7 Receiver Equipment

A. Make
B. Model
C. Selectivity
D. IM Rejection
E. Filters

11.10 DEN Rules and Regulations

All installations shall comply with the latest edition of DEN rules and regulations, including but not limited to the following:

A. Part 40: Conduct of Commercial Operators Using the Airport, which contains regulations regarding Alternations of Airport Facilities and Telecommunications regulations.
B. Part 120: Carrier Rates and Charges, which contains rates and charges for the use of the DEN antenna farm.

DEN Rules and Regulations

11.11 DEN RF Application Process Flowchart

The following application process flowchart is provided for reference purposes.

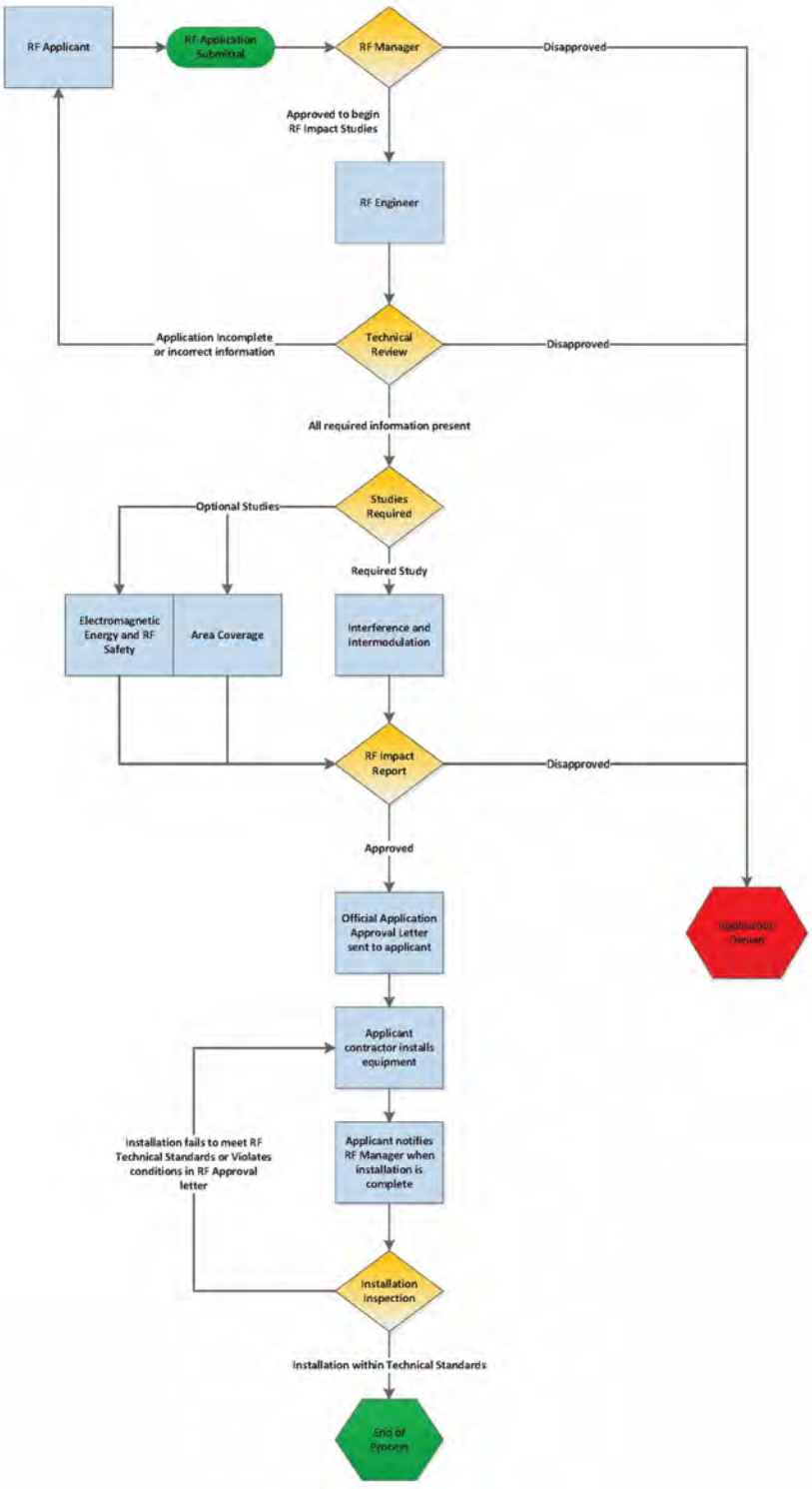

Figure 11-5: DEN RF Application Process Flowchart

End of Chapter

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Chapter 12 - Public Safety Distributed Antenna System

12.0 System Overview

12.0.1 Description

The Public Safety Distributed Antenna System at DEN distributes the P25 Harris radio signal from outdoor primary or secondary transmission sites into interior buildings or underground tunnels. This system is critical to the First Responders (Fire/Police/Paramedics) that use it, as well as DEN Operations, Maintenance, and Airline tenants. This system is based on a Zinwave Unitivity system. This system contains primary hubs that are connected to the P25 radio system, which also connect via single-mode fiber to secondary hub sites and remotes units (RU) and antennas throughout the facility. Refer to the Life Safety DSM for additional requirements regarding two-way communication and other related life safety systems.

The DEN Public Safety Distributed Antenna System (DAS) is equivalent to Denver Fire Code Radio Enhancement System (RES). The term RES is also used in International Fire Codes.

12.1 Requirements

A. The system must be architected such that signal levels and overall compliance is maintained with the International Fire Code, as adopted and amended by the City and County of Denver.

B. All new or modified interior areas requiring indoor radio distribution will use Zinwave 5000 series equipment.

C. All electronic components in the system are served by a UPS in line with emergency power circuits with a 4-hour run time at full load. Refer to Electrical DSM for additional requirements regarding UPS and emergency power systems.

D. All Primary and secondary hubs must be located in rooms with a two (2) hour fire rating.

E. Cabling from primary to secondary hubs must be redundant and in a level 1 survivability pathway. The pathways have a minimum 20' separation between the redundant paths. The pathway from the secondary hub to RU must reside in a level 1 survivability pathway. Coax cable from RU to antennas do not require a level 1 survivability path.

F. The designer shall use RF modeling tools in new construction or remodeling efforts to demonstrate needed additions or changes to the Public Safety DAS system to DEN stakeholders prior to completing the design.

G. Systems engineers need to coordinate the positioning of equipment such that adequate space is provided in architectural locations (e.g., Remote Unit placement above ceilings, antenna locations, and cabling pathways) prior to design finalization.

H. New construction or remodel design processes will need to validate that these exceptions are still enforced/accepted by the authority having jurisdiction and validate the design with the DEN subject matter expert prior to the final design and permitting process.

I. Testing per Denver Fire Code is required for system acceptance.

J. Connection to operational systems must be coordinated in advance and requires DEN RF Systems Technicians' support.

K. Detailed specifications are contained in DEN Public Safety Distributed Antenna System, 27 Communications, Section 275319 technical specification.

End of Chapter

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Chapter 13 - Energy Management and Control

13.0 System Overview

13.0.1 Scope

This chapter provides guidance to the Design Consultant in the area of design of the Energy Management & Control System (EMCS) at DEN.

13.0.2 Criteria

General criteria are set forth below. Drawing and design requirements are contained in this chapter.

A. Applicable City and County of Denver building codes
B. NFPA 70: National Electrical Code
C. TIA/EIA – TIA-485 / RS-485: Recommended Standard for drivers and receivers used in serial communications systems.

13.0.3 Definitions

Table 13-1: EMCS Definitions

Term/Abbreviation	Definition
BACNet	A data communication protocol for building automation and control networks, as defined and maintained by AHSRAE Standing Standard Project Committee 135.
BBMD	BACNet/IP Broadcast Management Device
DDC	Direct Digital Controls in a centralized network-oriented approach to control systems that are integrated into the EMCS including HVAC, Electrical Metering, Lighting, and others.
EMCS	Energy Management and Control System
GUI	Graphical User Interface
HMI	Human-Machine Interface
IP	Internet Protocol
MSTP	Master-Slave, Token-Passing

13.1 Networks and Services

13.1.1 Basic EMCS Network Architecture

The DEN EMCS is a comprehensive network of electrical and mechanical systems and system components that shall provide the ability to monitor, control, and alarm equipment connected to the EMCS and is scoped to be available in all buildings on the DEN campus. The EMCS is primarily used for HVAC and lighting control, data analysis, utility metering, and billing.

The standard communication at the DEN Enterprise Network level is BACnet/IP. The standard communication at the field bus level is BACnet MSTP at a baud rate of 38.4. All addresses, including IP addresses, MSTP Network numbers, BACnet instances, and MAC addresses, are managed and assigned by DEN, and assigned addressing must be strictly adhered to at all times.

Because of the size and complexity of the DEN EMCS network, each project must coordinate with the DEN EMCS administrator as early as possible to ensure network availability and expedite the process. DEN must be provided all tools to fully support, update, replace, or otherwise maintain any component on any type of control system and installed components. All Devices shall be uniquely discoverable using standard BACnet discovery tools and applications. Control System Groups shall be on separate and independent MSTP networks; for example, HVAC MSTP networks shall not have Tenant Electrical Panel Energy Metering devices or lighting control devices on the HVAC MSTP bus.

13.1.2 BACNet IP Networks

All DEN Enterprise Network-connected equipment is to be statically assigned from the DEN EMCS Administrator. BBMDs are installed and maintained by DEN- no device shall be installed and configured as a BBMD by any contractor, and care shall be taken to ensure devices that may have BBMD enabled by default are configured with this feature turned off.

13.1.3 BACNet MS/TP Networks

All MSTP networks shall follow BACnet architecture standards, and specific care must be taken to ensure common installation errors such as total length of MSTP runs, Starred networks, T-tapped networks, and incorrectly installed/ not installed End of Line (EOL) resistors are avoided. Network shop drawings shall indicate accurate architecture and include any and all EOL devices and resistors. Routers shall always be the first device of an MSTP BUS. MSTP networks shall be equipment group specific. DEN standard color and polarity shall be: Black Wire to BACnet MSTP (+) and White Wire to BACnet MSTP (-).

13.2 Design Criteria

13.2.1 General Network Requirements

Design each network of the DDC system to include at least 30 percent available spare bandwidth with the DDC system operating under normal and heavy load conditions. Calculate bandwidth usage and apply a safety factor to ensure that this requirement is satisfied when subjected to testing under worst-case conditions. Do not use an existing network controller that is at 80 percent capacity or greater. If DDC equipment is added to a piece of controls equipment (e.g. a FEC, NAE, SNE, etc.) which is below 80 percent capacity, it must not exceed 70 percent capacity once the equipment is installed.

Projects that add points and sequences to DEN Network Automation Engines (NAEs) or System Network Engines (SNEs) must add a new DEN NAE or SNE should the extra controls load cause the NAE to reach 80 percent capacity in hardware points, software points, memory, and/or processing capacity. If a network engine is required, it is to be located in the closest DEN COMM room.

Additionally, any project or program that adds over 500 thousand (500,000) new building square feet to DEN shall require a new controls integration server to be installed. This server shall have at minimum, processing, memory, and network performance requirements capable of operating all mechanical, electrical, and plumbing controls and meters for the new space, as well as any white spaces, future tenant spaces, and/or office buildouts, plus extra hardware and software for an extra 25% performance (i.e., no newly installed controls integration server shall be loaded more than 80 percent in either hardware points, software points, memory, or processing capacity for a full build-out of said space).

Include spare processing memory for each new or replacement controller. RAM, PROM, or EEPROM will implement requirements indicated with the following spare memory:

A. Network Controllers: Not less than 30 percent spare capacity.
B. Programmable Application Controllers: Not less than 30 percent spare capacity.
C. Application-Specific Controllers: Not less than 30 percent spare capacity.

D. HVAC Controls Networks are to remain independent of all other networks. Tenant BACNet devices such as electrical, water, and BTU meters are to be on an IE dedicated Engine. Extend a temperature controls color coded conduit and conductors for each meter with a 50 FT neat and tidy service loop to the nearest DEN controlled COMM room. A single conduit is allowed to go from the tenant space to the COMM room and carry all three sets of conductors.

13.2.2 HVAC Controls Networks

The HVAC Control Network shall be comprised of any and all equipment attached to a DEN heating, cooling, or ventilation system. This shall include any tenant space with heating, cooling, or ventilation equipment supplied by a DEN-owned and maintained system. HVAC controls networks shall include all HVAC equipment such as Air Handlers, Temperature Control Panels (TCPs), Energy Meters (BTU meters), Variable Frequency Drives, Boilers, Chillers, or any other equipment that controls any aspect of Heating, Cooling, or Ventilation. The intent is 100% BACnet Native equipment to avoid the use of any protocol gateways.

Refer to the Mechanical DSM for detailed requirements regarding HVAC Controls.

13.2.3 Programmable Logic Controllers (PLC) Located in Switchgear

All PLCs shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 13-2: Electrical Switchgear EMCS Integration Points.

Table 13-2: Electrical Switchgear EMCS Integration Points

Integration Point	Units	Status	Command	Trend
PLC Low Battery	True/False	Yes	No	Yes
System Error	True/False	Yes	No	Yes
Software Fault	True/False	Yes	No	Yes
Bad RAM	True/False	Yes	No	Yes
Application Fault	True/False	Yes	No	Yes
CPU Hardaware Fault	True/False	Yes	No	Yes
I/O Module Loss	True/False	Yes	No	Yes
Main 1 Tripped	True/False	Yes	No	Yes
Main 2 Tripped	True/False	Yes	No	Yes
Fire Department Control Relay (86 Relay or LOR) Tripped	True/False	Yes	No	Yes

13.2.4 Automatic Transfer Switches (ATS)

All ATS shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 13-4: Metering EMCS Integration Points

Table 13-3: ATS EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Transfer to Secondary Power Source	True/False	Yes	No	Yes
Trouble Alarm	True/False	Yes	No	Yes

13.2.5 Electrical Metering Networks

All Electrical meters shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation. BACNet/MSTP meters shall be on a dedicated BACnet/MSTP trunk. All devices shall be Revenue Grade devices. All billable meters shall be integrated in both DEN GUI and DEN billing application. Refer to the Electrical DSM for electrical metering requirements. Integration points shall be as defined in Chapter 13.2.5 - Electrical Metering Networks.

Table 13-4: Metering EMCS Integration Points

Integration Point	Point Name	Units	Status	Command	Trend
Total Energy Consumed (3 phases combined)	Total Energy	kWh	Yes	No	Yes
Total demand (3 phases combined)	Current Demand (3 phases)	kW	Yes	No	Yes
Total demand (per phase)	A Phase Current Demand	kW	Yes	No	Yes
Voltage (per phase)	A Phase Voltage	V	Yes	No	Yes
Current (per phase)	A Phase Current	A	Yes	No	Yes
Peak demand (3 phases combined)	Peak Demand (3 phases)	kW	Yes	No	Yes
Real time power factor	Power Factor	N/A	Yes	No	Yes

13.2.6 Lighting Controls

All lighting control systems shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP. Lighting Control Systems software shall be server-based, with programming and maintenance tools that can be run from the server.

Power consumption of lighting loads is required, either using the lighting control system or electrical submetering. The lighting control system is not required to meter energy on a zone level. Total power consumption from the lighting panel is acceptable.

Individual lighting fixtures will be controlled using either separate control-voltage wiring (e.g., 0-10-volt dimming), such that line-voltage power is not interrupted at the fixtures as part of the control sequence. Refer to the Electrical DSM for lighting control requirements. Integration points shall be as defined inTable 13-5: Lighting and Control EMCS Integration Points.

Table 13-5: Lighting and Control EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble alarm	True / False	Yes	No	No
On/off, each zone	On/Off	Yes	Yes	Yes
Normal and after-hours schedule per zone	Norma/After-hours	Yes	Yes	Yes
Occupancy sensor detection state	Occupied/Unoccupied	Yes	No	Yes
Aggregate occupancy state per zone	Occupied/Unoccupied	Yes	Yes	Yes
Dimming level, per load	%	Yes	Yes	Yes
Button status, per field switch/device	On/Off	Yes	No	Yes
Occupancy sensor time delay, per sensor	Minutes: Seconds	Yes	Yes	No
Occupancy sensor sensitivity, per sensor	%	Yes	Yes	No
Scene selection, per zone	Scene	Yes	Yes	Yes
Daylight sensor day/night setpoints, per sensor	fc	Yes	Yes	No
Daylight sensor fade time, per sensor	Minutes: Seconds	Yes	Yes	No
Daylight sensor current light level, per sensor	fc	Yes	No	Yes
Daylight sensor operating mode, per zone	Mode	Yes	Yes	Yes
Wall switch lock status	True/False	Yes	Yes	Yes
Demand (3 phases combined)	kW	Yes	No	Yes

13.2.7 Lighting Inverters

All Lighting Inverters shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as

defined in Table 13-6: Lighting Inverter EMCS Integration Points.

Table 13-6: Lighting Inverter EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble alarm	True/False	Yes	No	No
Standby/Emergency Power Mode	True/False	Yes	No	Yes

13.2.8 UPS Systems

All UPS systems shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 13-7: UPS EMCS Integration Points.

Table 13-7: UPS EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble Alarm	True/False	Yes	No	No
Low battery condition	True/False	Yes	No	Yes
Standby/Backup power mode	True/False	Yes	No	Yes

13.2.9 Photovaltaic Inverters

All Photovoltaic Inverters shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 13-8: Photovoltaic Inverter EMCS Integration Points.

Table 13-8: Photovoltaic Inverter EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble Alarm	True/False	Yes	No	No
Total Energy Produced	kWh	Yes	No	Yes
Total Power Output (3 phases combined)	kW	Yes	No	Yes
Peak Power Output (3 phases combined)	kW	Yes	No	No
Output Voltage (per phase)	V	Yes	No	Yes
Output Current (per phase)	A	Yes	No	Yes

13.2.10 Surge Protection Devices

All Surge Protection Devices shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 1-1: Surge Protection Device EMCS Integration Points.

Table 13-9: Surge Protection Device EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble Alarm	True/False	Yes	No	No
Surge Event, with timestamp	Event & Date Time	Yes	No	Yes

13.2.11 Ground Power Units

All Ground Power Units shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP. Integration points shall be as defined in Table 13-10: Ground Power Units EMCS Integration Points.

Table 13-10: Ground Power Units EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble Alarm	True/False	Yes	No	No
On / Off Status	On /Off	Yes	Yes	Yes
Total Energy Consumed	kWh	Yes	No	Yes
Demand (3 phases combined)	kW	Yes	No	Yes
Demand (per phase)	kW	Yes	No	Yes
Output Voltage (per phase)	V	Yes	No	Yes
Output Current (per phase)	A	Yes	No	Yes
Peak Demand (3 phases combined)	kW	Yes	No	No

13.2.12 Engine Generators

All Generators shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 13-11: Engine Generator EMCS Integration Points.

Table 13-11: Engine Generator EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Generator Running	On / Off	Yes	No	Yes
Low Engine Oil	True/False	Yes	No	No
Low Oil Pressure	True/False	Yes	No	No
Battery Charger Fault	True/False	Yes	No	No
Low Battery Voltage	True/False	Yes	No	No
AC Sensing Loss	True/False	Yes	No	No
Not in Auto	True/False	Yes	No	No
Over-Crank	True/False	Yes	No	No
Output Undervoltage	True/False	Yes	No	No

13.2.13 Sump Pump Controllers

All sump pump controllers shall have BACnet Native connectivity, either via BACnet/IP or BACnet/MSTP, and shall be determined by the specific installation and shall be on a dedicated BACnet network. Integration points shall be as defined in Table 13-12: Sump Pump Controller EMCS Integration Points.

Table 13-12: Sump Pump Controller EMCS Integration Points

Integration Point	Units	Status	Command	Trend
Trouble Alarm	True/False	Yes	No	No

13.3 Design Requirements

13.3.1 Drawing Requirements

Designer shall include, at a minimum, the following elements in their design drawings:

A. EMCS riser diagram, including existing and new components in the project area
B. Floor plans indicating locations of all EMCS devices

NOTE: Device locations may be shown on individual discipline floor plans (e.g., HVAC control devices on HVAC plans, metering on electrical plans, etc.)

13.4 EMCS Graphics

13.4.1 General

An HMI is any interface allowing for an operator to monitor or control a machine. A GUI is a type of HMI that provides a digital, graphical user interface generated on a display screen.

All equipment integrated into the EMCS shall be provided with a GUI for monitoring and control. All graphics must be designed to prioritize ease of use for the intended end user. Graphic screens should be intuitive, easy to navigate, use consistent labeling and iconography, and shall be designed to minimize eye strain for operators.

13.4.2 Metasys UI Graphics

All graphics developed shall be developed for the current Metasys UI environment.

13.4.3 Integration with Existing Systems

All new graphics and modifications to the existing graphics must be carefully reviewed by DEN stakeholders, including any impacted operations and maintenance groups. The EMCS is implemented at DEN through multiple software platforms, and any new graphics must be incorporated into the appropriate software platform based on the location and type of equipment affected. New software platforms shall be prohibited unless specifically approved in writing by the DEN Project Manager and DEN Maintenance.

All entities working within the existing EMCS software environments shall possess adequate training for programming and modification of those systems. Contractor access to the EMCS must be formally requested and approved by DEN Maintenance prior to the start of work. Any programming errors, device conflicts, or other issues introduced by a contractor shall be expeditiously resolved by the contractor at the direction of the DEN Project Manager and DEN Maintenance.

13.4.4 Equipment Page Design

A dedicated equipment graphic page is required for all mechanical equipment and any other equipment with more than (1) associated control point.

13.4.4.1 Blocks and Templates

There are many existing graphics in the EMCS, including interactive symbols for pumps, fans, lights, piping, ductwork, etc. Existing graphics are also laid out with standardized page arrangements for ease of use. New graphics pages for equipment that is similar to existing equipment shall utilize symbology and page layouts to match the existing graphics. For equipment types with no existing equivalent, the contractor may propose a new layout and submit it to DEN for review and approval.

13.4.4.2 Color Coding

Where symbols contain color coding to indicate a status or other condition, match the color coding utilized in existing graphics. If no similar system exists, coordinate color coding requirements with DEN Maintenance and the DEN Project Manager.

13.4.4.3 Equipment Values and Status

Analog readouts and equipment statuses should be clearly labeled, with appropriate units of measure indicated, and placed as close to the associated graphical item as possible. All analog values should include two decimal point precision.

13.4.4.4 Command and Control

Equipment control buttons should be clearly labeled and placed as close as possible to the associated equipment. Visually differentiate command and control elements from readouts and status elements to avoid potential operator confusion. Maintain consistency in depiction and function across the equipment page and consistency in placement between each similar equipment page.

13.4.4.5 Alarms

The EMCS shall have the capability of setting an alarm based on certain status or conditions detected in the system. An EMCS alarm will typically be in the form of a user alert or notification. Alarms for equipment are managed by multiple groups at DEN. Due to the overall quantity of buildings and equipment integrated into the EMCS, careful coordination is required to determine alarm definition, priority, notification requirements, and other details.

For projects adding a significant amount of new equipment, a work session is recommended to determine alarm strategy in coordination with the DEN Project Manager, DEN Maintenance, and other affected stakeholders.

13.4.5 Page Navigation

Existing navigation layouts have been developed for locating equipment according to its physical location, including a standardized page navigation bar, key plans, floor plans, enlarged plans, hierarchical navigation, and categorized lists.

13.4.5.1 Page Navigation Bar

Utilize a standardized page navigation bar on each graphical page. The navigation bar should include the following:

- Title Bar: Description of current page or equipment
- Basic weather information: Temperature, humidity, wet bulb, cloud cover
- Homepage navigation buttons: DEN Home, Building Home
- Building Key Plan'

13.4.5.2 Home Page

Navigation design shall be hierarchical in nature, allowing the operator to begin at an overall view of the facility or building with options to “drill down” into areas or types of equipment. Refer to Figure 13-1: Example of a GUI EMCS Home Page: Concourse B for an example of a typical building home page.

Figure 13-1: Example of a GUI EMCS Home Page: Concourse B

13.4.5.3 Floor Plan Graphics

Floor plan graphics are generally arranged to provide a graphics page for each Core Area of a building within the Terminal Complex and each floor for out-buildings, as shown in Figure 13-2: Example of a Floor Plan: Concourse B. When new equipment is added to existing buildings where new floor plans are not required, all existing floor plan graphics where that equipment may appear shall be modified to graphically depict each piece of new equipment that is integrated into the EMCS, including mechanical equipment, lighting, meters, sensors, and control devices. For equipment with a separate graphical equipment page, provide the ability for the user to select the equipment on the floor plan and navigate to the associated equipment graphics.

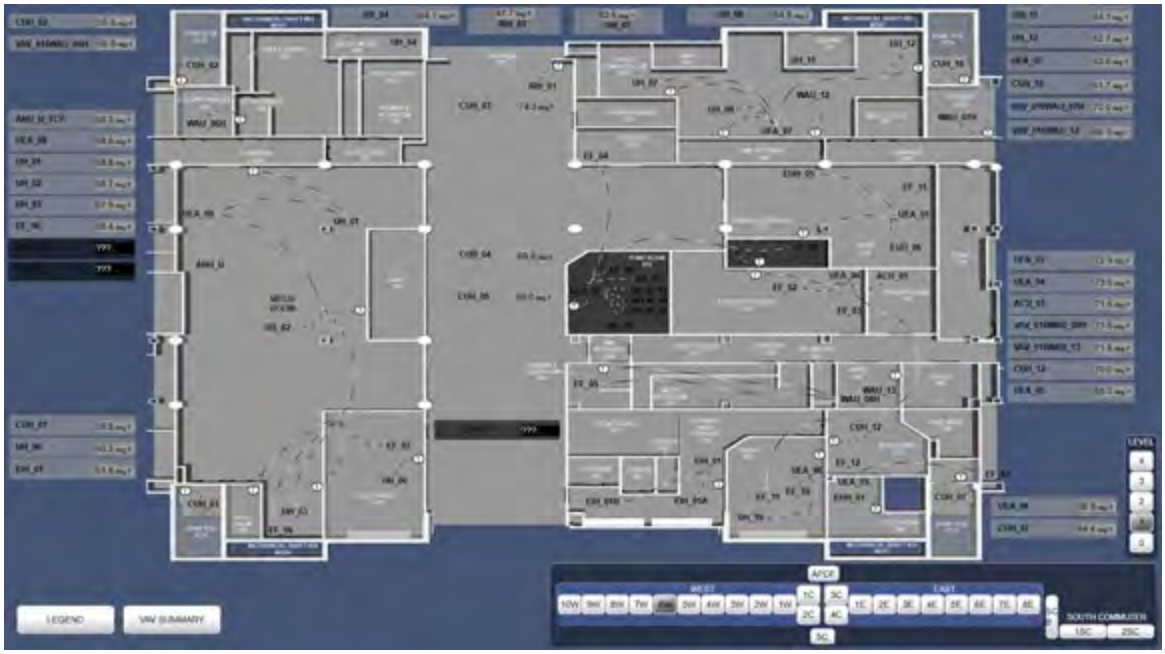

Figure 13-2: Example of a Floor Plan: Concourse B

When new buildings or expansions of existing buildings are constructed, or when existing floor plans are substantially modified, new floor plan graphics shall be provided, based on the most current BIM model of the affected area(s), to accurately reflect the general architectural layout (walls, doors, stairs, and other major features) as well as to graphically depict each piece of equipment that is integrated into the EMCS, including mechanical equipment, lighting, meters, sensors, and control devices. For equipment with a separate graphical equipment page, provide the ability for the user to select the equipment on the floor plan and navigate to the associated equipment graphics.

13.4.5.4 Key Plans

Key plans are provided for single-selection access to each core area within the Terminal Complex and for each floor of out-buildings. When a building floor plan is added, the key plan page must be updated to include the new floor plan.

Figure 13-3: Figure 13-3: Example of a Key Plan: Concourse B

13.4.5.5 Enlarged Plus

Enlarged plans are required for congested areas, such as mechanical rooms, to allow for all equipment to be depicted in a usable way.

Figure 13-4: Example of an Enlarged Plan: Concourse B

End of Chapter

Chapter 14 - Technical Specification Requirements

14.0 General

Designers are required to provide project specifications on all DEN projects in accordance with the Standards and Criteria DSM, Chapter 11. The project specifications should encompass all aspects of the project and be based on industry-standard construction methods and products, with content based on the DEN Standard Specifications (where available) or from an industry-standard guide specification.

14.0.1 How to Use DEN Standard Specifications

14.0.1.1 DEN Standard Specifications

The DEN Standard Specifications listed in this chapter have been developed to ensure project consistency and compliance with DEN policy and procedure. For sections available as DEN Standard Specifications, the designer must obtain and use these sections for their project.

14.0.1.2 DEN Technical Requirements

This provides DEN-specific requirements that must be included in nonstandard specifications for all DEN projects. An itemized list of DEN-specific technical specification requirements is provided, which may include general requirements, product requirements, and execution requirements. The designer shall incorporate these requirements into their project specification content as appropriate for the project scope. Requirements are provided in an outline format similar to construction specifications for ease of incorporation. Content may be copied directly from this chapter, with article/paragraph numbering and structure modifications as needed to ensure a cohesive document.

Note: This chapter is intended to be used as an aid to the development of a project specification and is not intended to represent a complete specification as presented.

The designer is responsible for developing a complete specification, incorporating the requirements, which encompasses all aspects of the project and complies with general specification requirements outlined in the Standards & Criteria DSM, Chapter 11. After incorporating the requirements listed herein, the project specification should be reviewed to ensure it is free of redundant and/or conflicting information.

14.0.1.3 Notes to the Designer

Notes to the designer are included throughout the chapter, shown in red highlighted text. These are provided for guidance and clarification of requirements and are intended for use only by the designer in development of their specification.

Notes to the designer shall not be incorporated into the final project specifications.

14.0.2 Specification Numbering

14.0.2.1 Numbering of Deliverables

Project deliverables should utilize Section names and numbers contained in the latest edition of MasterFormat Numbers & Titles at the time of project kickoff, which may vary from those in this chapter. It is the designer's responsibility to ensure that all applicable DEN requirements are reflected accurately in the appropriate sections of the project specifications.

14.0.2.2 Numbering Provided in this Chapter

Specification section names and numbers provided in this chapter are based on MasterFormat Numbers & Titles, 2014 edition.

14.0.2.3 Product and Manufacturer Listings

Where manufacturers and products are listed in this chapter, they represent approved manufacturers and/or products. Do not include additional manufacturers and/or products for that Article or paragraph without written permission from the DEN Project Manager.

For sections without manufacturer and/or products listed in this chapter, the designer shall select a basis of design based on current industry standards which comply with all applicable requirements in this and other DEN DSMs, the DEN Standard Specifications, and the Denver Building Code. Provide at least (2) acceptable alternatives to the basis of design for all products, for a total of (3) or more acceptable products, except where a sole-source selection has been approved in writing by the DEN Project Manager.

14.1 DEN Standard Specifications

Please contact the DEN Project Manager.

14.2 DEN Technical Requirements

Please contact the DEN Project Manager.

End of Chapter