

CONTRACT FOR CONSTRUCTION

THIS CONTRACT FOR 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 **PCL CONSTRUCTION SERVICES, INC.**, a Colorado corporation and authorized to do business in the State of Colorado (“**Contractor**”) (collectively the “**Parties**”).

WITNESSETH

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 the work proposed for Contract No. PLANE-202056518-00, Concourse A Center Core Escalator Replacement Project (the “**Project**”) at Denver International Airport (“**DEN**”); and

WHEREAS, a proposal in response to said advertisement has been received by the Chief Executive Officer of DEN (the “**CEO**”), who has recommended that a contract for the work be made and entered into with Contractor, which was the lowest, responsive, qualified proposer; 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:

ARTICLE I. 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
- Notice to Proceed
- Form of Final Receipt
- Building Information Modeling (“**BIM**”) if applicable
- Change Directives
- Change Orders
- Exhibit A Federal Appendices
- 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

Contents attached as Exhibit F)

- Exhibit G Performance Bond
- Exhibit H Payment Bond
- Exhibit I Technical Specifications
- Exhibit J Contract Drawings
- Exhibit K Invitation to Bid & Contractor's Response and Forms

In the event of an irreconcilable conflict between a provision of Article I through XXXI 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. Exhibit A Federal Appendices
2. Contract
3. Exhibit K Invitation to Bid and Contractor's Response and Forms
4. Change Directives
5. Change Orders
6. Exhibit B Equal Employment Opportunity Provisions
7. Exhibit E Special Conditions
8. Exhibit F Standard Specifications for Construction General Contract Conditions (2011 Edition) (the "**Yellow Book**") ("**General Conditions**") (Table of Contents attached as Exhibit F)
9. Exhibit C Insurance Requirements
10. Exhibit D Prevailing Wage Schedules
11. Exhibit I Technical Specifications
12. Exhibit J Contract Drawings
13. Exhibit G Performance Bond
14. Exhibit H Payment Bond
15. Notice to Proceed
16. Form of Final Receipt
17. Building Information Modeling ("**BIM**") if applicable

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

ARTICLE II. SCOPE OF WORK

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 Contract Documents (the "**Work**").

ARTICLE III. TERM OF CONTRACT

The Senior Vice President of Aviation – Airport Infrastructure Management (the "**SVP-AIM**") will issue a written notice to proceed to Contractor (the "**Notice to Proceed**"), and Contractor shall begin performing the Work required under this Contract within ten (10) days of such Notice to Proceed (the "**Commencement Date**"). Contractor shall fully complete the Work in its entirety within 420 consecutive calendar days from the date of the Notice to Proceed

(“**Contract Time**”). Contractor is not authorized to commence work prior to its receipt of the Notice to Proceed.

ARTICLE IV. TERMS OF PAYMENT

The City agrees to pay Contractor for the performance and completion of all of the Work as required by the Scope of Work and the Contract Documents, and Contractor agrees to accept as its full and only compensation therefor, a total amount of **Seven Million Six Hundred Thirty-Eight Thousand Nine Hundred and Sixty-Six Dollars and Zero Cents (\$7,638,966.00)** (the “**Maximum Contract Amount**”). In no event will the City’s liability 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 above.

ARTICLE V. 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.

ARTICLE VI. DISPUTES

All disputes arising under or related to this Contract shall be resolved by administrative hearing under the procedures described in Denver Revised Municipal Code Section 5-17 (“**D.R.M.C.**”) and all related rules and procedures. 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.

ARTICLE VII. DEFENSE AND INDEMNIFICATION

A. To the fullest extent permitted by law, the 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 the Contractor or the 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 shall arise at the time written notice of the Claim is first provided to 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 City and will pay on behalf of City any expenses incurred by reason of such Claims including, but not limited to, court costs and attorney 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 Article V. Such payments on behalf of City shall be in addition to any other legal remedies available to City and shall not be considered City's exclusive remedy.

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

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

ARTICLE VIII. 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.

ARTICLE IX. LIQUIDATED DAMAGES

If Contractor fails to achieve Substantial Completion of the Work within the Contract Time or fails to substantially complete the Work described in the Scope of Work within the time set forth in the Special Conditions, 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 within the Contract Time or to substantially complete the work described in Milestone Areas within the time set forth in the Special Conditions shall be Two Thousand Five Hundred dollars (\$2,500.00) per day. 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.

ARTICLE X. 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 and any required endorsements must be received and approved by DEN Risk Management before any airport access or work commences.

B. Unless specifically excepted in writing by DEN Risk Management, if Contractor shall be using subcontractors to provide any part of the services under this Contract, Contractor shall do one of the following:

1. Include all subcontractors performing services hereunder as insureds under its required insurance and specifically list on all submitted certificates of insurance required under *Exhibit C*; or

2. Ensure that each subcontractor provides its own insurance coverage in accordance with the requirements set forth in this Contract.

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.

ARTICLE XI. 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.

ARTICLE XII. 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.

ARTICLE XIII. 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 his/her 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 his/her authorized representative, automatically terminate this Contract and all rights of Contractor hereunder.

ARTICLE XIV. 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 City and County of Denver 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.

ARTICLE XV. 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.

ARTICLE XVI. 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.

ARTICLE XVII. NO DISCRIMINATION IN EMPLOYMENT

In connection with the performance of work under this Contract, Contractor agrees not to refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, gender variance, marital status, or physical or mental disability; and Contractor further agrees to insert the foregoing provision in all subcontracts hereunder.

ARTICLE XVIII. 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.

ARTICLE XIX. COMPLIANCE WITH ALL LAWS AND REGULATIONS

Consultant and its subcontractor(s) shall perform all work under this Agreement 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.

ARTICLE XX. PROMPT PAYMENT

A. The City will make monthly progress payments to the Contractor for all services performed under this Contract based upon the Contractor's monthly invoices. Such invoices shall be in a form acceptable to the City and shall include detail of the time worked by the Contractor's own personnel, billings from subcontractors, and all other information necessary to assess the Contractor's progress. Invoices shall be accompanied by documentation of expenses for which reimbursement is sought, and all other supporting documentation required by the City. The City's Prompt Payment Ordinance, §§ 20-107 to 20-118, D.R.M.C., 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. 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. However, no deductions shall be made from the Contractor's compensation because of penalty, liquidated damages or other sums withheld from payments to contractor(s).

C. Prompt Pay of MWBE Subcontractors. For contracts of one million dollars (\$1,000,000.00) and over to which § 28-72, D.R.M.C. applies, the Contractor is required to comply with the Prompt Payment provisions under § 28-72, D.R.M.C., 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.

ARTICLE XXI. 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 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 Article within ten (10) business days in the event a schedule or otherwise agreed-upon timeframe does not exist.

ARTICLE XXII. 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 specified in Article V.

ARTICLE XXIII. 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 Contractor's performance pursuant to this Contract, provision of any goods or services to the City, and any other transactions related to this Contract. Contractor 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 six (6) years after the final payment under the Contract or expiration of the applicable statute of limitations. When conducting an audit of this Contract, 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 audits pursuant to this paragraph shall require Contractor to make disclosures in violation of state or federal privacy laws. Contractor 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 his or her 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 Consultant'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.

ARTICLE XXIV. 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 December 14, 2020.

B. 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.

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

D. 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.

E. 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.

F. 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.

ARTICLE XXV. MINIMUM WAGE REQUIREMENTS

To the extent required by law, Contractor shall comply with and agrees to be bound by all requirements, conditions, and City determinations regarding the City’s Minimum Wage Ordinance, D.R.M.C. §§ 20-82 through 20-84, including, but not limited to, the requirement that every covered worker shall be paid no less than the City Minimum Wage in accordance with the

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

ARTICLE XXVI. COMPLIANCE WITH MINORITY/WOMEN BUSINESS ENTERPRISE REQUIREMENTS

A. This Contract is subject to Article III, Divisions 1 and 3 of Chapter 28, Denver Revised Municipal Code (“**D.R.M.C.**”), designated as §§ 28-31 to 28-40 and 28-51 to 28-90 (the “**MWBE Ordinance**”) and any Rules or Regulations promulgated pursuant thereto. The contract goal for MWBE participation established for this Contract by the Division of Small Business Opportunity (“**DSBO**”) is 13%.

B. Under § 28-68, D.R.M.C., the Contractor has an ongoing, affirmative obligation to maintain for the duration of this Contract, at a minimum, compliance with its originally achieved level of MWBE participation upon which this Contract was awarded, unless the City initiates a material alteration to the scope of work affecting MWBEs performing on this Contract through change order, contract amendment, force account, or as otherwise described in § 28-70, D.R.M.C. The Contractor acknowledges that:

1. If directed by DSBO, the Contractor is required to develop and comply with a Utilization Plan in accordance with § 28-62, 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 participation goal. The Utilization Plan is subject to modification by DSBO.

2. If change orders or any other contract modifications are issued under the Contract, the Contractor shall have a continuing obligation to immediately inform DSBO in writing of any agreed upon increase or decrease in the scope of work of such contract, upon any of the bases discussed in § 28-70, 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.

3. If change orders or other amendments or modifications are issued under the contract that include an increase in the scope of work of this Contract, whether by amendment, change order, force account 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 orders or contract modification shall be immediately submitted to DSBO for notification purposes.

4. Those amendments, change orders, force accounts or other contract modifications that involve a changed scope of work that cannot be performed by existing project subcontractors are subject to the original contract goal. The Contractor shall satisfy the goal with respect to such changed scope of work by soliciting new MWBEs in accordance with § 28-70, D.R.M.C. The Contractor must also satisfy the requirements

under §§ 28-60 and 28-73, D.R.M.C., with regard to changes in scope or participation. The Contractor shall supply to the DSBO Director all required documentation described in §§ 28-60, 28-70, and 28-73 D.R.M.C. with respect to the modified dollar value or work under the contract.

5. For contracts of one million dollars (\$1,000,000.00) and over, the Contractor is required to comply with § 28-72, D.R.M.C., as applicable, regarding prompt payment to MWBEs. Payment to MWBE subcontractors shall be made by no later than thirty-five (35) days after receipt of an MWBE subcontractor invoice.

6. Failure to comply with these provisions may subject the Contractor to sanctions set forth in § 28-76 of the MWBE Ordinance.

7. Should any questions arise regarding specific circumstances, the Contractor should consult the MWBE Ordinance or may contact the Project's designated DSBO representative at (720) 913-1999.

ARTICLE XXVII. 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 the DEN's Security Office.

ARTICLE XXVIII. 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.

ARTICLE XXIX. 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 Denver Municipal Airport System.

1. 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 subtier contractors 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.

2. 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.

3. 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.

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

ARTICLE XXX. 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.

ARTICLE XXXI. 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.

[END OF PAGE]

Contract Control Number: PLANE-202056518-00
Contractor Name: PCL CONSTRUCTION SERVICES, 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:

REGISTERED AND COUNTERSIGNED:

Attorney for the City and County of Denver

By:

By:

By:

Contract Control Number:
Contractor Name:

PLANE-202056518-00
PCL CONSTRUCTION SERVICES, INC.

By: DocuSigned by:
Ryan Schmidt
3E5699C94A324CA..._____

Name: Ryan Schmidt
(please print)

Title: District Manager
(please print)

ATTEST: [if required]

By: _____

Name: _____
(please print)

Title: _____
(please print)

EXHIBIT A

Standard Federal Assurances and Nondiscrimination Non-Federal Contract Provision

A5 CIVIL RIGHTS - GENERAL

A5.3.1 Clause that is used for Contracts

GENERAL CIVIL RIGHTS PROVISIONS

The 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 the Contractor and subcontractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

A6 CIVIL RIGHTS – TITLE VI ASSURANCE

A6.3.1 Title VI Solicitation Notice

Title VI Solicitation Notice:

The (**Name of Sponsor**), in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that any contract entered into pursuant to this advertisement, [select disadvantaged business enterprises or airport concession disadvantaged business enterprises] will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

A6.4 CONTRACT CLAUSES

A6.4.1 Title VI Clauses for Compliance with Nondiscrimination Requirements

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, or national origin 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.

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.

A6.4.2 Title VI Clauses for Deeds Transferring United States Property

CLAUSES FOR DEEDS TRANSFERRING UNITED STATES PROPERTY

The following clauses will be included in deeds effecting or recording the transfer of real property, structures, or improvements thereon, or granting interest therein from the United States pursuant to the provisions of the Airport Improvement Program grant assurances.

NOW, THEREFORE, the Federal Aviation Administration as authorized by law and upon the condition that the (*Title of Sponsor*) will accept title to the lands and maintain the project

constructed thereon in accordance with (*Name of Appropriate Legislative Authority*), for the (**Airport Improvement Program or other program for which land is transferred**), and the policies and procedures prescribed by the Federal Aviation Administration of the U.S. Department of Transportation in accordance and in compliance with all requirements imposed by Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation pertaining to and effectuating the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252; 42 USC § 2000d to 2000d-4), does hereby remise, release, quitclaim and convey unto the (*Title of Sponsor*) all the right, title and interest of the U.S. Department of Transportation/Federal Aviation Administration in and to said lands described in (*Exhibit A attached hereto or other exhibit describing the transferred property*) and made a part hereof.

(HABENDUM CLAUSE)

TO HAVE AND TO HOLD said lands and interests therein unto (*Title of Sponsor*) and its successors forever, subject, however, to the covenants, conditions, restrictions and reservations herein contained as follows, which will remain in effect for the period during which the real property or structures are used for a purpose for which Federal financial assistance is extended or for another purpose involving the provision of similar services or benefits and will be binding on the (*Title of Sponsor*), its successors and assigns.

The (*Title of Sponsor*), in consideration of the conveyance of said lands and interests in lands, does hereby covenant and agree as a covenant running with the land for itself, its successors and assigns, that (1) no person will on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or in part on, over, or under such lands hereby conveyed [,] [and]* (2) that the (*Title of Sponsor*) will use the lands and interests in lands and interests in lands so conveyed, in compliance with all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations and Acts may be amended[, and (3) that in the event of breach of any of the above-mentioned nondiscrimination conditions, the Department will have a right to enter or re-enter said lands and facilities on said land, and that above described land and facilities will thereon revert to and vest in and become the absolute property of the Federal Aviation Administration and its assigns as such interest existed prior to this instruction].*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary in order to make clear the purpose of Title VI.)

A6.4.3 Title VI Clauses for Transfer of Real Property Acquired or Improved Under the Activity, Facility, or Program

CLAUSES FOR TRANSFER OF REAL PROPERTY ACQUIRED OR IMPROVED UNDER THE AIRPORT IMPROVEMENT PROGRAM

The following clauses will be included in (deeds, licenses, leases, permits, or similar instruments) entered into by the (*Title of Sponsor*) pursuant to the provisions of the Airport Improvement Program grant assurances.

- A. The (grantee, lessee, permittee, etc. as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add “as a covenant running with the land”] that:
 1. In the event facilities are constructed, maintained, or otherwise operated on the property described in this (deed, license, lease, permit, etc.) for a purpose for which a Federal Aviation Administration activity, facility, or program is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee, lessee, permittee, etc.) will maintain and operate such facilities and services in compliance with all requirements imposed by the Nondiscrimination Acts and Regulations listed in the Pertinent List of Nondiscrimination Authorities (as may be amended) such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.
- B. With respect to licenses, leases, permits, etc., in the event of breach of any of the above Nondiscrimination covenants, (*Title of Sponsor*) will have the right to terminate the (lease, license, permit, etc.) and to enter, re-enter, and repossess said lands and facilities thereon, and hold the same as if the (lease, license, permit, etc.) had never been made or issued.*
- C. With respect to a deed, in the event of breach of any of the above Nondiscrimination covenants, the (*Title of Sponsor*) will have the right to enter or re-enter the lands and facilities thereon, and the above described lands and facilities will there upon revert to and vest in and become the absolute property of the (*Title of Sponsor*) and its assigns.*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

A6.4.4 Title VI Clauses for Construction/Use/Access to Real Property Acquired Under the Activity, Facility or Program

CLAUSES FOR CONSTRUCTION/USE/ACCESS TO REAL PROPERTY ACQUIRED UNDER THE ACTIVITY, FACILITY OR PROGRAM

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by (*Title of Sponsor*) pursuant to the provisions of the Airport Improvement Program grant assurances.

- A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, “as a covenant running with the land”) that (1) no person on the ground of race, color, or

national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the List of discrimination Acts And Authorities.

- B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above nondiscrimination covenants, (*Title of Sponsor*) will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued.*
- C. With respect to deeds, in the event of breach of any of the above nondiscrimination covenants, (*Title of Sponsor*) will there upon revert to and vest in and become the absolute property of (*Title of Sponsor*) and its assigns. *

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

A6.4.5 Title VI List of Pertinent Nondiscrimination Acts and Authorities

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 USC § 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);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 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 USC § 794 et seq.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 et seq.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of

the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 USC §§ 12131 – 12189) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC 1681 et seq).

A17 FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

A17.3 SOLICITATION CLAUSE

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR 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.

The [*Contractor / Consultant*] has full responsibility to monitor compliance to the referenced statute or regulation. The [*Contractor / Consultant*] must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

A20 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

A20.3 CONTRACT CLAUSE

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. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer 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). The employer 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.

EXHIBIT B

**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/ _____
Attorney for the City and
County of Denver

/s/ _____
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 for 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 minority¹ 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**

From January 1, 1982
to 21.7% - 23.5%
Until Further Notice

**GOALS FOR FEMALE PARTICIPATION
FOR EACH TRADE**

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 OWNER CONTROLLED INSURANCE PROGRAM (OCIP/ROCIP) PROJECT

1. General Information

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 Contractor and subcontractors of any tier, and other designated parties (Enrolled Parties), for work performed at the Project Site. Certain trade contractors and subcontractors are ineligible for this program; see Excluded Parties under the definitions Section 7 for a general list of excluded parties. Insurance requirements are determined based on the scope of work.

1.2 ROCIP Manuals

Below are links to access the current reference manuals related to DEN ROCIP III. These manuals are part of the Contract Documents.

[DEN ROCIP III Insurance Manual](#)

[DEN ROCIP III Safety Manual](#)

[DEN ROCIP III Claims Guide](#)

2. Insurance Requirements for Non-ROCIP Contractors and Subcontractors (Excluded Parties)

Contractor and subcontractors of any tier shall require all Excluded Parties, as defined in Section 7 or confirmed as excluded by DEN, to provide and maintain insurance of the type and in limits as set forth in the Contractor Subcontract Agreement and such insurance shall include the minimum defined coverages and be evidenced to DEN as required in this Section 2.

2.1 Certificate Holder

Certificate(s) shall be issued to: CITY AND COUNTY OF DENVER
Denver International Airport
8500 Peña Boulevard, Suite 8810
Denver CO 80249
Attn: Risk Management

2.2 Acceptable Certificate of Insurance Form and Submission Instructions

Please read these requirements carefully to ensure proper documentation and receipt of your certificate(s) of insurance.

- ACORD FORM (or equivalent) certificate is required.
- SUBMIT via emailed in pdf format to: contractadmininvoices@flydenver.com
- ELECTRONIC CERTIFICATES are required, hard copy documents will not be accepted.
- THIRD PARTY SOFTWARE may be implemented during the term of this Agreement to manage insurance compliance and documents with required use by Vendor of such system.
- REFERENCE on the certificate must include the DEN assigned Contract Number.

2.3 Coverage and Limits

2.3.1 Commercial General Liability

Contractor shall maintain insurance coverage including bodily injury, property damage, personal injury, advertising injury, and products and completed operations in minimum limits of \$1,000,000 each occurrence, \$2,000,000 products and completed operations aggregate and \$2,000,000 annual aggregate.

2.3.1.1 Coverage shall include Contractual Liability covering liability assumed under this Agreement (including defense costs assumed under contract) within the scope of coverages provided.

2.3.1.2 Coverage shall include Mobile Equipment Liability.

2.3.2 Business Automobile Liability

Contractor 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.

2.3.2.1 If operating vehicles unescorted airside at DEN, a \$10,000,000 combined single limit each occurrence for bodily injury and property damage is required.

2.3.2.2 If Contractor does not have blanket coverage on all owned and operated vehicles, then a schedule of insured vehicles (including year, make, model and VIN number) must be submitted by the insurer with the Certificate of Insurance.

2.3.2.3 The policy must not contain an exclusion related to operations on airport premises.

2.3.2.4 If transporting waste, hazardous material, or regulated substances, Contractor shall carry a Broadened Pollution Endorsement and an MCS 90 endorsement on its policy.

2.3.2.5 If Contractor is an individual or represents that Contractor does not own any motor vehicles and Contractor's owners, officers, directors, and employees use their personal vehicles for business purposes, Personal Automobile Liability insurance coverage will be accepted provided it includes a business use endorsement.

2.3.2.6 If Contractor will be completing all services to DEN under this Agreement remotely this requirement will be waived.

2.3.3 Workers' Compensation and Employer's Liability Insurance

Contractor shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits no less than \$1,000,000 per occurrence for each bodily injury claim, \$1,000,000 per occurrence for each bodily injury caused by disease claim, and \$1,000,000 aggregate for all bodily injuries caused by disease claims.

2.3.3.1 If Contractor is a sole proprietor, Workers' Compensation and Employer's Liability is exempt under the Colorado Workers' Compensation Act.

2.3.4 Professional Liability (Errors and Omissions) Insurance

Contractor shall maintain a minimum limit of \$1,000,000 each claim and policy aggregate, providing coverage for applicable services outlined in this Agreement. If there are no applicable professional services, this coverage will not be required.

The Contractor shall be responsible for conferring with DEN Risk Management on any subcontractors providing work to the Project to obtain a formal determination if this coverage will be required.

2.3.5 Contractor's Pollution Legal Liability

If required by DEN Risk Management for any specific Excluded Party based on their scope of work, Contractor shall maintain coverage for its work site operations that are conducted on DEN's premises including project management and site supervision duties with a limit no less than \$1,000,000 each occurrence and aggregate resulting from claims arising out of a pollution condition or site environmental condition resulting out of work site operations on DEN's premises.

2.3.5.1 Coverage shall include claims/losses for bodily injury, property damage including loss of use of damaged property, defense costs including costs and expenses incurred in the investigation, defense or settlement of claims, and cleanup cost for pollution conditions resulting from illicit abandonment, the discharge, dispersal, release, escape, migration or seepage of any solid, liquid, gaseous or thermal irritant, contaminant, or pollutant, including soil, silt, sedimentation, smoke, soot, vapors, fumes, acids, alkalis, chemicals, electromagnetic fields, hazardous substances, hazardous materials, waste materials, low level radioactive waste, mixed wastes, on, in, into, or upon land and structures thereupon, the atmosphere, surface water or groundwater on the DEN premises.

2.3.5.2 Work site means a location where covered operations are being performed, including real property rented or leased from DEN for the purpose of conducting Contractor's covered operations.

The Contractor shall be responsible for conferring with DEN Risk Management on any subcontractors providing work to the Project to obtain a formal determination if this coverage will be required.

2.3.6 Technology Errors and Omissions, Network Security, and Privacy Liability (Cyber):

If required by DEN Risk Management for any specific Excluded Party based on their scope of work, Contractor shall maintain a limit no less than \$1,000,000 each claim and aggregate; \$1,000,000 each claim and aggregate for cyber extortion; and no less than \$250,000 each claim for invoice manipulation and email spoofing.

2.3.6.1 Coverage shall include professional misconduct or lack of ordinary skill.

2.3.6.2 Coverage shall include, but not be limited to, liability arising from theft, dissemination and/or use of personal, private, confidential, information subject to a non-disclosure agreement, including information stored or transmitted, privacy or cyber laws, damage to or destruction of information, intentional and/or unintentional release of private information, alteration of information, extortion and network security, introduction of a computer virus into, or otherwise causing damage to, a customer's or third person's computer, computer system, network or similar computer related property and the data, software, and programs thereon, advertising injury, personal injury (including invasion of privacy) and intellectual property offenses related to internet.

The Contractor shall be responsible for conferring with DEN Risk Management on any subcontractors providing work to the Project to obtain a formal determination if this coverage will be required.

2.3.7 Unmanned Aerial Vehicle (UAV) Liability

If Contractor desires to use drones in any aspect of its work on DEN premises, the following requirements must be met prior to commencing any drone operations:

- 2.3.7.1 Express written permission must be granted by DEN.
- 2.3.7.2 Express written permission must be granted by the Federal Aviation Administration (FAA).
- 2.3.7.3 Drone equipment must be properly registered with the FAA.
- 2.3.7.4 Drone operator(s) must be properly licensed by the FAA.
- 2.3.7.5 Contractor 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 each occurrence for bodily injury and property damage.

2.3.8 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.

2.4 Reference to Project and/or Contract

The DEN Project and/or Contract Number and project description shall be noted on the Certificate of Insurance.

2.5 Additional Insured

For all coverages required under this Agreement (excluding Workers' Compensation and Professional Liability), Contractor'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.

2.6 Waiver of Subrogation

For all coverages required under this Agreement, Contractor'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.

2.7 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 coverage before the expiration date thereof.

- 2.7.1 Such notice shall reference the DEN assigned contract number related to this Agreement.
- 2.7.2 Said notice shall be sent thirty (30) days prior to such cancellation, non-renewal or reduction in coverage unless due to non-payment of premiums for which notice shall be sent ten (10) days prior.
- 2.7.3 If such written notice is unavailable from the insurer or afforded as outlined above, Contractor and/or it is insurance broker/agent shall provide written notice of cancellation, non-renewal and any reduction in coverage to the Certificate Holder within seven (7) business days of receiving such notice by its insurer(s) and include documentation of the formal notice received from its insurer(s) as verification. Contractor shall replace cancelled or nonrenewed policies with no lapse

in coverage and provide an updated Certificate of Insurance to DEN.

2.8 Additional Provisions

- 2.8.1 Deductibles, SIRS, or any other type of retention are the sole responsibility of the Contractor.
- 2.8.2 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.
- 2.8.3 A severability of interests or separation of insureds provision (no insured vs. insured exclusion) is included under any policy requiring Additional Insured status.
- 2.8.4 A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by DEN, excluding Professional Liability and Workers' Compensation policies, if required.
- 2.8.5 The insurance requirements under this Agreement shall be the greater of (i) the minimum limits and coverage specified hereunder or (ii) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the Contractor. It is agreed that the insurance requirements set forth herein shall not in any way act to reduce coverage that is broader or that includes higher limits than the minimums set forth in this Agreement.
- 2.8.6 All policies shall be written on an occurrence form when available and industry norm. If an occurrence form is unavailable and/or the industry norm, claims-made coverage may be accepted by DEN provided the retroactive date is on or before the Agreement Effective Date or the first date when any goods or services were provided to DEN, whichever is earlier, and continuous coverage will be maintained or an extended discovery period of three years beginning at the time work under this Agreement is completed or the Agreement is terminated, whichever is later.
- 2.8.7 Contractor shall advise DEN in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.
- 2.8.8 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 a person authorized by the insurer to bind coverage on its behalf and must be submitted to DEN at the time Contractor signed this Agreement.
- 2.8.9 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.
- 2.8.10 Certificate of Insurance and Related Endorsements: DEN's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Agreement shall not act as a waiver of Contractor's breach of this Agreement or of any of DEN's rights or remedies under this Agreement. DEN's acceptance of any submitted insurance certificate is subject to the approval of DEN Risk Management. All coverage requirements specified in the certificate shall be enforced unless waived or otherwise modified in writing by DEN Risk Management. Contractor is solely responsible for ensuring all formal policy endorsements are issued by their insurers to support the requirements herein.
- 2.8.11 DEN shall have the right to verify or confirm, at any time, all coverage, information or representations, and the insured and its undersigned agent shall promptly and fully cooperate in any such audit DEN may elect to undertake including provision of certified copies of insurance policies upon request.
- 2.8.12 No material changes that negatively impact DEN or reductions in the coverage required herein shall be allowed without the review and written approval of DEN Risk Management.

3. Insurance Requirements for ROCIP Enrolled Contractors and Subcontractors

3.1 Insurance Provided by the DEN ROCIP

DEN retains the right to have this Project insured under a ROCIP. ROCIP coverage shall provide: (i)

Commercial General Liability, (ii) Workers' Compensation & Employer's Liability, (iii) Excess Liability, (iv) Contractor's Pollution Liability, and (v) Builder's Risk as outlined herein and as defined by the respective policies for each coverage, for the period from the start of Work through completion and final acceptance by DEN except as otherwise provided herein.

3.2 Enrollment Required

Parties performing labor or services at the Project Site are eligible to enroll in the DEN ROCIP, unless they are Excluded Parties (as defined in Section 7). Participation is mandatory but not automatic. Parties eligible for enrollment shall follow the procedures and follow the instructions as provided in the DEN ROCIP Insurance Manual to enroll in the program. When the Contractor and subcontractors of any tier are properly enrolled, the DEN ROCIP Administrator will issue a Certificate of Insurance evidencing the coverages afforded to each Enrolled Party under the DEN ROCIP, prior to their commencing Work on the Project Site.

3.3 Exclusion of Contractor/Subcontractor Insurance Costs from Proposal and Bid Prices

Contractor shall exclude from Contractor's cost of work and ensure that each subcontractor of any tier exclude from their cost of work, normal costs for insurance for those coverages provided under the DEN ROCIP. As part of the enrollment process, Contractor and subcontractors shall provide policy declaration rate pages and deductible endorsements on the General Liability, Workers' Compensation, and Excess Liability policies as required in the DEN ROCIP Insurance Manual. The calculation of these costs will be determined by the ROCIP Program Administrator. The costs of DEN ROCIP coverage includes reductions in insurance premiums, all relevant taxes and assessments, markup on insurance premiums, and losses retained through large deductibles, self-insured retentions, or self-funded programs. Change orders shall also exclude the cost of ROCIP coverage.

Pre-employment substance abuse testing costs will be covered by DEN and should be removed from bid prices. Drug testing will be more thoroughly discussed in the ROCIP Safety Manual.

3.4 Insurance Premiums

DEN will pay the insurance premiums for the DEN ROCIP insurance policies. DEN is responsible for all adjustments to the premiums and will be the sole beneficiary of all dividends, retroactive adjustments, return premiums, and any other monies due through audits or otherwise. The Contractor assigns to DEN the right to receive all such adjustments and will require that each subcontractor of any tier assign to DEN all such adjustments. The Contractor and the subcontractors who are Enrolled Parties shall execute such further documentation as may be required by DEN to accomplish this assignment.

3.5 Off Site Operations Coverage Under ROCIP

The DEN ROCIP will provide certain insurance coverage for DEN, Contractor and Enrolled Parties, along with their Eligible Employees performing Work at the Project Site. Off-site operations shall be covered only if designated in writing by DEN and when all operations at such site are identified and solely dedicated to the Project. Contractors and subcontractors are responsible to notify the DEN ROCIP Administrator in writing, to request coverage for specified off-site operations. Coverage is not provided at the off-site location unless confirmed in writing by the DEN ROCIP Administrator.

3.6 DEN ROCIP Insurance Manual

As soon as practicable, the DEN ROCIP Insurance Manual will be sent to each Enrolled Party and will become a part of the Contract and Contractor's Subcontract with its subcontractor and its subcontractors' agreements with any lower-tier subcontractor. The DEN ROCIP Insurance Manual will contain the administrative and claim reporting procedures. Contractor agrees to and will require that its

subcontractors of any tier to cooperate with the DEN ROCIP Administrator in providing all required information.

3.7 Conflicts

Descriptions of the DEN ROCIP coverages set forth in Section 3.8 are not intended to be complete or meant to alter or amend any provision of the DEN ROCIP insurance policies. The DEN ROCIP coverages, terms, conditions, and exclusions are set forth in full in their respective policy forms. In the event of a conflict or omission between the coverages provided in the DEN ROCIP insurance policies and the coverages summarized or described in the DEN ROCIP Insurance Manual, this Exhibit or elsewhere in the Contract Documents, the DEN ROCIP insurance policies shall govern. In the event of a conflict between the provisions of this Exhibit and the DEN ROCIP Insurance Manual, that does not involve any conflict with the provisions of the DEN ROCIP insurance policies, the provisions of this Exhibit shall govern.

3.8 ROCIP Insurance Coverage Provided to Enrolled Parties

3.8.1 Insurance Provided by DEN

Unless otherwise provided herein, prior to commencement of the Work, DEN, at its sole option and expense, shall secure and maintain at all times during the performance of this Contract the insurance specified below, insuring DEN, Enrolled Parties and such other persons or interests as DEN may designate with limits not less than those specified below for each coverage.

3.8.1.1 Workers' Compensation & Employer's Liability – On Site Only

DEN shall maintain the coverage as required by statute for the Project Site and shall maintain Employer's Liability insurance with limits no less than \$1,000,000 per occurrence for each bodily injury claim, \$1,000,000 per occurrence for each bodily injury caused by disease claim, and \$1,000,000 aggregate for all bodily injuries caused by disease claims.

3.8.1.2 Commercial General Liability – On Site Only

DEN shall maintain insurance coverage including bodily injury, property damage, personal injury, advertising injury, and products and completed operations in minimum limits as listed below:

| Coverage | Limit |
|--|-------------|
| Annual General Aggregate (Per Project and Reinstates Annually) | \$4,000,000 |
| Products/Completed Operations Aggregate (Per Project and Statute of Repose) | \$4,000,000 |
| Total Products/Completed Operations Aggregate (Statute of Repose) | \$8,000,000 |
| Personal / Advertising Injury Limit | \$2,000,000 |
| Each Occurrence Limit | \$2,000,000 |
| Fire Damage Legal Liability (any one fire) | \$ 300,000 |
| Medical Payments (any one person) | \$ 10,000 |

3.8.1.3 Excess Liability Insurance

DEN shall maintain coverage following form with underlying policies of Commercial General Liability and Employer's Liability in minimum limits as listed

below:

| Coverage | Limit |
|---|---------------|
| Annual General Aggregate (Per Project and Reinstates Annually) | \$200,000,000 |
| Products/Completed Operations Aggregate (Per Project) | \$200,000,000 |
| Total Products/Completed Operations Aggregate (Policy Cap) | \$400,000,000 |
| Each Occurrence Limit | \$200,000,000 |

DEN, in its sole discretion, may elect to provide higher limits, based on Project size. Excess Liability limits are shared by all Insured parties.

3.8.1.4 Contractor's Pollution Liability

DEN shall maintain coverage for bodily injury, property damage, or environmental damage caused by a pollution event resulting from covered operations, including completed operations, at the Project Site with a limit no less than \$10,000,000 each occurrence and aggregate. Coverage includes microbial matter and legionella pneumophila in any structure on land and the atmosphere contained with the structure. Products/Completed Operations coverage may extend for the statute of limitations/repose after final completion of the Project.

3.8.1.5 Builder's Risk Insurance

DEN shall maintain, Builder's Risk (and/or Installation Floater) in the amount of \$500,000,000 per occurrence subject to various sublimits (as defined in the Builders' Risk Policy). Such insurance shall end when the first of the following occurs: 1) DEN's interest in the Work ceases; 2) the policy expires or is cancelled; or 3) the Work is accepted by DEN.

Builder's Risk Insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss of damage including , theft, vandalism, malicious mischief, terrorism, rigging and hoisting for materials and equipment that are part of the Project, collapse, earthquake, flood, windstorm, falsework, testing and startup (as provided by the policy), temporary buildings and debris removal including demolition occasioned by enforcement of any applicable ordinance laws, and shall cover reasonable compensation for services and expenses required as a result of such insured loss.

This Builder's Risk Insurance shall cover portions of the Work stored off site, and also portions of the Work in transit.

DEN and Contractor shall waive all rights against (1) each other and any of their subcontractors of any tier, and all respective agents and employees, and (2) the architect, architect's consultants, separate contractors, if any, and any of their subcontractors of any tier, and all respective agents and employees, for damages caused by fire or other causes of loss to the extent covered by Builder's Risk Insurance obtained pursuant to this Section or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by DEN as fiduciary. DEN or Contractor, as appropriate, shall require of the architect,

architect's consultants, separate contractors, and their subcontractors of any tier, and all respective agents and employees, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

3.8.2 Claim Chargeback

A claim charge-back will be assessed, regardless of fault, for the amount of any loss payable under this program with the exception of Workers' Compensation and Excess Liability, up to a maximum of \$25,000 each loss. Lead Contractor may elect to pass no more than \$5,000 of this charge, each loss, through to any responsible subcontractor.

3.9 Other Insurance Provided By Enrolled Parties

At their own expense, the Enrolled Parties of all tiers must carry the following minimum coverage and limits and such insurance shall be evidenced to DEN and the DEN ROCIP Administrator as required in this Section 3.9.

3.9.1 Certificate Holder

Certificate(s) shall be issued to: CITY AND COUNTY OF DENVER
Denver International Airport
8500 Peña Boulevard, Suite 8810
Denver CO 80249
Attn: Risk Management

and

CITY AND COUNTY OF DENVER
Department of Aviation
c/o Arthur J. Gallagher RMS, Inc.
12444 Powerscourt Drive
St. Louis, MO 63131
Attn: Gallagher OCIP Group

3.9.2 Acceptable Certificate of Insurance Form and Submission Instructions

Please read these requirements carefully to ensure proper documentation and receipt of your certificate(s) of insurance.

- ACORD FORM (or equivalent) must be emailed in pdf format to:
contractadmininvoices@flydenver.com
and heather_lawson@ajg.com
- HARD COPIES of certificates and/or copies of insurance policies will not be accepted.
- ACORD FORM (or equivalent) must reference the DEN assigned Contract Number.

3.9.3 Commercial General Liability – Off Site Only

Contractor shall maintain insurance coverage including bodily injury, property damage, personal injury, advertising injury, and products and completed operations for Contract operations not

physically occurring within the Project Site in minimum limits of \$1,000,000 each occurrence, \$2,000,000 products and completed operations aggregate and \$2,000,000 policy and annual aggregate.

3.9.3.1 Coverage shall include Contractual Liability covering liability assumed under this Agreement (including defense costs assumed under contract) within the scope of coverages provided.

3.9.4 Business Automobile Liability

Contractor 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.

3.9.4.1 If operating vehicles unescorted airside at DEN, a \$10,000,000 combined single limit each occurrence for bodily injury and property damage is required.

3.9.4.2 If Contractor does not have blanket coverage on all owned and operated vehicles, then a schedule of insured vehicles (including year, make, model and VIN number) must be submitted by the insurer with the Certificate of Insurance.

3.9.4.3 The policy must not contain an exclusion related to operations on airport premises.

3.9.4.4 If transporting waste, hazardous material, or regulated substances, Contractor shall carry a pollution coverage endorsement and an MCS 90 endorsement on its policy.

3.9.4.5 If Contractor is an individual or represents that Contractor does not own any motor vehicles and Contractor's owners, officers, directors, and employees use their personal vehicles for business purposes, Personal Automobile Liability insurance coverage will be accepted provided it includes a business use endorsement.

3.9.4.6 If Contractor will be completing all services to DEN under this Agreement remotely this requirement will be waived.

3.9.5 Workers' Compensation and Employer's Liability Insurance – Off Site Only

Coverage to protect Contractor/Subcontractor from and against all claims arising from performance of Work outside the Project Site under the Contract.

Contractor shall maintain the coverage as required by statute for performance of Work outside the Project Site under the Contract and shall maintain Employer's Liability insurance with limits no less than \$1,000,000 per occurrence for each bodily injury claim, \$1,000,000 per occurrence for each bodily injury caused by disease claim, and \$1,000,000 aggregate for all bodily injuries caused by disease claims.

3.9.5.1 If Contractor is a sole proprietor, Workers' Compensation and Employer's Liability is exempt under the Colorado Workers' Compensation Act.

3.9.6 Professional Liability (Errors and Omissions) Insurance

Contractor shall maintain a minimum limit of \$1,000,000 each claim and policy aggregate, providing coverage for applicable services outlined in this Agreement.

The Contractor shall be responsible for conferring with DEN Risk Management on any subcontractors providing work to the Project to obtain a formal determination if this coverage will be required.

3.9.7 Technology Errors and Omissions, Network Security, and Privacy Liability (Cyber):

Contractor shall maintain a limit no less than \$1,000,000 each claim and aggregate; \$1,000,000

each claim and aggregate for cyber extortion; and no less than \$250,000 each claim for invoice manipulation and email spoofing for applicable services outlined in this Agreement.

- 3.9.7.1 Coverage shall include professional misconduct or lack of ordinary skill.
- 3.9.7.2 Coverage shall include, but not be limited to, liability arising from theft, dissemination and/or use of personal, private, confidential, information subject to a non-disclosure agreement, including information stored or transmitted, privacy or cyber laws, damage to or destruction of information, intentional and/or unintentional release of private information, alteration of information, extortion and network security, introduction of a computer virus into, or otherwise causing damage to, a customer's or third person's computer, computer system, network or similar computer related property and the data, software, and programs thereon, advertising injury, personal injury (including invasion of privacy) and intellectual property offenses related to internet.

The Contractor shall be responsible for conferring with DEN Risk Management on any subcontractors providing work to the Project to obtain a formal determination if this coverage will be required.

3.9.8 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.

3.9.9 Reference to Project and/or Contract

The DEN Project and/or Contract Number and project description shall be noted on the Certificate of Insurance.

3.9.10 Additional Insured

For all coverages required under this Agreement (excluding Workers' Compensation and Professional Liability), Contractor'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.

3.9.11 Waiver of Subrogation

For all coverages required under this Agreement, Contractor'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.

3.9.12 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 coverage from the requirements herein before the expiration date thereof.

- 3.9.12.1 Such notice shall reference the DEN assigned contract number related to this Agreement.
- 3.9.12.2 Said notice shall be sent thirty (30) days prior to such cancellation or non-renewal or reduction in coverage unless due to non-payment of premiums for which notice shall

be sent ten (10) days prior.

- 3.9.12.3 If such written notice is unavailable from the insurer, and in any event, Contractor and/or its insurance broker/agent shall provide written notice of cancellation, non-renewal and any reduction in coverage to the Certificate Holder within seven (7) business days of receiving such notice by its insurer(s) and include documentation of the formal notice received from its insurer(s) as verification. Contractor shall replace cancelled or nonrenewed policies with no lapse in coverage and provide an updated Certificate of Insurance to DEN.

3.9.13 Additional Provisions

- 3.9.13.1 Deductibles, SIRS, or any other type of retention are the sole responsibility of the policyholder.
- 3.9.13.2 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.
- 3.9.13.3 A severability of interests or separation of insureds provision (no insured vs. insured exclusion) is included under any policy requiring Additional Insured status.
- 3.9.13.4 A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by DEN, excluding Professional Liability and Workers' Compensation policies, if required.
- 3.9.13.5 The insurance requirements under this Agreement shall be the greater of (i) the minimum limits and coverage specified hereunder or (ii) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the Contractor. It is agreed that the insurance requirements set forth herein shall not in any way act to reduce coverage that is broader or that includes higher limits than the minimums set forth in this Agreement.
- 3.9.13.6 All policies shall be written on an occurrence form when available and industry norm. If an occurrence form is unavailable and/or the industry norm, claims-made coverage may be accepted by DEN provided the retroactive date is on or before the Agreement Effective Date or the first date when any goods or services were provided to DEN, whichever is earlier, and continuous coverage will be maintained or an extended discovery period of three years beginning at the time work under this Agreement is completed or the Agreement is terminated, whichever is later.
- 3.9.13.7 Contractor shall advise DEN in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.
- 3.9.13.8 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 a person authorized by the insurer to bind coverage on its behalf and must be submitted to DEN at the time Contractor signed this Agreement.
- 3.9.13.9 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.
- 3.9.13.10 Certificate of Insurance and Related Endorsements: DEN's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Agreement shall not act as a waiver of Contractor's breach of this Agreement or of any of DEN's rights or remedies under this Agreement. DEN's acceptance of any submitted insurance certificate is subject to the approval of DEN Risk Management. All coverage requirements specified in the certificate shall be enforced unless waived or otherwise modified in writing by

- DEN Risk Management. Contractor is solely responsible for ensuring all formal policy endorsements are issued by their insurers to support the requirements herein.
- 3.9.13.11 DEN shall have the right to verify or confirm, at any time, all coverage, information or representations, and the insured and its undersigned agent shall promptly and fully cooperate in any such audit DEN may elect to undertake including provision of certified copies of insurance policies upon request.
- 3.9.13.12 No material changes that negatively impact DEN or reductions in the coverage required herein shall be allowed without the review and written approval of DEN Risk Management.

4. Contractor Warranties and Agreements

4.1 Accuracy of Contractor-provided Information

Contractor warrants that all information submitted to DEN or the DEN ROCIP Administrator is accurate and complete to the best of its knowledge. Contractor will notify DEN or the DEN ROCIP Administrator immediately in writing of any errors discovered during the performance of the Work.

4.2 Contractor Responsible to Review Coverage

Contractor acknowledges that all references to DEN ROCIP policy terms, conditions, and limits of liability in this document, as well as the DEN ROCIP Insurance Manual, are for reference only. Contractor and its subcontractors of any tier are responsible for conducting their own independent review and analysis of the DEN ROCIP insurance policies in formulating any opinion or belief as to the applicability of such coverage in the event of any loss or potential claim. Any type of insurance or increase of limits not described above, which the Contractor requires for its own protection or on account of statute, shall be its own responsibility and at its own expense.

4.3 Audit

Contractor agrees to make its records available for review and to cooperate with DEN, its insurers and insurance brokers, the City Auditor, and representatives of the aforesaid parties in the event of an audit. In the event that a DEN audit of Contractor's records, as permitted in the Contract or other DEN ROCIP documents, reveals a discrepancy in the insurance, payroll, safety, or any other information required to be provided to DEN or the DEN ROCIP Administrator, or reveals inclusion of costs for DEN ROCIP coverage or other coverage beyond what is described above in any payment for the Work, DEN will have the right to deduct from payments due Contractor all such insurance costs as well as all audit costs.

4.4 Insurance Costs Removed

Contractor warrants that the costs for insurance as provided under the DEN ROCIP were not included in Contractor's bid or proposal for the Work, the Contract Price/Contract Sum, and will not be included in any change order or any request for payment for the Work or extra work.

5. Contractor Obligations

5.1 ROCIP Documents Shall be Provided to Subcontractor

Contractor shall furnish each bidding subcontractor, vendor, supplier, material dealer or other party a copy of this Exhibit, the DEN ROCIP Insurance Manual and the DEN ROCIP Safety Manual and shall incorporate the terms of this Exhibit in all contracts and agreements entered into for performance of any portion of the Work.

5.2 Timely Enrollment Required

Contractor shall enroll in the DEN ROCIP within five (5) business days following a request by DEN or the DEN ROCIP Administrator. Contractor shall notify each subcontractor of the process for enrolling in DEN ROCIP and confirm that enrollment is mandatory, but not automatic. Contractor shall assure that subcontractors of any tier shall not commence Work until verification of enrollment is confirmed by the DEN ROCIP Administrator by the issuance of a Certificate of Insurance to each individual Enrolled Party.

5.3 Compliance with Conditions

Contractor shall not violate any condition of the policies of insurance provided by DEN under the terms of this Exhibit, the DEN ROCIP Insurance Manual or the DEN ROCIP Safety Manual. All requirements imposed by the subject policies and to be performed by Contractor shall likewise be imposed on, assumed, and performed by each subcontractor of any tier.

5.4 Claims Cooperation

Contractor shall participate in claim reporting procedures. Contractor agrees to assist and cooperate in every manner possible in connection with the adjustment of all claims arising out of operations within the scope of the Work required by the Contract, and to cooperate with DEN's insurer(s) in all claims and demands which DEN's insurer(s) is called upon to adjust or to defend against. Contractor shall take all necessary action to assure that its subcontractors of any tier comply with any request for assistance and cooperation. This obligation includes, without limitation, providing light or modified duty for injured workers, appearing in mediation, arbitration or court proceedings and/or participating in settlement meetings, as may be required.

5.5 Monthly Payroll Submission

All Enrolled Parties shall submit monthly payrolls and worker-hour reports to DEN and/or the DEN ROCIP Administrator via the DEN ROCIP Administrator's online reporting system as outlined in the DEN ROCIP Insurance Manual. The online reporting instructions will be provided to all Contractors at time of enrollment. Failure to submit these reports may result in funds being held or delayed from monthly progress payments. Payroll must be submitted online for each month, including zero (0) payroll, if applicable, until completion of the Work under each Contract and Subcontract. For subcontractors of any tier performing Work under multiple Subcontracts, a separate payroll report is required for each Subcontract under which Work is being performed.

5.6 Response to Information Requests

All insurance underwriting, payroll, rating or loss history information requested by DEN or the DEN ROCIP Administrator shall be provided by the Contractor within three (3) business days of request. Contractor agrees (and will require each subcontractor to agree) that DEN, DEN's insurers or its representative may audit the Contractor's records or records of subcontractors of any tier to confirm the accuracy of all insurance information provided including, without limitation, any such information that may have any effect on insurance resulting from changes in the Work. At all times during performance of the Contract and Subcontracts, the Contractor and subcontractors of any tier shall cooperate with DEN, the DEN ROCIP Administrator and DEN's insurers.

5.7 Responsibility for Safety

Notwithstanding the DEN ROCIP, the Contractor shall initiate, maintain and supervise all safety precautions and programs in connection with the Work. Contractor is solely responsible, at no adjustment to the contract sum payable or contract time, for initiating, maintaining, and supervising all safety precautions and programs relating to the conduct of Work including, without limitation, any safety

programs or procedures that are required by any applicable state or federal laws, rules or regulations, or under the terms of the DEN ROCIP Safety Manual.

5.8 Duty of Care

Nothing herein shall relieve the Enrolled Parties of their respective obligations to exercise due care in the performance of their duties in connection with the Work or to complete the Work in strict compliance with this Contract and subsequent subcontracts.

6. Notices and Costs

6.1 Limitations on DEN Provided Coverage and DEN Right to Purchase Other Coverage

DEN assumes no obligations to provide insurance other than that evidenced by the policies referred to in Section 3.8. DEN, however, reserves the right to furnish insurance coverage of various types and limits provided that such coverage shall not be less than that specified in Section 3.8 and the costs of such insurance shall be paid by DEN. Apart from the DEN ROCIP, DEN may at its option purchase additional insurance coverages that insure the Project that may not necessarily insure the Contractor or the subcontractors. Without limitation, examples of such coverage may include pollution liability, excess professional liability, and excess automobile liability insurance.

6.2 Contractors Responsible for Own Equipment

Contractor and subcontractors are solely responsible for loss or damage of all construction tools and other equipment whether owned, leased, rented, borrowed or used on Work at the Project Site. If an individual Enrolled Party purchases insurance on their tools and equipment, such insurance shall contain a waiver of subrogation in favor of the City and County of Denver, its elected and appointed officials, agents, employees and volunteers and all other Enrolled Parties. If an individual Enrolled Party does not purchase such insurance, that Enrolled Party will hold harmless the City and County of Denver, its elected and appointed officials, agents, employees and volunteers and other Enrolled Parties for loss or damage to its tools and equipment.

6.3 No Release; No Waiver of Immunity

The provision of the DEN ROCIP shall in no way be interpreted as relieving Contractor or subcontractors of any tier of any responsibility or liability under the Contract Documents, the DEN ROCIP insurance policies or applicable laws including, without limitation, Contractor's and subcontractor's responsibilities relative to indemnification and their obligation to exercise due care in the performance of the Work and to complete the Work in strict compliance with the Contract Documents. The parties hereto understand and agree that the City and County of Denver, its elected and appointed officials, agents, employees and volunteers are relying on, and do not waive or intend to waive by any provisions of this agreement, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, §§ 24-10-101 to 120, C.R.S., or otherwise available to DEN, its officers, officials and employees.

6.4 DEN Right to Withhold Payments

In addition to any other rights of withholding that DEN may have under the Contract Documents, DEN has the right to withhold any payments otherwise due to Contractor in the event of a failure by Contractor or any subcontractor to comply with the requirements of this Exhibit, the DEN ROCIP Insurance Manual or the DEN ROCIP Safety Manual. DEN may withhold from any payment owing to Contractor the costs of DEN ROCIP coverages if included in a request for payment. Such withholding by DEN shall not be deemed to be a default under the Contract. DEN shall withhold from Contractor the costs of DEN ROCIP coverages attributable to an increase in an Enrolled Party's total payroll for the Work over the amount

reported to DEN and/or the DEN ROCIP Administrator at time of enrollment.

6.5 DEN Remedies

Without limitation upon any of DEN’s other rights or remedies, any failure of an Enrolled Party to comply with any provision of this Exhibit, the DEN ROCIP Insurance Manual, or the DEN ROCIP Safety Manual shall be deemed a material breach of the Contract, thereby entitling DEN, at its option, upon notice to Contractor, to (1) suspend performance by Contractor and/or the offending subcontractor, without any adjustment to Contract Sum Payable or Contract Time, until there is full compliance, or (2) terminate this Contract for cause.

6.6 Off Site Storage

Unless otherwise provided in the Contract Documents, the property insurance provided by DEN shall not cover portions of the Work stored off the Site without written approval of DEN. Contractor shall be responsible for reporting such property or work if ownership has been transferred to DEN. If ownership rests with the Contractor, Contractor shall be responsible for obtaining insurance to protect its interests.

6.7 Partial Occupancy

Partial occupancy or use shall not commence until DEN insurer(s) providing Builders Risk and/or Property Insurance have consented to such partial occupancy or use by endorsement or otherwise. DEN and the Contractor shall take reasonable steps to obtain consent of the insurer(s) and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

6.8 DEN Right to Exclude Parties from the DEN ROCIP

DEN reserves the right to exclude any subcontractor from the DEN ROCIP, before or after enrollment by the subcontractor. If DEN elects to exclude a subcontractor from the DEN ROCIP, the Contractor will be responsible for ensuring the insurance coverages outlined in the Contractor’s Subcontract Agreement are provided to DEN or the DEN ROCIP Administrator before the subcontractor can begin or resume Work on the Project.

6.9 DEN’s Right to Modify or Discontinue DEN ROCIP Coverages

If DEN determines that modification or discontinuation of the DEN ROCIP is in the best interest of DEN, the Contractor and subcontractor will receive sixty (60) days advance written notice to secure and maintain such insurance as is required to provide replacement coverage comparable to that provided under the DEN ROCIP. Provided that the foregoing is not the result of any failure by the Contractor or any subcontractor to comply with the requirements of the Contract Documents, the DEN ROCIP Insurance Manual or DEN ROCIP Safety Manual, the costs of such replacement insurance shall be deemed a cost of Work for which the Contractor shall be entitled to a Contract Adjustment, without any sum added thereto for Allowable Markup. The form, content, limits of liability, cost and the rating of the insurer(s) issuing such replacement coverage shall be subject to DEN’s prior written approval.

7. Definitions

| | |
|---------------------------|--|
| Certificate of Insurance: | A document providing evidence of coverage for a particular insurance policy or policies. This will include certificates issued to Enrolled Parties evidencing the coverage afforded under the DEN ROCIP and certificates issued to DEN evidencing additional coverage “Provided by Enrolled Parties” |
|---------------------------|--|

| | |
|---|---|
| DEN: | City and County of Denver and Denver International Airport |
| Contract: | The written agreement between DEN and Contractor describing the Work, contract terms and conditions, or a portion thereof; also includes a written agreement between a Contractor and any subcontractor as well as between subcontractors and their subcontractors of any tier. |
| Contractor Insurance Cost: | The costs of ROCIP coverage are defined as the amount of Contractor's and eligible Subcontractors' of every tier reduction in insurance costs due to participation in the DEN ROCIP. |
| Rolling Owner Controlled Insurance Program (ROCIP): | A coordinated insurance program providing certain coverage, as defined herein, for DEN, Contractor and Enrolled Subcontractors, along with their Eligible Employees, performing Work at the Project Site. |
| Eligible Employees: | Employees of the Contractor and Enrolled Subcontractors who are not excluded from the ROCIP under the "Excluded Parties" definition. |
| Enrolled Parties: | The Contractor and those subcontractors that have submitted all necessary enrollment information and been accepted into the ROCIP as evidenced by the issuance of a Certificate of Insurance. |
| Excluded Parties: | <p>Parties not covered by the ROCIP because of ineligibility or DEN explicit exclusion. No insurance coverage provided by DEN under the ROCIP shall extend to the activities or products of the following:</p> <ul style="list-style-type: none">• Any person or organization that fabricates or manufactures products, materials or supplies away from a Project Site with no direct onsite installation responsibility <p>Exception: The ROCIP Insurer may agree to extend General Liability coverage only if the Lead Contractor has a written contract with the off-site fabricator or manufacturer to provide the pre-fabricated product. To consider extending coverage, the Insurer requires 30 days advance written notice to the ROCIP Administrator with details of the work/product and a copy of the contract between the Lead Contractor and the off-site fabricator or manufacturer. Approval must be obtained from the Insurer before enrolling in the ROCIP for General Liability coverage only.</p> <ul style="list-style-type: none">• Hazardous materials remediation, removal, or transportation companies and their consultants• Architects, engineers, surveyors and their consultants• Truckers, haulers, material dealers, vendors, suppliers, and others who merely transport, pick up, deliver or carry materials, personnel, parts or equipment or any other items or persons to or from a Project Site• Contractors, subcontractors and subconsultants who do not work at a Project Site |

- Employees of an Enrolled Party who either (i) do not work on-site or (ii) occasionally visit a Project Site to make deliveries, pick-up supplies or personnel, to perform supervisory or progress inspections, or for any other reason
- Day labor employees (individuals working directly for the Contractor and not procured through a third party

Exception: The ROCIP Insurer typically will accept including employees working for a contractor, or employed by temporary staffing agencies or professional employer organizations, as long as those employer-entities are enrolled as subcontractors to supply supplemental workforce.

| | |
|----------------------------------|---|
| Insured: (liability policies) | DEN, Contractor and Enrolled Parties and their Eligible Employees and any other party named in the insurance policies. |
| Insurers: | Those insurance companies providing the DEN ROCIP coverage. The insurers will be identified on the issued Certificate of Insurance and in the DEN ROCIP Insurance Manual. |
| Net Bid: | Contractor bids with insurance costs removed because of the obligation of any Enrolled Party to delete insurance costs for coverage provided by the ROCIP from its bid and all change orders. Net bids are subject to verification by the Administrator through the providing of contractors' rate and declaration pages from their Insurance policies. |
| ROCIP Administrator: | The DEN ROCIP Administrator will be identified in the DEN ROCIP Insurance Manual. |
| ROCIP Insurance Manual: | A reference document provided to Contractor and subcontractors of all tiers, which summarizes the terms and provisions of the DEN ROCIP and provides information about requirements and compliance. |
| ROCIP Safety Manual: | A reference document provided to Contractor and subcontractors of all tiers which contains workplace safety requirements of all Enrolled Parties. |
| Off Site Work: | Work performed away from the Project Site. |
| Payroll: | For purposes of the ROCIP only, refers to Unburdened Straight Time Payroll per Workers Compensation Class Code. |
| Policy Owner: | City and County of Denver and Denver International Airport |
| Project: | The Project as defined in the contract documents and as described in the Declarations of the DEN ROCIP insurance policies. |

Project Site: Means those areas designated in writing by DEN in a Contract document for performance of the Work and such additional areas as may be designated in writing by DEN for Contractors' use in performance of the Work. Subject to the ROCIP Insurer(s) written approval, the term "Project Site" shall also include: (1) field office sites, (2) property used for bonded storage of material for the Project approved by DEN, staging areas dedicated to the Project, and (4) areas where activities incidental to the Project are being performed by Contractor or subcontractors covered by the DEN ROCIP Worker's Compensation policy (if included), but excluding any permanent locations of any Enrolled Party.

Items 1 through 4 above must be approved by the ROCIP Insurer and listed on the DEN ROCIP insurance policies.

Subcontract: The written agreement between Contractor and subcontractor, or between subcontractor and a lower tier subcontractor, describing the Work, subcontract terms and conditions, or a portion thereof.

Subcontractor: Includes those persons, firms, joint venture entities, corporations, or other parties that enter into a Subcontract with Contractor to perform Work at the Project Site and any of these subcontractor's lower-tier subcontractors.

Work: Operations, as fully described in the Contract and Subcontract, performed at the Project Site.

EXHIBIT D

PREVAILING WAGE SCHEDULES



TO: All Users of the City and County of Denver Prevailing Wage Schedules
FROM: Ryland Feno, Classification and Compensation Technician II
DATE: November 03, 2020
SUBJECT: Latest Change to Prevailing Wage Schedules

The effective date for this publication will be **Friday, October 30, 2020** 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 4 stories) in accordance with the Denver Revised Municipal Code, Section 20-76(c).

General Wage Decision No. CO20200020
Superseded General Decision No. CO20190020
Modification No. 4
Publication Date: 10/30/2020
(6 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.

***Career Service Board approved to adjust all Davis Bacon classifications under \$13.00 to comply with the city's minimum wage. The effective date is August 15, 2019. See page 6 for reference.**

Office of Human Resources
201 W. Colfax Ave. Dept. 412 | Denver, CO 80202
p: 720.913.5751 | f: 720.913.5720
www.denvergov.org/humanresources

"General Decision Number: CO20200020 10/30/2020

Superseded General Decision Number: CO20190020

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 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 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 calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

| Modification Number | Publication Date |
|---------------------|------------------|
| 0 | 01/03/2020 |
| 1 | 01/10/2020 |
| 2 | 01/24/2020 |
| 3 | 08/28/2020 |
| 4 | 10/30/2020 |

ASBE0028-002 07/01/2019

| | Rates | Fringes |
|---|----------|---------|
| ASBESTOS WORKER/HEAT & FROST INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation)..... | \$ 32.98 | 14.73 |

CARP0055-002 11/01/2019

| | Rates | Fringes |
|---------------------------------------|----------|---------|
| CARPENTER (Drywall Hanging Only)..... | \$ 29.95 | 10.99 |

 CARP1607-001 06/01/2020

| | Rates | Fringes |
|-----------------|----------|---------|
| MILLWRIGHT..... | \$ 35.50 | 14.68 |

 * ELEC0068-012 06/01/2020

| | Rates | Fringes |
|--|----------|---------|
| ELECTRICIAN (Includes Low Voltage Wiring)..... | \$ 38.00 | 16.97 |

 ELEV0025-001 01/01/2020

| | Rates | Fringes |
|------------------------|----------|---------|
| ELEVATOR MECHANIC..... | \$ 46.53 | 35.245 |

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 05/01/2018

| | Rates | Fringes |
|----------------------------------|----------|---------|
| POWER EQUIPMENT OPERATOR (Crane) | | |
| 141 tons and over..... | \$ 31.07 | 10.70 |
| 50 tons and under..... | \$ 28.40 | 10.70 |
| 51 to 90 tons..... | \$ 28.57 | 10.70 |
| 91 to 140 tons..... | \$ 29.55 | 10.70 |

 IRON0024-009 11/01/2019

| | Rates | Fringes |
|-----------------------------|----------|---------|
| IRONWORKER, ORNAMENTAL..... | \$ 30.85 | 11.92 |

 IRON0024-010 11/01/2019

| | Rates | Fringes |
|-----------------------------|----------|---------|
| IRONWORKER, STRUCTURAL..... | \$ 30.85 | 11.92 |

 PAIN0079-006 08/01/2017

| | Rates | Fringes |
|---|----------|---------|
| PAINTER (Brush, Roller and Spray; Excludes Drywall Finishing/Taping)..... | \$ 20.50 | 8.41 |
| ----- | | |
| PAIN0079-007 08/01/2017 | | |
| | Rates | Fringes |
| DRYWALL FINISHER/TAPER..... | \$ 21.20 | 8.41 |
| ----- | | |
| PAIN0419-001 07/01/2016 | | |
| | Rates | Fringes |
| SOFT FLOOR LAYER (Vinyl and Carpet)..... | \$ 20.00 | 10.83 |
| ----- | | |
| PAIN0930-002 07/01/2019 | | |
| | Rates | Fringes |
| GLAZIER..... | \$ 31.92 | 10.49 |
| ----- | | |
| PLUM0003-009 06/01/2018 | | |
| | Rates | Fringes |
| PLUMBER (Excludes HVAC Duct, Pipe and Unit Installation)..... | \$ 35.48 | 15.94 |
| ----- | | |
| PLUM0208-008 06/01/2018 | | |
| | Rates | Fringes |
| PIPEFITTER (Includes HVAC Pipe and Unit Installation; Excludes HVAC Duct Installation)..... | \$ 37.55 | 14.95 |
| ----- | | |
| * SFCO0669-002 04/01/2020 | | |
| | Rates | Fringes |
| SPRINKLER FITTER (Fire Sprinklers)..... | \$ 38.23 | 24.78 |
| ----- | | |
| SHEE0009-004 07/01/2019 | | |
| | Rates | Fringes |
| SHEET METAL WORKER (Includes HVAC Duct Installation; Excludes HVAC Pipe and Unit Installation)..... | \$ 34.62 | 17.95 |

 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)..... | \$ 17.68 | 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..... | \$ 14.49 | 5.22 |
| LABORER: Mason Tender - Brick.... | \$ 15.99 | 0.00 |
| LABORER: Mason Tender - Cement/Concrete..... | \$ 16.00 | 0.00 |
| LABORER: Pipelayer..... | \$ 16.96 | 3.68 |
| OPERATOR: Backhoe/Excavator/Trackhoe..... | \$ 20.78 | 5.78 |
| OPERATOR: Bobcat/Skid Steer/Skid Loader..... | \$ 19.10 | 3.89 |
| OPERATOR: Grader/Blade..... | \$ 21.50 | 0.00 |
| ROOFER..... | \$ 16.56 | 0.00 |
| TRUCK DRIVER: Dump Truck..... | \$ 17.34 | 0.00 |
| WATERPROOFER..... | \$ 12.71 | 0.00 |

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

**Office of Human Resources
Supplemental Rates
(Specific to the Denver projects)
Revision Date: 08-21-2019**

| Classification | | Base | Fringe |
|--------------------------|---------------------------------|-------------|---------------|
| Boilermaker | | \$30.97 | \$21.45 |
| Iron Worker, Reinforcing | | \$18.49 | \$3.87 |
| Laborer: Concrete Saw | | \$13.89 | - |
| Paper Hanger | | \$20.15 | \$6.91 |
| Plasterer | | \$24.60 | \$12.11 |
| Plaster Tender | | \$13.00 | - |
| Power Equipment Operator | Concrete Mixer - Less than 1 yd | \$23.67 | \$10.67 |
| | Concrete Mixer - 1 yd and over | \$23.82 | \$10.68 |
| | Drillers | \$23.97 | \$10.70 |
| | Loader - up to and incl 6 cu yd | \$23.67 | \$10.67 |
| | Loaders - over 6 cu yd | \$23.82 | \$10.68 |
| | Mechanic | \$18.48 | - |
| | Motor Grader | \$23.97 | \$10.70 |
| | Oilers | \$22.97 | \$10.70 |
| | Roller | \$23.67 | \$10.67 |
| | Truck Driver | Flatbed | \$19.14 |
| Semi | | \$19.48 | \$10.11 |
| Waterproofer | | \$13.00 | \$0.00 |

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

EXHIBIT E

SPECIAL CONDITIONS

SC-1 CONSTRUCTION CONTRACT GENERAL CONDITIONS

The Construction Contract General Conditions which constitute a part of the Contract Documents are set forth in a separately published document, entitled “City and County of Denver, Department of Aviation and Department of Public Works, Standard Specifications for Construction, General Contract Conditions,” 2011 Edition, the Table of Contents to which is bound herein (which may be informally referred to as the Yellow Book). The General Conditions book is available for purchase for \$12.00 per copy at the following locations during the business hours stated, Monday through Friday, excluding holidays:

Office of the Cashier
Wellington E. Webb Municipal Office Building, 2nd Floor
201 West Colfax Avenue
Denver, Colorado, USA 80202
7:30 a.m. to 4:30 p.m.

The General Conditions are also available on the City and County of Denver website at:

<https://www.denvergov.org/content/denvergov/en/contract-administration/contractor-resources/general-contract-conditions.html>

SC-2 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
Project Manual Volume 1 dated 12/9/2020
Contract Drawings dated December 9, 2020

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.

If Sensitive Security Information (“SSI”) is provided to the Contractor, the Contractor shall be required to comply with Department of Aviation, Standard Policies and Procedures No. 6003, “Contractor Protection of Sensitive Security Information,” or its successor, and 49 C.F.R. § 1520, or its successor.

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

SC-3 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 Airport Infrastructure Management Office under the supervision of the Senior Vice President for Maintenance and Airport Infrastructure

Management.”

SC-4 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 Operating Officer (EVP-COO) who reports to the CEO. Airport Infrastructure Management office, 9th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Senior Vice President - Airport Infrastructure Management (SVP-AIM) who reports to the COO. Airport Infrastructure Management office, 10th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Director of Infrastructure and Quality Assurance reports to the SVP-AIM. The Project Manager reports to the Director of Infrastructure and Quality Assurance. Airport Infrastructure Management Division, 7th Floor, Airport Office Building, 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-AIM. 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: Bradley Frederick, Airport Infrastructure Management Concourse A Room 1172, 8500 Peña Boulevard, Denver, CO 80249, phone 303-342-2707.

The CEO may from time to time substitute a different City official as the designated “SVP-AIM” hereunder, and any such change will be effective upon the issuance of written notice to the Contractor which identifies the successor SVP-AIM. The SVP-AIM 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-5 CONTRACTOR PERFORMANCE; SUBCONTRACTING

With respect to General Condition 501, no more than ninety percent (90%) of the work may be subcontracted. If it is determined to be in the City’s best interest, this percentage may be modified throughout the course of the project by the SVP-AIM.

SC-6 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.

Without limiting the foregoing, the following contracts administered by the City involve or may involve work overlapping or adjoining the Work under this Contract and may be prosecuted concurrently with the Work performed under this Contract. There may also be other adjoining or overlapping contracts which are not listed.

| <u>Contract Number</u> | <u>Description</u> |
|------------------------|--------------------|
| None | |

SC-7 PROSECUTION AND COMPLETION OF THE WORK:

The Work to be performed under the Contract is described in the Technical Specifications and Contract Drawings. The Contractor shall complete the Work within 480 consecutive calendar days from Notice to Proceed.

The Work to be performed under the Contract may be divided into the Milestone Areas which are described in the Technical Specifications or Contract Drawings. The Contractor shall complete the work included within these areas within the number of days set forth by the Project Manager.

| | <u>Milestone</u> | <u>Date of Completion (or, days from NTP)</u> |
|----|------------------------------|---|
| 1. | South Escalators Replacement | 300 days from NTP |
| 2. | North Escalators Replacement | 480 days from NTP |

SC-8 LIQUIDATED DAMAGES

If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time, the Contractor shall be liable to the City for liquidated damages at the rate of Two Thousand Five Hundred dollars (\$2,500.00) per day until substantial completion is achieved.

Article IV of the Contract and General Condition 602 cover payment and withholding of liquidated damages.

SC-9 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 Access Services 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 **Total Contract BID Amount** 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.

The Contractor will provide contract security guard services to maintain supervision of these openings. The security services must provide coverage to allow for lunch breaks, comfort breaks and etc. The security services **must** be obtained from the following contract security guard company:

HSS
900 S. Broadway, Suite 100
Denver, Colorado 80209

DEN Contact: [Glenn Spies]
[(303) 342-4323]

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-10 CONSTRUCTION ACCESS

The work site is located at Denver International Airport – Concourse A Center Core. The Contractor shall have access to the work site via the secure area screening and to the airfield via Gate 4 along the haul route shown in the drawings for equipment and material deliveries. 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 Total Contract Bid Amount or Contract Amount 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-11 VEHICLE PERMITTING

Vehicle access on the Airport Operation Area ("AOA") is controlled by and requires permission from the Airport Access Services Office. It is 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-12 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-13 COMMUNICATION DEVICES

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

SC-14 USE, POSSESSION OR SALE OF ALCOHOL OR DRUGS

The Contractor and its officers, agents, and employees shall cooperate and comply with the provisions of Executive Order No. 94 and Attachment A thereto concerning the use, possession, or sale of alcohol or drugs. Violation of these provisions or refusal to cooperate with implementation of the policy can result in the City's barring the Contractor from City facilities or participating in City operations.

SC-15 ATTORNEYS' FEES

Colorado Revised Statute 38-26-107 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 the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver 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. 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 per hour of City Attorney time.

SC-16 INSURANCE REQUIREMENTS

In accordance with the provisions of Title 16 of the General Conditions, the minimum insurance requirements for this contract are set forth in IV-14 of the Instructions to Bidders. The Contractor specifically agrees to comply with each condition, requirement or specification set forth in the attachment for each required coverage during all periods when the required coverages are in effect.

Contractor and sub-contractors shall procure and maintain until all of their obligations have been discharged, including any warranty periods under this Contract are satisfied, required insurance against claims for injury to persons or damage to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or sub-contractors.

The insurance requirements herein are minimum requirements for this Contract and in no way limit the indemnity covenants contained in this Contract.

The City and County of Denver in no way warrants that the minimum limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, his agents, representatives, employees or sub-contractors. The Contractor shall assess its own risks as it deems appropriate and/or prudent, maintain higher limits and/or broader coverages. The Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration or types.

Contractor shall furnish the City and County of Denver with certificates of insurance (ACORD form or equivalent approved by CCD) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf.

All certificates and any required endorsements are to be received and approved by the City before work commences. Each insurance policy required by this Contract must be in effect at or prior to commencement of work under this Contract and remain in effect for the duration of the project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of the Contract. All insurance coverages for sub-contractors shall be subject to the minimum requirements identified in the Exhibit. All sub-contractors' certificates and endorsements shall be received and approved by the Contractor before work commences. The City reserves the right to request copies of these certificates at any time.

All certificates required by this Contract shall be sent directly to ContractAdminInvoices@flydenver.com. The City project/contract number and project description shall be noted on the certificate of insurance. The City reserves the right to require complete, certified copies of all insurance policies required by this Contract at any time.

The parties hereto understand and agree that the City and County of Denver, its officers, officials and employees, are relying on, and do not waive or intend to waive by any provisions of this Contract, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, §§ 24-10-101 - 120, C.R.S., or otherwise available to the City and County of Denver, its officers, officials and employees.

SC-17 SUBCONTRACTOR RELEASES

The release form referred to in General Condition 907 is attached to this Contract. It is entitled "Denver International Airport Partial Release."

SC-18 ADDITIONAL AFFIRMATIVE ACTION REQUIREMENTS, FEDERAL PROVISIONS

This contract is subject and subordinate to the terms, reservations, restrictions, and conditions of any existing or future agreements 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 airport purposes. The "Federal Requirements" section attached hereto is made a part of this Contract.

SC-19 ESTIMATED QUANTITIES OF UNIT PRICED ITEMS

The "total estimated quantity" of each unit price item as stated on the bid schedules shall be the estimated quantity which is used to determine the percentage of change in such item for purposes of G.C. 1104.7.

SC-20 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-21 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-22 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-30. “Accessible” parking spaces and access aisles as used in this SC-30 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 Section 019990 of 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-23 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-24 PAYMENTS TO CONTRACTORS

The Contractor recognizes and agrees that applications for payment shall be submitted using the Textura® Payment Management System (PPM System), 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, 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, 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 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 Division Senior 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.

EXHIBIT F

City and County of Denver



D E N V E R
THE MILE HIGH CITY

DEPARTMENT OF AVIATION
DEPARTMENT OF PUBLIC WORKS

**STANDARD SPECIFICATIONS FOR
CONSTRUCTION
GENERAL CONTRACT CONDITIONS**

2011 Edition

Statement

The City and County of Denver does not warrant or represent the accuracy or timeliness of the information contained in this page or any of its constituent pages and the information presented is for instructional purposes and illustration only and is not intended to be specific advice, legal or otherwise. The City has made every effort to provide accurate up-to-date information, however this database is dynamic and errors can occur. The City and County of Denver shall not be held responsible for errors or omissions nor be liable for any special consequential or exemplary damages resulting, in whole or in part, from any viewer(s)' uses of, or in reliance upon, this material.

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EXHIBIT G

PERFORMANCE BOND

Bond no. 6357725, 107385654, K40583373

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned PCL Construction Services, Inc., a corporation organized under the laws of the State of Colorado, hereinafter referred to as the "Contractor" and Fidelity and Deposit Company of Maryland, Travelers Casualty and Surety Company of America, Federal Insurance Company, a corporation organized under the laws of the State of Illinois, Connecticut, Hartford, and authorized to transact business in the State of Colorado, hereinafter referred to as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereinafter referred to as the "CITY", in the penal sum of seven million six hundred and thirty-eight thousand nine hundred and sixty-six Dollars and zero cents (\$7,638,966.00), lawful money of the United States of America, for the payment of which sum the Contractor and Surety bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally by these presents.

WHEREAS, the above Contractor has, as of the date of execution listed on the contract signature page, entered into a written contract with the City for furnishing all labor, materials, equipment, tools, superintendence, and other facilities and accessories for the construction of Contract No. 202056518, Concourse A Center Core Escalator Replacement at Denver International Airport, in accordance with the Technical Specifications, Contract Drawings and all other Contract Documents therefor which are incorporated herein by reference and made a part hereof, and are herein referred to as the Contract.

NOW, THEREFORE, the condition of this performance bond is such that if the Contractor:

1. Promptly and faithfully observes, abides by and performs each and every covenant, condition and part of said Contract, including, but not limited to, its warranty provisions, in the time and manner prescribed in the Contract, and
2. Pays the City all losses, damages (liquidated or actual, including, but not limited to, damages caused by delays in the performance of the Contract), expenses, costs and attorneys' fees, that the City sustains resulting from any breach or default by the Contractor under the Contract, then this bond is void; otherwise, it shall remain in full force and effect.

IN ADDITION, if said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, or any other supplies used or consumed by said Contractor or its subcontractors in its 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 shall pay the same in an 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 any and all changes in the Contract or compliance or noncompliance with the formalities in the Contract for making such changes shall not affect the Surety's obligations under this bond and the Surety hereby waives notice of any such changes.

(End of Page)

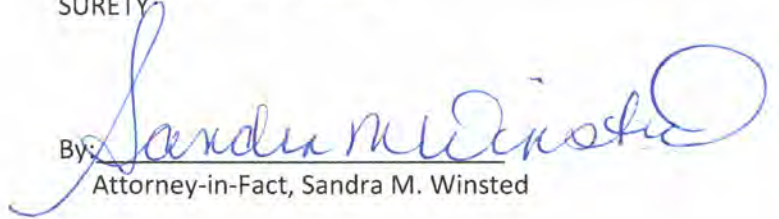
IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this ___ day of _____, _____.

PCL Construction Services, Inc.
CONTRACTOR

By: 

President *District Manager*

Fidelity and Deposit Company of Maryland
Travelers Casualty and Surety Company of America
Federal Insurance Company
SURETY

By: 

Attorney-in-Fact, Sandra M. Winsted

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

CITY AND COUNTY OF DENVER

Signatures by CEO, CAO and the Mayor will be provided later and shall be fully incorporated herein

By: _____
MAYOR

By: _____
Chief Executive Officer
Denver International Airport

APPROVED AS TO FORM:

KRISTIN M. BRONSON, Attorney for the
City and County of Denver

By: _____
Assistant City Attorney

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Sandra M. WINSTED, Diane M. O'LEARY, Susan A. WELSH, Judith A. LUCKY-EFTIMOV, James B. MCTAGGART, Debra J. DOYLE, Sandra M. NOWAK, Jessica B. DEMPSEY, Christina L. SANDOVAL, Kristin L HANNIGAN and Samantha CHIERICI, all of Chicago, Illinois**, EACH, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: any and all bonds and undertakings, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland, and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland, in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 8th day of April, A.D. 2020.



**ATTEST:
ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 8th day of April, A.D. 2020, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposed and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2023

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Secretary of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this _____ day of _____, _____.



Brian M. Hodges

By: Brian M. Hodges
Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfclaims@zurichna.com
800-626-4577



**Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company**

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Sandra M. Winsted** of **Chicago Illinois**, their true and lawful Attorney-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory 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.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **3rd** day of **February**, **2017**.



State of Connecticut

City of Hartford ss.

By: _____

Robert L. Raney
Robert L. Raney, Senior Vice President

On this the **3rd** day of **February**, **2017**, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June**, **2021**



Marie C. Tetreault
Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance 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 remains in full force and effect.

Dated this _____ day of _____



Kevin E. Hughes
Kevin E. Hughes, Assistant Secretary

**To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney-in-Fact and the details of the bond to which the power is attached.**



Power of Attorney

Federal Insurance Company | Vigilant Insurance Company | Pacific Indemnity Company

Westchester Fire Insurance Company | ACE American Insurance Company

Know All by These Presents, that **FEDERAL INSURANCE COMPANY**, an Indiana corporation, **VIGILANT INSURANCE COMPANY**, a New York corporation, **PACIFIC INDEMNITY COMPANY**, a Wisconsin corporation, **WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** corporations of the Commonwealth of Pennsylvania, do each hereby constitute and appoint Samantha Chierici, Jessica B. Dempsey, Derek J. Elston, Rachel Fore, Kristin L Hannigan, Jennifer L. Jakaitis, Andrew Marks, James B. McTaggart, Judith A. Lucky-Eftimov, Sandra M. Nowak, Diane M. O'Leary, Nicholas Pantazis, Christina L. Sandoval, Bartlomiej Siepierski, Christopher P. Troha, Aerie Walton, Susan A. Welsh and Sandra M. Winsted of Chicago, Illinois -----

each as their true and lawful Attorney-in-Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said **FEDERAL INSURANCE COMPANY**, **VIGILANT INSURANCE COMPANY**, **PACIFIC INDEMNITY COMPANY**, **WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** have each executed and attested these presents and affixed their corporate seals on this 26th day of **February**, 2021.

Dawn M. Chloros

Dawn M. Chloros, Assistant Secretary

Stephen M. Haney

Stephen M. Haney, Vice President



STATE OF NEW JERSEY
County of Hunterdon

SS.

On this 26th day of **February**, 2021 before me, a Notary Public of New Jersey, personally came Dawn M. Chloros and Stephen M. Haney, to me known to be Assistant Secretary and Vice President, respectively, of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY and ACE AMERICAN INSURANCE COMPANY, the companies which executed the foregoing Power of Attorney, and the said Dawn M. Chloros and Stephen M. Haney, being by me duly sworn, severally and each for herself and himself did depose and say that they are Assistant Secretary and Vice President, respectively, of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY and ACE AMERICAN INSURANCE COMPANY and know the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of said Companies; and that their signatures as such officers were duly affixed and subscribed by like authority.

Notarial Seal



KATHERINE J. ADELAAR
NOTARY PUBLIC OF NEW JERSEY
No. 2316685
Commission Expires July 16, 2024

Katherine J. Adelaar

Notary Public

CERTIFICATION

Resolutions adopted by the Boards of Directors of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY on August 30, 2016; WESTCHESTER FIRE INSURANCE COMPANY on December 11, 2006; and ACE AMERICAN INSURANCE COMPANY on March 20, 2009:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into in the ordinary course of business (each a "Written Commitment"):

- (1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.
- (2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such person's written appointment as such attorney-in-fact.
- (3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (4) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing to any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested."

I, Dawn M. Chloros, Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY and ACE AMERICAN INSURANCE COMPANY (the "Companies") do hereby certify that

- (i) the foregoing Resolutions adopted by the Board of Directors of the Companies are true, correct and in full force and effect,
- (ii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Whitehouse Station, NJ, this



Dawn M. Chloros

Dawn M. Chloros, Assistant Secretary

IN THE EVENT YOU WISH TO VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT:
Telephone (908) 903-3493 Fax (908) 903-3656 e-mail: surety@chubb.com

EXHIBIT H
PAYMENT BOND



Aon Risk Solutions

Performance Bond and Payment Bond Date Authorization

May 17, 2021

CITY AND COUNTY OF DENVER
8810 Denver International Airport
Denver, CO, 80249-6340
(as Obligee)

RE: Contractor (as Principal): PCL CONSTRUCTION SERVICES, INC.
Project Name: Concourse A Center Core Escalator Replacement - DEN Contract Number 202056518
Contract Amount: \$7,638,966.00
Performance and Payment Bond(s) No.: 6357725, 107385654, K40583373

The Performance and Payment Bond(s) covering the above captioned project were executed by this agency, through FIDELITY AND DEPOSIT COMPANY OF MARYLAND TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA FEDERAL INSURANCE COMPANY, as Surety(ies), on May, 12th, 2021.

We hereby authorize the above noted Obligee to date all bonds, powers of attorney and other attachments (if any) to coincide with the date of the contract.

If you should have any additional questions or concerns, please do not hesitate to call the undersigned at 312-381-4589.

Sincerely,
Aon Risk Services Central, Inc.


Signature

Sandra M. Winsted
Print Name

Surety Analyst
Print Title

AON RISK SERVICES CENTRAL, INC.
200 E. Randolph, 12th Floor, Chicago, IL, 60601
tel: (312) 381-1000

Bond no. 6357725, 107385654, K40583373

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned PCL Construction Services, Inc., a corporation organized under the laws of the State of Colorado, hereinafter referred to as the "Contractor" and Fidelity and Deposit Company of Maryland, Travelers Casualty and Surety Company of America, Federal Insurance Company, a corporation organized under the laws of the State of Illinois, Connecticut, Hartford and authorized to transact business in the State of Colorado, hereinafter referred to as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereinafter referred to as the "CITY", in the penal sum of seven million six hundred and thirty-eight thousand nine hundred and sixty-six Dollars and zero cents (\$7,638,966.00), lawful money of the United States of America, for the payment of which sum the Contractor and Surety bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above Contractor has entered into a written contract with the City for furnishing all labor, materials, tools, superintendence, and other facilities and accessories for the construction of Contract No. 202056518, Concourse A Center Core Escalator Replacement at Denver International Airport, in accordance with the Technical Specifications, Contract Drawings and all other Contract Documents therefor which are incorporated herein by reference and made a part hereof, and are herein referred to as the Contract.

NOW, THEREFORE, the condition of this payment bond obligation is such that if the 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 shall indemnify and save harmless the City to the extent of any and all payments in connection with the carrying out of such Contract which the City may be required to make under the law, then this obligation shall be null and void, otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that any and all changes in the Contract, or compliance or noncompliance with the formalities in the Contract for making such changes shall not affect the Surety's obligations under this bond and the Surety hereby waives notice of any such changes.

[END OF PAGE]


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

PCL Construction Services, Inc.
CONTRACTOR

By: 

President *District Manager*

Fidelity and Deposit Company of Maryland
Travelers Casualty and Surety Company of America
Federal Insurance Company
SURETY

By: 

Attorney-in-Fact, Sandra M. Winsted

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

CITY AND COUNTY OF DENVER

**Signatures by CEO, CAO
and the Mayor will be
provided later and shall
be fully incorporated
herein**

By: _____
MAYOR

By: _____
Chief Executive Officer
Denver International Airport

APPROVED AS TO FORM:

KRISTIN M. BRONSON, Attorney for the
City and County of Denver

By: _____
Assistant City Attorney

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Sandra M. WINSTED, Diane M. O'LEARY, Susan A. WELSH, Judith A. LUCKY-EFTIMOV, James B. MCTAGGART, Debra J. DOYLE, Sandra M. NOWAK, Jessica B. DEMPSEY, Christina L. SANDOVAL, Kristin L HANNIGAN and Samantha CHIERICI, all of Chicago, Illinois**, EACH, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: any and all bonds and undertakings, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland, and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland, in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 8th day of April, A.D. 2020.



**ATTEST:
ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 8th day of April, A.D. 2020, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, depose and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2023

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Secretary of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this _____ day of _____.



Brian M. Hodges

By: Brian M. Hodges
Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfelaims@zurichna.com
800-626-4577



**Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company**

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Sandra M. Winsted** of **Chicago Illinois**, their true and lawful Attorney-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory 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.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **3rd** day of **February**, 2017.



State of Connecticut

City of Hartford ss.

By: _____

Robert L. Raney, Senior Vice President

On this the **3rd** day of **February**, 2017, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June**, 2021



Marie C. Tetreault

Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance 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 remains in full force and effect.

Dated this _____ day of _____



Kevin E. Hughes, Assistant Secretary

**To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney-in-Fact and the details of the bond to which the power is attached.**



Power of Attorney

Federal Insurance Company | Vigilant Insurance Company | Pacific Indemnity Company

Westchester Fire Insurance Company | ACE American Insurance Company

Know All by These Presents, that **FEDERAL INSURANCE COMPANY**, an Indiana corporation, **VIGILANT INSURANCE COMPANY**, a New York corporation, **PACIFIC INDEMNITY COMPANY**, a Wisconsin corporation, **WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** corporations of the Commonwealth of Pennsylvania, do each hereby constitute and appoint **Samantha Chierici, Jessica B. Dempsey, Derek J. Elston, Rachel Fore, Kristin L Hannigan, Jennifer L. Jakaitis, Andrew Marks, James B. McTaggart, Judith A. Lucky-Eftimov, Sandra M. Nowak, Diane M. O'Leary, Nicholas Pantazis, Christina L. Sandoval, Bartlomiej Siepierski, Christopher P. Troha, Aerie Walton, Susan A. Welsh and Sandra M. Winsted** of Chicago, Illinois -----

each as their true and lawful Attorney-in-Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** have each executed and attested these presents and affixed their corporate seals on this 26th day of **February, 2021**.

Dawn M. Chloros

Dawn M. Chloros, Assistant Secretary

Stephen M. Haney

Stephen M. Haney, Vice President



STATE OF NEW JERSEY
County of Hunterdon

SS.

On this 26th day of **February, 2021** before me, a Notary Public of New Jersey, personally came Dawn M. Chloros and Stephen M. Haney, to me known to be Assistant Secretary and Vice President, respectively, of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY**, the companies which executed the foregoing Power of Attorney, and the said Dawn M. Chloros and Stephen M. Haney, being by me duly sworn, severally and each for herself and himself did depose and say that they are Assistant Secretary and Vice President, respectively, of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** and know the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of said Companies; and that their signatures as such officers were duly affixed and subscribed by like authority.

Notarial Seal



KATHERINE J. ADELAAR
NOTARY PUBLIC OF NEW JERSEY
No. 2316685
Commission Expires July 16, 2024

Katherine J. Adelaar
Notary Public

CERTIFICATION

Resolutions adopted by the Boards of Directors of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY** on August 30, 2016; **WESTCHESTER FIRE INSURANCE COMPANY** on December 11, 2006; and **ACE AMERICAN INSURANCE COMPANY** on March 20, 2009:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into in the ordinary course of business (each a "Written Commitment"):

- (1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.
- (2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such person's written appointment as such attorney-in-fact.
- (3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (4) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing to any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested."

I, Dawn M. Chloros, Assistant Secretary of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, PACIFIC INDEMNITY COMPANY, WESTCHESTER FIRE INSURANCE COMPANY** and **ACE AMERICAN INSURANCE COMPANY** (the "Companies") do hereby certify that

- (i) the foregoing Resolutions adopted by the Board of Directors of the Companies are true, correct and in full force and effect,
- (ii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Whitehouse Station, NJ, this



Dawn M. Chloros

Dawn M. Chloros, Assistant Secretary

IN THE EVENT YOU WISH TO VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT:
Telephone (908) 903-3493 Fax (908) 903-3656 e-mail: surety@chubb.com

EXHIBIT I

TECHNICAL SPECIFICATIONS

PROJECT MANUAL



Concourse A Center Core Escalator Replacement North and South Packages

CONTRACT NUMBER:
202056518

VOLUME 1

Issued for Construction
09 Dec 2020

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

KIM DAY
CHIEF EXECUTIVE OFFICER

Jacobs

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Architect: Christine Rajpal
2. License Number: 203667
3. Responsible for Divisions 01-14 Sections



12/09/20

1.1 DESIGN PROFESSIONALS OF RECORD

A. Structural Engineer

1. Structural Engineer: Stace Edward McComb
2. License Number: 53112
3. Responsible for Divisions 03 and 05



12/09/20

1.1 DESIGN PROFESSIONALS OF RECORD

A. Electrical Engineer:

1. Engineer: Karen Purcell
2. License Number: 41898
3. Responsible for Divisions 26-27 Sections



12/09/20

1.1 DESIGN PROFESSIONALS OF RECORD

A. Engineer:

1. Architect: Matt Killebrew, P.E.
2. License Number: 39787
3. Responsible for Division 21



12/09/20

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Note:

- * Indicates the specification is nonstandard and will be issued separately for review and approval.
- ** Indicates the specification is edited and issued by DEN PM.
- *** Indicates the specification is edited by DEN PM and reviewed by DOR.

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SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY AND DESCRIPTION

- A. The Work specified in this contract consists of furnishing all management, supervision, labor, materials, tools, equipment, services, testing and incidentals for the construction of the Work indicated in the contract documents including lump sum items.
- B. The Work in this Contract may affect operations at DEN. The Contractor shall bid, plan and execute the Work to minimize disruption of operations and inconvenience to the public.
- C. Change Notice:
1. The Contractor will be required to submit a proposal for each Change Notice
 2. The Contractor shall submit a proposal for the complete scope of the Work within the specified duration identified by the Notice. Where there is no time requirement identified by the notice documents, the Contractor shall submit a proposal within 20 days of receiving the notice or as allowed in Title 11 - Changes in the Work, Contract Price, or Contract Time of the General Contract Conditions, 2011 Edition.
 3. The proposal could contain both competitive bid and estimated costs and shall adhere to the requirements of Title 11 of the General Contract Conditions.
 4. The Contractor shall not proceed on any change notice work until a change order is issued.
- D. Change Directives:
1. The DEN Project Manager may issue Change Directive(s) for a Scope of Work. The Contractor shall keep all Time and Material record for any Change Directive(s) issued until a final settlement for the task is settled and finalized in a Change Order.
 2. The Contractor shall keep records and approvals for all Time and Material impacts of a Change Directive until a final settlement is reached and fully executed by the DEN Project Manager.
 3. The Contractor may invoice for a Change Directive in accordance with Title 11 of the General Contract Conditions, 2011 Edition.
- E. Guaranteed Maximum Price (GMP): For Contracts assigned as GMP the Contractor shall follow the Special Conditions issued for the Contract.

- F. This Project will be administered using the current Project Management Information System (PMIS). The application will be supplied by DEN at no cost to the Contractor. DEN will provide PMIS training for up to two (2) of the contractor's personnel.
- G. The Contractor shall participate in a preconstruction coordination meeting and update the existing BIM Project Execution Plan or prepare a BIM Project Execution Plan if one does not exist based upon the DEN BIM Project Execution Plan (BPXP) template included as provided by the DEN BIM group and the coordination meeting instructions.
- H. DEN utilizes several programs as part of the Asset Management System. Keeping accurate as-built record and operation and maintenance data are essential in the integrity and the validity of the airport operation. The Contractor is required to make every effort to keep the airport data informed, updated and accurate in the format required by DEN Project Manager:
1. The Contractor shall provide and implement BIM Project Execution Plan based on the DEN BIM Project Execution Plan. The Contractor shall employ or contract a consultant to provide all the requirements to produce the Project model in the latest edition of the currently approved DEN format.
 2. The Contractor shall comply with all the requirements of DEN BIM Project Execution Plan and provide the data to DEN to produce the complete record of the BIM model of the Project
- I. Inspection Requirements:
1. Special Inspection and Testing required by the building official or the Engineer of Record in the Contract Documents or in the Statement of Special Inspections will be performed by DEN contracted Agencies.
 2. Contractor shall subcontract Qualified Material Testing Agency(s) to perform all necessary Quality Control, processing control and any additional Testing required by the Contract Documents.
 3. DEN Quality Assurance Manager may audit all material tests performed by the Contractor Quality Control at any time. Testing and Inspections for structural elements [reinforced concrete, steel, masonry caissons, fire protection, precast and post tension concrete] not identified as special inspection will be performed by the Contractor Quality Control Program and Contractor Material Testing Agency and audited and confirmed by DEN Quality Assurance Manager. DEN will perform 100% visual inspection on all weldments. DEN will perform Quality Assurance testing at a frequency of approximately 10% of the Quality Control test and inspection frequencies. The testing frequencies by DEN may escalate to higher percentages and the Contractor will be responsible for all costs associated with failing tests of the same pay item elements. The Contractor may not hire the DEN contracted or testing agency in any capacity on this Project.
- J. DEN Quality Assurance is required to submit a letter indicating that all Work performed on the project complies with all applicable codes. The Contractor shall make sure that all required test frequencies and all deficiencies has been corrected to comply with all applicable codes, standards and the requirements of the Contract Documents.

1.3 WORK BY OTHERS AND FUTURE WORK

- A. Refer to Title 7 – Cooperation, Coordination and Rate of Progress of the General Contract Conditions, 2011 Edition

1.4 SITE CONDITIONS

- A. Refer to Title 14 – Site Conditions of the General Contract Conditions, 2011 Edition

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S DUTIES

- A. Refer to Title 3 – Contractor Performance and Services of the General Contract Conditions, 2011 Edition
- B. Execute the Work as specified and in a timely manner. Submit a schedule of Work that will be performed at times other than during the eight-hour working day of Monday through Friday, daylight hours. Submit this schedule five (5) working days prior to the beginning of Work to the DEN Project Manager for review and acceptance. Approval to work at night may be obtained after Contractor presents a written program outlining special precautions to be taken to control the extraordinary hazards presented by night work. That program shall include, but not limited to, supplementary lighting of work areas, availability of medical facilities, security precautions, and noise limitations.

3.2 COORDINATION

- A. Coordinate execution of the Work with those public utilities, governmental bodies, private utilities and other contractors performing work on and adjacent to the worksites. Eliminate or minimize delays in the Work and conflicts with those utilities, bodies, and contractors. Schedule governmental, private utility and public utility work that relies upon survey points, lines and grades established by the Contractor to occur immediately after those points, lines and grades have been established. Confirm coordination measures for each individual case with the DEN Project Manager in writing.
- B. In the coordination effort of work by others, the Contractor shall obtain and refer to equipment locations and other layouts, as available, to avoid interface problems.

- C. The City reserves the right to permit access to the site of the Work for the performance of work by other contractors and persons at such times that the City deems proper. The exercise of such reserved right shall in no way or to any extent relieve the Contractor from liability for loss and damage to the Work due to or resulting from its operations or from responsibility for complete execution of the Contract. The Contractor shall cooperate with other contractors and persons in all matters requiring common effort.

3.3 CONTRACTOR USE OF WORK SITE

- A. Confine work site operations to areas permitted by law, ordinances, permits, and the Contract.
- B. Consider the safety of the Work and that of the people and property on and adjacent to the work site when determining amount, location, movement, and use of materials and equipment on work site.
- C. Do not load work site with equipment and products that would interfere with the Work. Only equipment, tools, or materials required for this Work may be stored at the work site.
- D. Protect products, equipment, and materials stored on work site.
- E. Relocate stored products, equipment, and materials that interfere with operations of City, government bodies, public, and private utilities, and other contractors.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 011100

SECTION 011400 - WORK SEQUENCE AND CONSTRAINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 OTHER WORK

- A. There are no other concurrent construction contracts with which the Contractor must interface with. Refer to Section 013210 "Schedule" and the Special Conditions for specific work constraints and milestones.

1.3 WORK SEQUENCE

- A. The work sequence shall comply with Phasing, Sequencing, and Milestones as indicated in the Contract Documents and in accordance with the approved Construction Schedule developed by the Contractor. The schedule shall comply with requirements indicated in the Special Conditions and Section **011400** "Work Sequence and Constraints". The Construction Schedule is described in Section 013210 "Schedule".

1.4 WORK CONSTRAINTS

- A. Site Constraints:
1. Access to the Project shall be generally as indicated in the Contract Documents. Access shall be organized and planned by the Contractor to ensure no disruption of airline or DEN operations.
 2. Access to work sites will be strictly monitored and must comply with DEN Airport Operations and FAA Regulations. The Contractor shall provide monitoring and escorts as required by DEN Operations in the area of the Work.
 3. The Contractor's staging area will be as indicated in the Construction Documents.
 4. Contractor employee parking will not be allowed within the existing revenue control system. Refer to SC-10 of the Invitation for Bid document for additional information.
 5. Material access to the Concourses will be via Gate 4.
 6. The Contractor shall use the haul routes specified in the Construction Documents.

7. If required, the Contractor shall provide a bus and driver to transport the Contractor's employees between the designated employee parking area and the work sites. No separate payment will be made for this bus and driver. The cost shall be included in the bid item "Mobilization". The bus driver shall be provided at all times when Contractor employees are working on the Project.
8. Any type of noise or activity that will disturb or prevent normal hearing, disrupt DEN or Concessionaires from normal operations, or prevent anyone from hearing the DEN Emergency Communications System shall be considered excessive noise and these activities will be required to be performed at night. Use of power tools (small) and hammering is not considered excessive noise. Final determination of activities required to be executed at night will be by the DEN PM.

B. System Interruptions:

1. DEN is a 24/7/365 facility. Construction activity that requires any system shutdown must be coordinated with the project manager and DEN AIM MCC.
2. The Shutdown cannot proceed unless all approver groups have approved the request. If any of the groups rejects the request, you may not proceed with the Shutdown. If a Shutdown is determined to be an emergency due to pending health issues or the risk of additional damage, this process may be bypassed. If the Shutdown is an emergency, proceed with the shutdown without the approvals. Approvals must be obtained as follows
 - a. Airfield Shutdowns must be submitted at least 72 hours prior to the shutdown start date.
 - b. All other Shutdowns must be submitted at least seven (7) business days prior to the shutdown start date.
 - c. All Shutdown Requests must be submitted using the Shutdown Request form, which can be accessed via the Home page of the DEN intranet.

C. Airfield Operations at Denver International Airport:

1. Full airport and aircraft operations are underway adjacent to this Project. Contractors are required to obtain a Contractor Participant Manual from the Security Manager and must follow the guidelines in the manual. Copies of the Contractor section of the manual are available for review at the Denver International Airport Access Services Office.
 - a. If any Work contains requirements for Work activities or access through or in the restricted area, reference Section 011420 "Security Requirements & Sensitive Security Information (SSI)" for requirements.
 - b. If not in a restricted area, the Contractor personnel still must be badged; reference Section 011420 "Security Requirements & Sensitive Security Information (SSI)".

D. Conduct of persons using the Denver Municipal Airport system:

1. Contractor activities shall comply with Airport Operations and Regulation 130 "TRAFFIC" and Regulation 20 "CONDUCT OF PERSONS USING THE DENVER MUNICIPAL AIRPORT SYSTEM" shall be followed at all times. These regulations are available from Airport Operations at Denver International Airport.

E. Operational safety on airports during construction:

1. All Work shall be accomplished in accordance with FAA Advisory Circular AC150/5370-2C, "Operational Safety on Airports during Construction", FAR Part 139 and FAR Part 107 except as herein modified.

F. Welding Equipment, Procedures and Constraints:

1. Natural gas-powered portable welders or inverter single- and three-phase electric portable welders are the only acceptable welding equipment to be used inside the building basement or tunnel areas. Acceptability of equipment other than the equipment noted above shall be at the sole discretion of the DEN Project Manager.
2. Welding activities inside buildings require submittal of a System Interruption Request (See paragraph "System Interruptions" above). Prior to welding in any area, the Contractor shall locate smoke detectors and shall request interruption of the fire alarm system. Subsequent to the interruption of the fire alarm system and prior to welding activities, the Contractor shall cover and protect smoke detectors until work is complete. Prior to expiration of each interruption of the system, the Contractor shall uncover the smoke detectors.
3. Electrical Service: The Contractor shall be responsible for verifying with the DEN Project Manager locations acceptable for accessing electrical power for welders and other electrical equipment feeders. The Contractor shall be responsible for all work and equipment required to install temporary or permanent electrical modifications for construction power and lighting.
 - a. Temporary Hook-up: In addition to the requirements of paragraph "Temporary Power and Lighting for Construction" below, comply with the following:
 - 1) Provide wiring sized to accommodate full load of welding equipment, accounting for voltage drop.
 - 2) Provide appropriate NEMA twist-lock or ANSI receptacle for welder hook-up.
 - 3) 480V, 3 phase, 3 pole, 4-wire twist lock ground line.
 - 4) NEMA L16-20 or ANSI C73.87.
 - b. The Contractor may not begin operation of the equipment prior to request for inspection by DEN representatives and acceptance of the installation.
 - c. Permanent installation of electrical branch circuiting for welding equipment shall be made in accordance with all Division 26 Specification Sections
4. Welding Practices: All standard safe welding practices must be followed, including but not limited to the following:

- a. Flash protection for surrounding areas.
 - b. Contractor fire extinguisher in area.
 - c. One person in each welding area solely designated as fire watch for each welder.
 - d. Protect all equipment, cable trays and contents, etc., in area.
 - e. Use fire blankets and other appropriate materials to confine sparks and molten metal from the welding, cutting, and/or grinding activities.
 - f. All welders shall have been qualified through welding tests in accordance with applicable welding code, such as but not limited to AWS, ASME, API, within one year prior to welding taking place. Evidence of qualification shall be through Welding Performance Qualification Records (WPQR).
 - g. All welder qualifications test shall be or shall have been administered and witnessed by an Independent Testing Agency (ITA), AWS Certified Welding Inspector (CWI).
 - h. If recertification of welders is required, delay costs and retesting costs shall be borne by the Contractor.
5. Grounding: Review with DEN representative's area of work prior to beginning work to ensure ground procedures do not induce undesirable charges in steel building system or other systems. This review should take place subsequent to the pre-work meeting. Do not ground to adjacent building systems, baggage system, hangers, or devices that support mechanical or electrical equipment.

G. Temporary Power and Lighting for Construction:

1. The Contractor shall be responsible for all work and equipment required to install temporary or permanent electrical modifications for construction power and lighting.
 - a. Comply with all requirements of NEC Article 590.
 - b. Flexible cords used for temporary power shall be listed in accordance with NEC Article 400, and rated for 'extra-hard' usage.
 - c. Provide an equipment grounding conductor with all temporary power circuits.
 - d. All temporary power distribution devices and equipment shall be listed and rated for the application.
 - e. Provide ground fault protection for personnel.
 - f. Temporary lighting fixtures shall be protected from physical damage.

H. Cleaning Equipment and Spoils:

1. Discharge of water, liquids, or chemicals into a building sanitary sewer system or storm drainage systems is prohibited. The Contractor shall comply with all Federal, State, and Local requirements for disposal of chemicals and equipment wash water. The Contractor shall maintain and service all equipment in work areas and collect all wash water, spoils and water from excavations in containers for discharge or removal off site.

I. Vehicle Permitting for Tunnel and Basement Use:

1. Electric carts require permitting. The Contractor shall provide at least one (1) electric cart for Contractor use during the work in the tunnel and basements of the buildings. Only electric or CNG powered trucks are allowed in the tunnel and basements of the buildings. Only electric or CNG trucks may be used and shall not be parked overnight or for long terms within the tunnel or basements. All vehicles require permitting. Permits may be acquired at the DEN Airport Security Office.

J. Radio and Cell Phone Use:

1. The Contractor shall have wireless communications in place prior to initiation of work in the tunnel or basements by use of cell phone and/or radio. Radio and cell phone coverage in the tunnels and basements varies in signal strength throughout the campus. An RF Application must be submitted for the Radio equipment intended for use at least 14 days prior to intended use. Include the following radio information:
 - a. Make
 - b. Model
 - c. Frequency
 - d. Effective Radiated Power (ERP)
2. Contractors must receive an approval letter from the RF Systems Manager prior to use of the radio equipment on the DEN campus.

K. Keys:

1. The Contractor shall be required to contact DEN Maintenance Control to procure keys for access to all rooms having locks in order to gain access. Keys may be checked out at the beginning of each work shift by the Contractor and shall be returned to DEN Maintenance Control at the end of each work shift

1.5 COORDINATION

- A. The Contractor will designate a contact person for coordination with the DEN Project Manager and airline tenants. The contact person shall have the authority to make decisions for the Contractor firm and shall have binding signatory power for changes in work. The contact person shall be on site at all times during work activity.
- B. No additional costs shall be considered for coordination activities throughout this project. The Contractor shall include in the Contractor's bid costs for coordination of all activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DUST/PROTECTION BARRIERS

- A. HVAC system containment. The Contractor shall submit to DEN Maintenance HVAC and Fire Alarm shutdown requests prior to modifications to the area of work for dust containment. The HVAC system shall be interrupted, re-routed, or blocked off to prevent dust from entering return or supply ducts.
- B. Debris and Protection Barriers: The Contractor shall construct code-approved and DEN-approved dust and debris barriers on both sides of walls and doors that are to be modified. Barriers shall be constructed to allow emergency ingress and egress to and from equipment and spaces. Barriers shall be constructed to allow continual uninterrupted function of building equipment and spaces.
 - 1. Return all removed door hardware to DEN. Label each hardware set correlating the door number of the original hardware set. Coordinate with the DEN Project Manager for storage and return of hardware.

3.2 EQUIPMENT

- A. Equipment: CNG-powered equipment is allowed within the buildings. No other fossil fuel equipment may be used within the buildings unless the equipment is directly vented to the building exterior.
- B. Electric: Electric powered equipment is acceptable in the Work area.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 011400

SECTION 011420 - SECURITY REQUIREMENTS & SENSITIVE SECURITY INFORMATION (SSI)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

- A. Each Contractor is required to become a "Participant" in the DEN Airport Security Program (ASP) and must remain in good standing in order to retain Airport Security privileges.
- B. All Contractor employees and all vehicles requiring access to the Secured Area, Sterile Area, and/or any other Controlled Areas shall be required to obtain the proper access authorizations for Airport ID badges and vehicle permits.

1.3 PARTICIPANT OF AIRPORT SECURITY PROGRAM

- A. Contractors are required to become a "Participant" of the ASP. In order to become a "Participant", your company must attend a Participant meeting within the Airport Security Office.
- B. The Contractor shall comply with all Denver Municipal Airport System Rules and Regulations and all Transportation Security Administration (TSA) regulations. Special emphasis should be paid to Denver Municipal Airport System Rules and Regulations Part 20 – Airport Security Rules and Regulations and Part 130 – Operating Vehicles In The Secured Area" and Part 35 – Operations Infraction Accountability Program". The Denver Municipal Airport System Rules and Regulations can be found on the flydenver.com website.
- C. The TSA has the authority to issue civil penalties for failure to adhere to their regulations.
- D. It is the responsibility of the Airport Security Office to ensure all fences and gates are secure. If a Contractor's operations necessitate the frequent use of a particular gate, the Contractor shall place, at the Contractor's expense, two (2) contract security guards at the gate that shall have been trained and certified by the Airport Operations Division to facilitate access to its Work. The Contractor assumes full responsibility for maintaining security once this is done. If the perimeter gate will be used as a haul route, the contractor must also place, at the Contractor's expense, Haul Route Monitors as dictated by the TSA approved Temporary Amendment. Any fines levied

against the Airport as a result of the failure by the Contractor to provide adequate security shall be passed on to the Contractor.

1. If the Contractor provides guards or monitors, the Contractor must also supply a shelter for the guards/monitors. The shelter must meet the following requirements:
 - a. One 10 x 12 Tuff Shed or similar type structure with a window, 24-inch convex mirror mounted outside for vehicle inspection, sufficient HVAC capability, generator, light plant, and sanitary services, which are maintained by the Contractor.
 - E. Contractors will be required at all times to have a supervisor or foreman at each work location in Secured, Sterile, and Controlled Areas.
 - F. All Work shall be accomplished in accordance with the most current FAA Advisory Circular (AC) 150/5370-2, "Operational Safety on Airports during Construction", 49 Code of Federal Regulations (CFR) Part 1542 and 14 CFR Part 139 except as modified herein.
 - G. All Work shall be accomplished in accordance with the most current TSA Security Directives applicable to DEN, except as modified herein.
 - H. This Section intends to supplement, modify, change, delete from, or add to the most current FAA AC150/5370-2. Where any paragraph, subparagraph, or clause of the AC is modified or deleted by these supplements, the unaltered provisions of that paragraph, subparagraph, or clause shall remain in effect.
- 1.4 SENSITIVE SECURITY INFORMATION (SSI)
- A. If the Contract involves SSI information or procedures, the Contractor must contact the Assistant Director of Airport Security or designee, for disclosure information, as well as protocols that must be followed with SSI distribution.
 - B. This Section governs the maintenance, safeguarding, and disclosure of records and information that the TSA has determined to be SSI as defined by 49 CFR Part 1520, "Protection of Sensitive Security Information". SSI is information that the TSA has determined to be detrimental to the security of Denver International Airport if disclosed to unauthorized persons. This is a process for the documentation, use, and recovery of SSI of a specific origin.
 - C. Applicability:
 1. For all management staff, all authorized departments, all contractors, and subcontractors handling documents or materials containing SSI information.
 2. Each person employed by, contracted to, or acting on behalf of the Department of Aviation at Denver International Airport is subject to the requirements of this Section.

3. SSI disclosure is limited to persons or entities under criteria identified in federal regulations, subject to strict “need-to-know” standard, and as otherwise determined by TSA or the Department of Homeland Security (DHS).
- D. Except as otherwise provided in this Section, records containing SSI are not available for public inspection or copying. Denver International Airport will not release such records to persons without a need to know. Prime contractors will not release SSI records to any subcontractor without a need to know. An employee or contractor has a “need to know” SSI if access to the information is necessary for performance of his or her official duties.
- E. Unauthorized disclosure of SSI is a Federal violation of 49 CFR Part 1520 and violation is grounds for a civil penalty and other enforcement action by DHS Security. In addition to the civil penalties, corrective action may include issuance of an order requiring retrieval of SSI to remedy unauthorized disclosure, an order to cease future unauthorized disclosure, and dismissal from the work site.
- F. Except as otherwise provided in writing by the TSA in the interest of public safety or airport security, the following information and records containing such information constitute SSI:
 1. Information that would be detrimental to the security of Denver International Airport and aviation transportation.
 2. Any performance specification, including a description of devices and procedures used by Denver International Airport, for the detection of any weapon, explosive, incendiary, or destructive substance.
 3. Any performance specification, including a description of devices and procedures, for any communications equipment used by Denver International Airport in carrying out any aviation transportation security requirements.
 4. Details of any security inspection or investigation of an alleged violation of aviation transportation security requirements of Federal law that could reveal security vulnerability.
 5. Specific details of aviation transportation security measures including those recommended by the Federal government.
 6. The following information regarding security screening under aviation transportation security requirements of Federal law:
 - a. Procedures for screening of persons, property, checked baggage, U.S. mail, and cargo.
 - b. Information used by a passenger or property-screening program or system, including an automated screening system.
 - c. Detailed information, if determined by the TSA to be SSI, about the locations at which particular screening methods or equipment are used.
 - d. Performance or test data from security equipment or screening systems.
 7. Identifying information of certain aviation transportation security personnel including lists of the names or other identifying information that identify persons as having unescorted access to a secure area of the airport.

8. Critical aviation asset information identifying systems so vital to the airport that the incapacity or destruction of such assets would have a debilitating impact on aviation security.
 9. Any information involving the security of operational or administrative data systems identified by the Department of Transportation or DHS as critical to the safety or security of Denver International Airport.
 10. Solicited or unsolicited proposals, pursuant to a grant or contract, to perform work that relates to security measures.
- G. Restrictions on the Disclosure of SSI:
1. Employees and contractors working onsite have a duty to protect sensitive security information and must take reasonable steps to safeguard SSI in that person's possession from unauthorized disclosure. When a person is not in physical possession of SSI, the person must store it in a secure container such as a locked desk, a locked file cabinet, or in a locked room. SSI is to be disclosed only to persons having a need to know as stated in CFR 1520. Requests for SSI are to be referred to City Project Manager.
 2. Prior to receiving SSI records, contractors must sign the "Confidentiality and Non-Disclosure Agreement", Form PS-17, stating that SSI will be guarded from unauthorized persons, that records will be controlled while in use and secured when not in use, and that all SSI plans and records will be returned to the airport or destroyed following the completion of the Project.
 3. Return or destruction of SSI documents must be done in a timely manner and documented on the SSI Return or Destruction Compliance Form, Form PS-20. Companies under contract to the City must return or destroy all SSI material following the completion of the Work. Companies not selected during the bidding process must return or destroy all SSI material immediately following the announcement of bid results.
- H. If a record containing SSI is received that is not marked as specified in this Section below, the following steps must be taken:
1. Mark the record as specified in paragraph Part 1 of this Section.
 2. Inform the sender of the record that the record must be marked as specified in Part 1 of this Section.
- I. If a person becomes aware that SSI has been released to unauthorized persons, promptly inform the Communication Center Supervisor at 303-342-4020 and request to speak to the on-call Airport Security Coordinator
- J. Marking SSI:
1. In the case of paper records containing SSI, a covered person must mark the record by placing the PROTECTIVE MARKING conspicuously on the top, and the DISTRIBUTION LIMITATION STATEMENT on the bottom, of following parts of the document:
 - a. The outside of any front and back cover, including a binder cover or folder, if the document has a front and back cover.

- b. Any title page.
 - c. Each page of the document.
 2. Protective Marking:
 - a. SENSITIVE SECURITY INFORMATION
 - b. Distribution Limitation Statement:
 - c. WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know", as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies, public disclosure is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520
 3. In the case of non-paper records that contain SSI, including motion picture films, videotape recordings, audio recording, and electronic and magnetic records, a covered person must clearly and conspicuously mark the records with the protective marking and the distribution limitation statement such that the viewer or listener is reasonably likely to see or hear them when obtaining access to the contents of the record.
 - K. Destruction of SSI:
 1. When the employee or contractor no longer needs the SSI to carry out their work requirements, the SSI must be returned to the issuing entity or completely destroyed by burning or cross-shredding to preclude recognition or reconstruction of the information.
 2. The Contractor shall comply with all the requirements of the Department of Aviation Standards and Procedures, Protection of Sensitive Security Information (SSI) No. 10003 Revised 08/01/15 regarding Contractor Protection of Sensitive Security Information (SSI).
- 1.5 MISCELLANEOUS
- A. Dumpster Security Requirements:
 1. The following procedures must be followed to provide maximum security with all construction projects in public areas unless an exception has been made by the Airport Security Coordinator (ASC) or designee:
 - a. Roll-off dumpsters must have the ability to be covered (hard side) and locked when not in use. DEN will provide the dumpsters.
 - b. When unlocked and in use, the Contractor shall provide an employee, or a subcontractor's employee, to stand by the dumpster to prevent unauthorized placement of prohibited items
 - B. Contractor Fences (Not Perimeter Fence):

1. If required, the Contractor shall establish and maintain a secure (fenced) perimeter at its primary operations area to include its field offices, staging and storage areas, and maintenance facilities. The responsibility for security within its operations area shall rest solely with the Contractor. Entrance gates to operations areas shall be equipped with a combination of locks to include a lock provided by the City for its use in accessing emergency equipment, should that need arise. The location, size and other physical characteristics of the Contractor's operations area must be approved by the DEN Project Manager prior to its installation.
2. Unless specifically required by the Contract Documents and with the exception of the fenced operations area described above, the Contractor shall install no fences or other physical obstructions on or around the Project work area without the written approval of the DEN Project Manager.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SUBMITTAL FOR AIRPORT ID BADGES

- A. By submitting information for the individual requesting or requiring an Airport ID badge that would permit unescorted access to the Sterile and/or Secured Areas must be fingerprinted and pass a Criminal History Records Check (CHRC) and Security Threat Assessment (STA). Passing a CHRC means the employee shall not have been convicted, given a deferred sentence, found not guilty by reason of insanity or have been arrested and are awaiting judicial proceedings of any felony charge during the ten (10) years before the date of the individual's application for unescorted access authority. For an individual to obtain driver authorization to drive within the Secured Area, the individual must have a valid driver license that allows them to drive their contractor vehicle.
- B. An employee requesting an Airport ID badge must resolve all pending or valid violations before being allowed to proceed in the airport ID badging process. If the employee no longer works for the company and is attempting to be employed by a different company, a management representative from the "new" company must attend the Violation Notice Hearing along with the employee.
- C. Airport ID Badges are obtained as follows:
 1. The Contractor shall meet with the City Project Manager to review the procedures and required access points at DEN. The Contractor and the DEN Project Manager shall visit the site to verify the access points. Access points shall be listed and submitted by the Contractor to the DEN Project Manager for review and comment prior to Contractor's application for badging.

2. The Contractor shall designate an Authorized Signatory who must attend an annual class with Airport Security. The Authorized Signatory must be an employee of the Contractor, have a valid Denver International Airport ID badge. The Authorized Signatory will be authorized to sign for the Contractor on the Fingerprinting and Badge Application Form and will be the primary designation contact for Airport Security related business.
3. The Contractor's Authorized Signatory shall schedule a Participant Meeting with the DEN Airport Security Office to review DEN security procedures and receive training on how to ensure that all Participants remain in compliance with Part 20 of the Denver Municipal Airport System Rules and Regulations. A second meeting will be scheduled for the Authorized Signatory to learn how to successfully complete the required forms for Airport ID badges and vehicle permits.
4. A CHRC and STA are required for each employee requesting unescorted access to the Secure and/or Sterile Area. The employee will complete the Fingerprinting and Badge Application (two-sided form) and schedule an appointment with the Airport Security Office to have the form reviewed and to be fingerprinted. The Federal Bureau of Investigation will conduct the CHRC and will return the results to the Airport Security Office. For the fee for the Fingerprinting, please see the flydenver.com website. The Transportation Security Administration will process the STA and will return the results to the Airport Security Office.
5. When the Authorized Signatory is notified by Airport Security that the CHRC and STA have cleared, the applicants must come to the Airport Security Office to receive regulated security and driver training. The training will take approximately one (1) hour for security training and approximately two (2) hours for security and driver training.
6. All applicants must watch and pass all concepts of a computer based security training module for a Security Identification Display Area (SIDA) Airport ID badge. All individuals requesting driver authorization in the non-movement area must also view an interactive computer based driver training module and complete a test by passing all concepts. In addition, the individual must receive non-movement driver orientation training by the Contractor's driver representative before being allowed to drive on the airfield. Non Movement Orientation training should be conducted annually.
7. All Airport ID badges must be immediately terminated upon employee separation from the Contractor or when a need for DEN access no longer exists.
8. The Airport ID badges must be returned to the Airport Security Office prior to final payment. All Airport ID badges are issued with an annual expiration date. The expiration date is determined by the birthday of the Airport ID badge holder. Contractors shall notify the DEN Project Manager as soon as possible but in no case less than four (4) weeks in advance of any requirement to extend the Sponsorship status.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
011420
SECURITY REQUIREMENTS & SENSITIVE SECURITY
INFORMATION (SSI)

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 011420

SECTION 011430 - VEHICLE AND EQUIPMENT PERMITTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Contractor shall comply with the Airport Security Program. Vehicle permits are required for all vehicles operating in the Secured Area. The DEN vehicle permit is required for vehicles operating in the Secured Area but limited to above grade, outdoor activity. Vehicles or machinery operating within buildings shall be required to acquire a DEN emissions permit as well as a DEN vehicle permit.
- B. Special emphasis should be paid to Denver Municipal Airport System Rules and Regulations Part 20 – Airport Security Rules and Regulations and Part 130 – Operating Vehicles In The Secured Area" and Part 35 – Operations Infraction Accountability Program". The Denver Municipal Airport System Rules and Regulations can be found on the flydenver.com website.
1. All Work shall be accomplished in accordance with the most current FAA Advisory Circular (AC) 150/5370-2, "Operational Safety on Airports during Construction", 49 Code of Federal Regulations (CFR) Part 1542 and 14 CFR Part 139 except as modified herein.
 2. All Work shall be accomplished in accordance with the most current TSA Security Directives applicable to DEN, except as modified herein.
 3. Access to the runways, taxiways, and aprons shall be gained by the Contractor after establishing radio communications with Airport Operations through the DEN Inspector. No personnel or equipment will be allowed on the runways until radio contact has been made with Airport Operations and permission given.
 4. Access to the Movement Area will be limited in order to allow the maximum efficient movement of aircraft. As part of this limitation, the Contractor may be required to only use these areas late at night when there is less aircraft traffic
 5. Once admitted into the Secured Area, the Contractor shall proceed directly to the work location by way of a route assigned by Airport Security. At no time shall a Contractor or any of its personnel enter onto a taxiway, runway, or ramp without proper clearance from the Airport Operations Manager or Assistant Airport Operations Manager. Contractors or individuals violating these requirements for driving in the Secured Area may be subject to fines, suspension, or permanent revocation of their driver authorization and/or Airport ID badge privileges.
 6. The Transportation Security Administration (TSA) requires that all operating airports be secured from the general public and has the authority to issue citations for violations of these requirements. It is the responsibility of the Airport to ensure all fences and gates are secure. If a Contractor's operations

necessitate the frequent use of a particular gate, the Contractor shall place guards at the gate. Refer to 011420 – Security Requirements and SSI for details regarding the placement of guards.

C. General Safety Regulations When in Aircraft Operations Areas May Include the Following:

1. At all times, the Contractor shall coordinate its Work with the requirements of the Airport site and operations. All Work, movement of personnel, materials, supplies and equipment in areas used by aircraft shall be subject to regulations and restrictions established by the City. The Contractor shall take special precautions and be fully responsible for the prevention of damage to materials and equipment in the areas affected by the jet blast of taxiing aircraft. No work shall proceed until necessary protective devices are placed as required to protect the public, airport operations, property, and personnel from the hazards of the Work. The Contractor shall proceed with the Contractor's Work, including temporary work and storage of tools, machinery, and materials, to cause no interference with or hazards to the operation of the Airport.
2. Landings, takeoffs, and taxiing shall take precedence over all Contractors' operations. In the event that the Contractor is notified that an emergency landing or a takeoff is imminent, the Contractor shall stop all operations immediately, regardless of the sequence of events in progress and shall immediately evacuate the Contractor's personnel and equipment from the runway and taxiway areas as directed.
3. The Contractor shall remove its personnel and equipment to the distance specified below for the prevailing conditions:
 - a. For emergencies, the Contractor shall move all personnel and equipment as directed by Airport Operations or the DEN Project Manager.
 - b. At the end of a work day in areas where aircraft are operating, all equipment shall be moved to a location that is not less than 750 lineal feet measured from the near edge of the runway, taxiway or ramp area or to the location designated by the City.
4. If the Contractor is asked to leave part of its work site to allow aircraft operation, the Contractor shall clean the area to allow safe aircraft movement. Cleaning may include sweeping the area to prevent damage to aircraft.

D. Vehicle Permitting:

1. Refer to the Denver Municipal Airport System Rules and Regulations Part 20 – Airport Security Rules and Regulations and Part 130 – Operating Vehicles In The Secured Area" and Part 35 – Operations Infraction Accountability Program" for information regarding vehicle permitting. These Denver Municipal Airport System Rules and Regulations can be found on the flydenver.com website.
2. For additional information regarding permitting, the Contractor must contact DEN Security.

E. Equipment Permitting

1. Fossil fuel powered equipment to be used in the interior of buildings and/or in basement/tunnel areas shall require inspection by DEN Maintenance and the Denver Fire Department.
 - a. Only CNG fossil fuel powered equipment may be used; gasoline powered, propane powered, or diesel powered equipment will not be acceptable unless identified and operated per Section 011400 "Work Sequence and Constraints".

1.3 SUBMITTALS

- A. Refer to Section 03300 "Submittal Procedures" for submittal procedures
- B. Submit a copy of each vehicle permit and/or equipment and vehicle emissions permit a maximum of fourteen (14) days after receipt of permit.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PERMITS

- A. Vehicle permits shall not be issued prior to Notice to Proceed. The Contractor may, at the Contractor's own risk, submit required information prior to Notice to Proceed to the following:
 1. Vehicle permit: DEN Project Manager or DEN Airport Security.
 2. Equipment and vehicle emissions permit. DEN Project Manager or DEN Maintenance Group.

3.2 SCHEDULE

- A. The Contractor shall allow in the Contractor's schedule five (5) days for DEN review of submittals for permits. Testing of equipment and review by the Denver Fire Department shall be scheduled by the Contractor. By submitting information for permits, the Contractor certifies that equipment and vehicles comply with Contract documents and with all City, state and federal regulations including but not limited to emissions, licensing and safety requirements.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
011430
VEHICLE AND EQUIPMENT PERMITTING

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 011430

SECTION 012510 - SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. All material and equipment substitutions must comply with Title 4, Article 406: Substitution of Materials and Equipment in the General Contract Conditions, 2011 Edition.
- B. The Work specified in this Section consists of submitting form CM-09, Request for Substitution for the approval of a different material, equipment, or process than is described in the Contract Documents.
- C. If the substitution changes the Scope of Work, Contract cost, or Contract time, a Change Order is required.
- D. As-built drawings and specifications must include all substitutions even if a Change Order is not issued.

1.3 REFERENCE DOCUMENTS

- A. Form CM-09, Request for Substitution
- B. Section 013300 "Submittal Procedures"
- C. Section 013325 "Shop and Working Drawings, Product Data and Samples"

1.4 QUALITY CONTROL

- A. The substitution shall provide as a minimum, the same performance as specified.

1.5 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- B. A completed Form CM-09 shall be submitted at least 60 days prior to when an order needs to be placed or a method needs to be changed.

- C. The submittal shall contain all the data required to be submitted for acceptance of the originally specified item or process, including, as appropriate:
1. Detailed product data sheets for the specified items and the substitution.
 2. Samples and shop drawings of the substitution.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SUBSTITUTION PROCESS

- A. Provide the information as required on Form CM-09.

3.2 SUBSTITUTION REQUEST

- A. The formal Request for Substitution will be evaluated by the DEN Project Manager and the Designer of Record based on the following criteria:
1. Compatibility with the rest of the project.
 2. Reliability, ease of use and maintenance.
 3. Both initial and long term cost.
 4. Schedule impact.
 5. The willingness of the Contractor to share equally in any cost savings.
 6. The ability of the item or process to meet all applicable governing regulations, rules, and laws along with funding agency requirements.
 7. The cost of evaluating the substitution.
- B. Based upon the above evaluation, the Sr. Director of AIM Development will make a final determination of what is in the best interest of the City and either approve, disapprove or approve as noted the requested substitution.

3.3 CONDITIONS

- A. As a condition for submitting a Request for Substitution the Contractor waives all rights to claim for extra cost or change in Contract time other than those outlined in the request and approved by the Deputy Manager of Aviation. The Contractor, by submitting a Request for Substitution, also accepts all liability for cost and scheduling impact on other contractors or the City due to the substitution.
- B. Included with the Request for Substitution shall be the following statement:
1. "The substitution being submitted is equal to or superior in all respects to the Contract-required item or process. All differences between the substitution and the Contract-required item or process are described in this request along with all required information, cost, and scheduling data."

- C. The statement shall be signed and dated by the Contractor's Superintendent.
- D. Replacement of Substitution Found to be Not Equal: The Contractor shall be responsible for all aspects and conditions of the substitution that are not clearly identified in the substitution submittal, and shall be liable for the appearance, function, performance or other aspects of the substitution that are found not to be equal to the originally specified item.
 - 1. The Contractor shall incur all labor and costs associated with replacement of any substitution that is found to be not equal to the originally specified item or process and rejected by the DEN Project Manager.
 - 2. The replacement of any rejected substitution shall either be with the originally specified item or process, or a substitution approved by the DEN Project Manager

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 012510

SECTION 012910 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions other Division 01 Specification Sections, and Related Requirements apply to this Section.

1.2 RELATED REQUIREMENTS

- A. The Work specified in this Section consists of preparing and submitting the Schedule of Values ("Schedule") as referenced in the General Conditions. Use the Project Specifications Table of Contents or Bid Tabs, if applicable, as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section. The Work also includes the preparing and submitting of updated copies of the Schedule if the Schedule is affected by change orders.
- B. A Schedule of Stored Material is a detailed cost breakdown for permanent materials that will be temporarily stored prior to their being installed and for which the Contractor seeks partial payments. The Schedule of Stored Material will be incorporated as a part of the Schedule of Values.
- C. Within 14 calendar days of issuance of the Notice to Proceed (NTP), the Contractor shall submit the Schedule of Values including the Schedule of Stored Material if applicable. The Schedule of Values and Schedule of Stored Material used to prepare the work/cost breakdown for the Schedule will be used for the Contractor's billings.
- D. Any Contract allowances shall be included in the Schedule. Expenditure of allowances shall be done using the Allowance Authorization form. Use of this form does not increase or decrease the Contract value.

1.3 RELATED DOCUMENTS

- A. Title 9 – Compensation of the General Contract Conditions, 2011 Edition
- B. Section 013300 "Submittal Procedures"
- C. Section 013325 "Shop and Working Drawings, Product Data and Samples"
- D. Form CM-89, Schedule of Values

1.4 SUBMITTALS

- A. The Schedule of Values shall be formally approved by the DEN Project Manager.
- B. The Schedule shall identify each item of work. Work items in the Schedule shall represent all Work and shall be referenced with the Technical Specifications section numbers, specification subparagraph, specification section title and the bid item number used for the Schedule of Prices and Quantities when applicable.
- C. Upon request by the City, the Contractor shall support values given with the data that will substantiate the correctness of the values.
- D. The Schedule will be utilized only as a basis for review of the Contractor's application for progress payment.

1.5 REVIEW AND RESUBMITTAL

- A. If review by the DEN Project Manager indicates that changes to the Schedule are required, the Contractor shall revise and resubmit the Schedule.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARING SCHEDULE OF VALUES

- A. Provide a breakdown of the Contract Price in enough detail to facilitate continued evaluation of Applications for Payment and progress reports.
- B. Breakdown of the items used in the Schedule shall include the following item costs. Ensure each item is complete:
 - 1. Delivered cost of product with applicable taxes paid.
 - 2. Total installation cost with overhead and profit.
 - 3. Breakdown costs of each lump sum item with a list of products and major operations for which the Contractor seeks to receive progress payments to recover the Contractor's costs for that bid item.
 - 4. Each unit price item as listed in the bid Schedule of Prices and Quantities shall list products and major operations for which the Contractor seeks to receive progress payments for that bid item.

3.2 PREPARING SCHEDULE OF STORED MATERIAL

- A. The Contractor shall submit with the Schedule an indication of whether products will be stored on or off the work site. The Schedule of Stored Material shall show all quantities and types of products that will be stored.

- B. Material allowances consist of only the net cost of the product, the cost of delivery and unloading at the storage site, the cost of applicable sales taxes, and all discounts.
- C. In no case will the cost paid for a permanent material be greater than 90 percent of the Contract price for the Work in which they are included.

3.3 PAYMENT FOR STORED MATERIALS

- A. Only materials that are described in the specifications and on the drawings will be considered permanent materials. Permanent materials are materials that will be left in the Work after the Contract is completed.
- B. Nothing in these specifications shall be interpreted as requiring the City to pay for stored materials. The DEN Project Manager shall decide on a case-by-case basis whether stored materials shall be paid for. No payment will be made for stored materials that have not been submitted and accepted.
- C. The Contractor must, at all times, store permanent materials in accordance with manufacturer's recommendations. Any material not properly stored will not be paid for. Amounts will be deducted from payments for any stored permanent material previously paid for and subsequently found to be improperly stored or not present, based upon a physical inventory of stored permanent material.
- D. Only the neat line quantity of material needed for the finished product may be paid for.
- E. All requests for stored permanent material payment must be accompanied by paid invoices clearly showing the quantity of permanent material, the type of permanent material and discounts or rebates and the net amount paid to the supplier along with a certificate stating that the permanent material is free of any liens or judgments preventing its use by the City.
- F. If the permanent material is stored outside the Denver area the Contractor must pay for the City representative's transportation and lodging to see the stored material as needed. Acceptable lodgings must, as a minimum, have a Mobil Travel Guide Rating Criteria® rating of Two-Star or the American Automobile Association Lodging Listing Requirements & Diamond Rating Guidelines® rating of Two Diamonds. The minimum transportation shall be by regularly scheduled commercial air carrier at coach rates. The DEN Project Manager will determine if an overnight stay is required.
- G. All permanent material stored off site, for which payment is being requested, must be insured and stored in bonded, insured warehouses. The Contractor shall provide proof of insurance for all material stored off site, and specific address and storage conditions of storage location.
- H. Any permanent material on which payment is requested must be in such a form that it cannot be used on work other than this Contract, or stored in a manner acceptable to the DEN Project Manager to ensure that the permanent material cannot be used on work other than this Contract.

3.4 ALLOWANCE AUTHORIZATION AND PAYMENT

- A. Contractor shall request written approval for expenditure of any Contract allowances **PRIOR TO** performing the Work involved. List work to be performed and estimated cost in the requesting correspondence.
- B. Original copies of all invoices and receipts must be submitted with the Allowance Authorization as part of the request for payment.
- C. Using the format provided by the City, the Contractor's request for payment of all Contract allowances shall be included in the Schedule of Values.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 012910

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations and coordination with other stakeholders and adjacent Contractors on the Project including,

1. Subcontractor's Acceptance Certification and Subcontractors List.
2. General Coordination Procedures.
3. Contract Administration Procedures.
4. Current Project Management Information Systems (PMIS)
5. Coordination drawings.
6. Current DEN Asset Management Systems
7. Requests for Information (RFIs).

- B. Related Requirements:

1. Section 011100, " Summary of Work" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
2. Section 011400 "Work Sequence and Constraints" for shutdown requests and coordinating with airport operational activities.
3. Section 011420 "Security Requirements and Sensitive Security Information (SSI)".
4. Section 013210 "Schedule" for preparing and submitting Contractor's Construction Schedule.
5. Section 013300 "Submittal Procedures".
6. Section 013325 "Shop and Working Drawings, Product Data and Samples".
7. Section 017720 "Contract Closeout" for coordinating closeout of the Contract.
8. Section 017419 "Construction Waste Management and Recycling".
9. DEN Building Information Modeling (BIM) Design Standards Manual (DSM).

1.3 DEFINITIONS

- A. RFI: Request from the DEN Contractor DEN Project Manager seeking information required by or clarifications of the Contract Documents.

1.4 SUBMITTALS - SUBCONTRACTORS ACCEPTANCE CERTIFICATION AND SUBCONTRACTORS LIST

- A. To comply with Section 502.2 in the General Contract Conditions, 2011 Edition, the Contractor must complete and submit form CM-02 Subcontractor Acceptance Certification for each Subcontractor working on the project. Additionally, the Contractor must prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
- B. Provide emergency contacts list to the DEN Project Manager prior to any site activities. List must contain project name, number, location, company name and address, name and title of emergency contacts in order and time and assigned responsibilities. Keep list current and accurate at all times. Include any specific security arrangements or special projects requirements.
- C. Within two (2) days of Notice to Proceed, the Contractor shall submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identifying individuals and their duties and responsibilities listing addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Providing names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of the accepted list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination with other Contractors:
 - 1. For details on coordinating with other Contractors, refer to Article 701 Cooperation with Other Work Forces, Article 702 Coordination of the Work, and Article 703 Coordination of Public Contact in the General Contract Conditions, 2011 Edition.
- B. Minimum cooperation requirements with other contractors include the following, unless directed by the DEN Project Manager in writing:
 - 1. Regular meetings, minimum weekly.
 - 2. Construction schedule coordination.
 - 3. Staging area and access planning (to include employee shuttle routes).
 - 4. Deliveries.
 - 5. Traffic control.
 - 6. When and where required or specified, the Contractor shall develop appropriate coordination drawings for use by interfacing adjacent parties using the Denver International Airport site.
- C. The following is a list that includes, but is not limited to, all of the contractors that will be working in the area of the project limits: None currently.

- D. Coordination with DEN entities shall include but is not limited to the following:
1. Coordinate with Utility Companies for utilities that are single sole source.
 2. Coordinate with Airport Security and DEN Maintenance for all security related services.
 3. Coordinate with DEN Life Safety Team for all issues related to fire alarm, fire protection systems in addition to compliance with all regulatory agencies.
 4. Coordinate all shutdowns and system interruptions in accordance with section 011400 "Work Sequence and Constraints".

1.6 Contract Administration Procedures:

- A. This Project will be administered in part using the current Project Management Information System (PMIS). Any processes necessary to properly administer the Contract and not included in the list below shall be addressed as acceptable to the DEN Project Manager. DEN Project Manager may modify the list below in serialized correspondence without constituting a change to the Contract. Administrative tools and processes shall not in any form waive any contractual or legal requirements of the law or the Contract. The Contractor shall attend all coordination meetings with the DEN Project Manager and the DEN Project Control Administrators to arrange for staff training, and technical support to facilitate the execution of electronic data management and control.
- B. Project Management Information Systems (PMIS): Oracle Unifier Enterprise Project Portfolio Manager (EPPM), or the Oracle Primavera P6.
- C. All submittals, RFIs, Pay Applications, Correspondence, change requests, and pricing proposals and settlement agreements shall be recorded and submitted using the current PMIS:
1. The Contractor shall follow the specified PMIS Access Request Procedure and adhere to all user license conditions.
 2. The Contractor shall sign the Information Technology Agreement (ITA) to comply with the DEN computer system security requirements and any contractual obligation to the software and service providers for the current PMIS software
 3. DEN will train the Contractor's staff on the use of the PMIS.
 4. At a minimum, the Contractor shall provide computer hardware and software to meet the following requirements and to run the following programs, as required for the project:
 - a. Internet connectivity that provides the necessary high-speed connection to perform all activities indicated in this Contract.
 - b. Internet Explorer version 8 or higher.
 - c. Based on the project, a specific Java JRE application may be required, which can be downloaded from the Internet. If needed, the revision and update number will be provided at NTP.
 - d. Other files capability pre-approved by the DEN Project Manager or as required by the DEN BIM Execution Plan
 - e. Most current version of Revit, as per DEN requirements.

1.7 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, BIM Design Standards Manual and BIM Project Execution Plan (BPXP), and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity. Coordination drawings will be the result of a Contractor driven Spatial Coordination effort as spelled out in the BPXP.
1. Field verify all existing dimensions and any as-built dimensions, whether built by the Contractor or others, necessary to produce accurate coordination and working drawings.
 2. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Models/Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Models/Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to DEN Project Manager indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Using software as in the BPXP, the Contractor shall coordinate these systems per floor or zone per BPXP, and as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 4. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 5. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes dimensioned from column centerlines.
 6. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 7. Review: DEN Project Manager will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If DEN Project Manager determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, DEN Project Manager will so inform Contractor, who shall make changes as directed and resubmit.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings, unless approved otherwise by DEN Project Manager.
 2. File Preparation Format: Provided in the Project BIM Execution Plan operating in Microsoft Windows operating system.
 3. File Submittal Format: Submit or post coordination drawing files as required in the Project BIM Execution Plan.
 4. The submittal must be logged in accordance with the submittal procedure
 5. For Fire Protection system; provide shop drawing and design calculations as approved by the building department. Submit as-built drawings in format as outline in BPXP.
 6. For all projects, receiving official variance from the BIM requirements not utilizing BIM, coordination drawings must be submitted in acceptable digital format shall be in an industry recognized 3D AutoCAD model.
 7. BIM File Incorporation: DEN Project Manager will incorporate Contractor's coordination drawing files into Building Information Model for Revit as established for Project.

- a. Contractor shall lead three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect or other sub-consultants.
8. DEN Project Manager will furnish Contractor one (1) set of digital data files of Models and/or Drawings for use in preparing coordination digital data files.
- a. The Design consultants and Contractors and Sub Contractors acknowledge and represent the following Right Of Reliance regarding Electronic Models and/or Drawing deliverables:
 - 1) Models may be transferred for allowing the recipients to develop derivative models to develop the means and methods by which to construct the project.
 - 2) It must be clear that each party be able to rely on the fact that the model furnished by others “match the 2D Contract Documents or shop drawings in their equivalent state of development”
- 1.8 Coordination with DEN Asset Management System:
- A. The full intent is to produce comprehensive record documents integrating existing data in the form of digital files and models, reconciled to actual field conditions, modifications or additions facilities or components of existing facilities according to new Contract Documents, and to produce record documents that could be incorporated into DEN asset management system.
 - B. Utilize the BIM to link all necessary data content to the model and follow the BPXP as collaboratively modified by the Contractor, Designer, and DEN BIM Administrators and approved by DEN Project Manager
 - C. Provide the following information through the execution of the Contract for all elements and element types that DEN has designated as assets. The information shall include but is not limited to:
 1. Project title, number, project manager contact information, contractor and subcontractor contact information
 2. Pertaining shop drawings
 3. Operational Manuals and safety information, MSDS and cut sheets, and any pertinent technical information.
 4. Details of all components’ maintenance procedures and requirements.
 5. Details of all applicable warranties including but not limited to; warranty providers, manufacturers information, warranty start and finish dates, contacts , bonding company name, consent of surety,
 6. Equipment location (by room number and location description or grid location format acceptable to DEN Project Manager, for civil projects), equipment make, model, serial number, and other asset information as outlined in the DEN BIM DSM

7. List of all spare parts including but not limited to; equipment make and model, location, submittal number or link, and suppliers reordering information
8. Commissioning results, acceptance criteria, test reports, and Tab reports

1.9 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI through the PMIS
 1. DEN Project Manager will distribute the RFIs to the proper entities.
 2. DEN Project Manager will coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's Work or work of subcontractors
- B. DEN Project Manager has the right to reject RFIs or those that do not contain proper information and required data to properly evaluate the request and respond in a timely manner.
- C. RFIs: Use PMIS to generate RFIs.
 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
 2. Attachments include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- D. For projects not using Unifier to create the RFI, the RFI must include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of DOR [and DEN Project Manager].
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- E. DEN Project Manager will review each RFI, determine action required, and respond. RFIs received by DEN Project Manager after 1:00 p.m. will be considered as received the following working day. Direct responses by any entity other than DEN Project Manager shall not be binding to the City and County of Denver. E-mails, and verbal conversations must be followed by an official RFI or proper contractual vehicle before it is considered for any additional compensation or time impact to the project terms and conditions.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of DEN Project Manager's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. DEN Project Manager's action may include a request for additional information, in which case DEN Project Manager's time for response will date from time of receipt of additional information.
 3. DEN Project Manager's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Title 11 - Changes In the Work, Contract Price, or Contract Time in the General Contract Conditions, 2011 Edition as amended by Special Conditions.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify DEN Project Manager in writing within five (5) days of receipt of the RFI response or the time required by Title 11 - Changes In the Work, Contract Price, or Contract Time in the General Contract Conditions, 2011 Edition
- F. RFI Log: For projects not utilizing the PMIS application, prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. The log shall include but not limited to the following data:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of DEN Project Manager.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date DEN Project Manager's response was received.

PART 2 - PRODUCTS (Not Used)

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
013100
PROJECT MANAGEMENT AND COORDINATION

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT:

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT:

- A. No additional Payment will be made for compliance with the requirements of this section.

END OF SECTION 013100

SECTION 013119 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section requires the Contractor's Project Manager, Superintendent, and Quality Control representative to attend meetings scheduled by the DEN Project Manager for the collection and dissemination of information related to the subject Contract.
- B. The DEN Project Manager will prepare the minutes of each meeting and distribute them to each of the participants.

1.3 REFERENCE DOCUMENTS

- A. Form CM-01, Preconstruction Meeting Agenda
- B. Form CM-62, Construction Meeting Agenda/Minutes

1.4 OTHER MEETINGS

- A. The Contractor shall attend all other project related meetings as directed by the DEN Project Manager.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. A Preconstruction Meeting will be scheduled by the DEN Project Manager after the Contract has been signed by all parties. The purpose of this meeting is to introduce the City's Representatives to their counterparts in the Contractor's organization and to establish lines of communication between these representatives and outline some Contract requirements. The Contractor's key personnel shall attend this meeting.

- B. The DEN Project Manager will distribute a notice of this meeting, along with an agenda of the subjects to be addressed. Refer to form CM-01, Preconstruction Meeting Agenda.
- C. The DEN Project Manager will explain and discuss the responsibilities and authorities of the City, the Designer of Record, and the DEN Project Manager's organization.
- D. The Contractor shall introduce the Contractor's key personnel, subcontractors, and representatives and briefly describe each person's responsibilities.
- E. Explanations provided by the DEN Project Manager will not amend, supersede, or alter the terms or meaning of any Contract document, and the Contractor shall not claim reliance on such explanations as a defense to any breach or failure by the Contractor to perform as specified in the Contract.

3.2 CONSTRUCTION PROGRESS MEETINGS

- A. Progress meetings will be scheduled weekly and more often as necessary by the DEN Project Manager to promote the competent and timely execution of the Contract.
- B. The meetings will be held at the Facilities Services Conference Room located on Concourse A Center Core. Meetings will be chaired by the DEN Project Manager or the DEN Project Manager's representative.
- C. The Contractor's key personnel shall attend unless otherwise agreed by the DEN Project Manager.
- D. At a minimum, and as directed by the DEN Project Manager, the items detailed in CM-62, Construction Meeting Agenda/Minutes shall be addressed at each meeting. The items addressed in the meeting do not waive notification or submittal requirements as required elsewhere in the Contract.
- E. The DEN Project Manager will be responsible for publishing minutes of the meetings. Refer to form CM-62, Construction Agenda/Meeting Minutes.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
013119
PROJECT MEETINGS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

- B. All payments for any Work done under this contract shall be in accordance with Title 9
- Compensation of the General Contract Conditions, 2011 Edition.

END OF SECTION 013119

SECTION 013210 - SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section describes the procedures and requirements for scheduling and documenting the progress of the project:

1. Preliminary Construction Schedule.
2. Initial Project Construction Schedule (IPS).
3. Monthly Progress Schedule update.
4. As-built Schedule.
5. Three-Week Look-Ahead Schedule.
6. Submittal Schedule.
7. Fabrication Schedule.
8. Material Delivery Schedules, cranes, special equipment and staging status.
9. Daily Superintendent/Foreman Reports.
10. Daily Quality Control Reports.
11. Special reports:
 - a. Weather impacts and mitigations.
 - b. Recovery Schedule and alternatives.

- B. Reference Documents

1. Article 1105 – Time Extensions in the General Contract Conditions, 2011 Edition.
2. Section 011100 "Summary of Work".
3. Section 011420 "Work Sequence and Constraints".
4. Section 012910 "Schedule of Values".
5. Section 013119 "Project Meetings".
6. Section 013300 "Submittal Procedures".

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a Construction Schedule consume time and resources:

- B. **Contract Time:** Total number of days provided in the Contract Documents from the Notice to Proceed to the date of Final Completion of the Work. Substantial Completion shall occur prior to Final Completion. Contract Time may be further defined and divided into phases by the Technical Specifications or Special Conditions. The Contract Documents may require completion on or before a certain specified date.
- C. **Cost Loading:** The allocation of the total contract value spread across each appropriate activity. All project costs, including those for stored materials, allowances and indirect costs shall be loaded into the schedule and shall be balanced to where no activity is unfunded.
- D. **Critical Activity:** An activity on the critical path that must start and finish on the planned early start and finish dates. Any delay in the start or finish of a critical activity will cause a delay to the project finish.
- E. **Critical Path Method (CPM):** A method of planning and scheduling a construction project where activities are arranged based upon defined relationships. Defined relationships determine when activities can be performed and the critical path for completing the Work.
- F. **Critical Path:** The longest chain of interdependent activities through the network sequence that establishes the shortest duration for completing the work and contains no float. The critical path shall be calculated as total float equal to but not less than zero days. Activities on the critical path have a total float of zero.
- G. **Data Date:** The date on which the schedule status is determined. For initial schedules, it is the project Notice to Proceed date. For schedule updates, it is the reporting period cut-off date. Updated schedules depict the actual status of the work started, on-going and/or completed within the reporting period. The data date is used to start the scheduling calculations for forward and backward passes.
- H. **Days:** Consecutive calendar days unless specifically designated otherwise and includes weekends, holidays or days of normal inclement weather.
- I. **Direct Man-hours:** Man-hours related only to the physical construction of the Work, i.e., drywall, carpeting, electrical, masonry, mechanical, etc.
- J. **Final Completion:** Occurs following Substantial Completion and when the Project Manager confirms in writing that the Contractor has completed the work in accordance with the contract, including completion of all punch list items, cleanup work and delivery of all required guarantees, warranties, licenses, releases and other required deliverables.
- K. **Free float:** The amount of time an activity can be delayed without adversely affecting the early start of its successor activity.
- L. **Indirect Man-hours:** Man-hours related to support of the physical construction of the Work, i.e., mobilization, cleanup, traffic control, temporary activities, badging, supervision and overhead, etc.

- M. Lag: The delay of a successor activity and represents time that must pass before the second activity can begin. There are no resources associated with a lag.
- N. Lead: The acceleration of a successor activity where it can begin in parallel with the predecessor activity. It compresses the total combined duration of both activities. The dependency must be discretionary and there is no physical limitation on completing Activity "A" before Activity "B" begins.
- O. Longest Path: The longest continuous path of activities through a project, which controls project early completion. It is possible for otherwise defined critical path activities to not be on the longest path and longest path activities to not show calculated critical float.
- P. Notice to Proceed: A notification letter from the Owner addressed to the contractor stating the date on which the contractor can begin project work. The NTP date marks the beginning of the Contract Time.
- Q. Predecessor Activity: An activity that comes before a dependent activity in the network sequence. It must either start or finish before a specified activity can begin.
- R. Resource Loading: A calculated value based on the actual worker's hours and costs, equipment and materials costs that are required to complete an activity. The value is allocated to the specific activities.
- S. Substantial Completion: The Work has progressed to the point that the City can beneficially occupy or utilize the Work for the purpose for which it is intended, and the Work complies with all applicable codes and regulations, including, if required, issuance of a certificate of occupancy, or certificate of suitability for use from the appropriate governmental agencies, as determined by the Manager in its sole discretion.
- T. Successor Activity: A dependent activity that logically comes after another activity in the network sequence.
- U. Total float: The amount of time that an activity in a network sequence can be delayed without causing a delay to subsequent activities and/or the completion date of the Work.
- V. Work Breakdown Structure (WBS): A hierarchical decomposition of the Work to be executed by the contractor. It shall allow for the roll-up and summarization to a predetermined level. The level of breakdown shall be agreed upon by the Contractor and the DEN Project Manager prior to the start of Work.

1.4 SUBMITTALS

- A. Submit for City acceptance the following in accordance with Section 013300 – Submittal Procedures:
1. Project Scheduler Qualifications
 2. Preliminary Project Construction Schedule

3. Initial Project Construction Schedule
4. Monthly Progress Update Schedules
5. Time Impact Analysis, when necessary
6. As-built Schedule

B. Scheduler/Scheduling Consultant Qualifications:

1. A professional with a minimum of two (2) years of experience with scheduling construction projects similar in size and scope of work as this project using Oracle Primavera P6 software.
2. The scheduler shall have a comprehensive knowledge of Critical Path Method (CPM) scheduling principles and application.
3. The scheduler shall also have the ability to produce reports and diagrams within 24 hours of the DEN Project Manager's request and be able to perform the below tasks, including, but not limited to, the following:
 - a. Create, maintain and update the project construction schedule.
 - b. Prepare monthly progress schedule updates, submit for review and incorporate the City's review comments into the schedule, if any.
 - c. Coordinate the participation of qualified personnel to assist in the development of the initial construction schedule and updating of the monthly progress schedule.
 - d. Develop a WBS to the appropriate level and be able to discuss verbally and in writing the applicability of the WBS.
 - e. Incorporate delivery dates for Owner-furnished products.
 - f. Incorporate submittal requirements, procedures and time required for review of submittals and resubmittals.
 - g. Incorporate requirements for tests and inspections by independent testing and inspecting agencies.
 - h. Incorporate time required for Project closeout and Owner start-up procedures, including commissioning activities.

1.5 COORDINATION

A. Pre-scheduling Conference: Schedule conference at Pre-Construction meeting to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to setting up the Preliminary Project Construction Schedule and Initial Project Construction Schedule, including, but not limited to, the following:

1. Verify availability of qualified personnel needed to develop and update schedule.
2. Review content and format for reports.
3. Discuss constraints, including phasing, area separations, interim milestones, and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review submittal requirements and procedures.
6. Review time required for review of submittals and resubmittals.
7. Review time required for Shutdown request and approval.

8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 10. Review procedures for updating schedule.
 11. Review requirements for content and input of direct man-hour resources in activities.
 12. Review requirements for cost loading of activities.
- B. Coordinate Initial Project Construction Schedule with the Schedule of Values.
- C. Work items in the Initial Construction Schedule shall be identified in a Work Breakdown Structure (WBS) format that corresponds with the areas, phasing or schedules of the project and the technical specifications.
- D. Secure time commitments for performing critical elements of the Work from entities involved.
- E. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SOFTWARE

- A. DEN Default Software:
1. DEN shall use Oracle Primavera P6, Release 18.7 for all City scheduling needs.
- B. Contractor Software:
1. Scheduling software used by the contractor shall be Oracle Primavera P6 Release 16 or higher.
 2. The software and any support agreements shall be purchased at the contractor's expense from a vendor of the contractor's choosing.
 3. The City will not provide training or support services for contractor purchased software.
- C. Oracle Primavera P6:
1. The following settings are mandatory and required in all schedule submissions to the City:
 - a. Activity codes shall be Project Level, not Global or EPS level.
 - b. Calendars shall be Project Level, not Global or Resource level.
 - c. Activity Duration Types shall be set to "Fixed Duration & Units".
 - d. Percent Complete Types shall be set to "Physical".

- e. Time Period Admin. Preferences shall remain the default "8.0 hour/day, 40 hour/week, 172 hour/month, 2000 hour/year". Set Calendar Work Hours/Day to 8.0-hour days.
- f. Set Schedule Option for defining Critical Activities to "Total Float less than or equal to zero (0) hours/day".
- g. Set Schedule Option for defining progressed activities to "Retained Logic".
- h. Set up cost loading using single lump sum resource. The Price/Unit shall be \$1/hour, Default Units/Time shall be 8h/d", and settings "Auto Compute Actuals" and "Calculate Cost from Units" selected.
- i. Activity ID's shall not exceed 10 characters.
- j. Activity Names shall have the most defining and detailed description within the first 30 characters.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Prepare for acceptance all Project Schedules utilizing the Critical Path Method (CPM) of network calculation to generate all Project Schedules.
- B. Prepare each Project Schedule utilizing the Precedence Diagram Method (PDM).
- C. Show in the schedule, the proposed sequence to perform the work and dates contemplated for starting and completing the schedule activities.
- D. The scheduling of the entire project is required.
- E. Provide a schedule that is forward planning as well as a project monitoring tool
- F. Contractor management personnel shall actively participate in its development.
- G. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate project schedule.
- H. The contractor shall keep the subcontractors and suppliers informed of the Project Construction Schedule to enable the subcontractors to plan and perform their work properly.

3.2 COST LOADING

- A. Activity cost loading shall be reasonable and without front-end loading.
- B. Provide additional documentation to demonstrate reasonableness, if requested by the City.

3.3 WITHHOLDINGS / PAYMENT REJECTION

- A. Failure to meet the requirements of this Section may result in the disapproval of the schedules or updates and subsequent rejection of payment requests until requirements are met.
- B. If the DEN Project Manager directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the DEN Project Manager may withhold 10 percent of pay request amount for each payment period until such revisions to the project schedule have been made.

3.4 PROJECT SCHEDULE DETAIL REQUIREMENTS

- A. Level of Detail Required
 - 1. Develop the Project Schedule as a Level 4 execution schedule.
 - 2. Level of detail to address major milestones and to allow for satisfactory project planning and execution.
 - 3. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval.
 - 4. The DEN Project Manager will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail
- B. Activity Durations
 - 1. Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods.
 - 2. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days.
- C. Procurement Activities
 - 1. Include activities associated with the critical submittals and their approvals, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies.
 - 2. Long lead procurement activities are those with an anticipated procurement sequence of over 30 calendar days.
- D. Mandatory Tasks
 - 1. Include the following tasks/activities in the preliminary and initial project schedules and all updates.
 - a. Notice to Proceed milestone activity.
 - b. Submission, review and acceptance of preconstruction submittals (individual activity for each).
 - c. Long procurement activities.
 - d. Submission and approval of testing activities, as needed by project.
 - e. Submission and approval of Operations & Maintenance (O&M) manuals.
 - f. Submission and approval of as-built drawings.

- g. City Punch list walk-through.
- h. Correction of Punch list items based on City Punch list walk-through.
- i. Substantial Completion milestone activity.

E. Owner Activities

- 1. Show the City and other agency activities that could impact progress. These activities include, but are not limited to:
 - a. Approvals
 - b. Acceptance
 - c. Building Department Permits
 - d. Environmental Permit Approvals by State Regulators
 - e. Inspections
 - f. Utility Tie-Ins
 - g. Owner Furnished Equipment
 - h. NTP For Phasing Requirements

F. Workers Per Day

- 1. Assign workers per day for the field construction and direct work activities, if directed by DEN Project Manager.
- 2. Workers per day shall be the average number of workers expected each day to perform the task for the duration of the activity.

G. Responsible Party Coding

- 1. Assign responsibility for activities to the Prime Contractor, subcontractors, DEN or other agencies responsible for performing the activity.
- 2. Activities cannot have more than one Responsibility Code.
- 3. Examples of acceptable activity code values are:
 - a. DOR (Designer of Record)
 - b. ELEC (electrical subcontractor)
 - c. MECH (mechanical subcontractor)
 - d. PAVE (paving subcontractor)
 - e. DEN (Denver International Airport)

H. Calendars

- 1. Schedule activities on a calendar to which the activity logically belongs.
- 2. Develop calendars to accommodate Contract-defined work periods, such as a 7-day calendar for City Acceptance activities, concrete cure times, etc.
- 3. Develop the default calendar to match the physical work plan with non-work periods identified including weekends and holidays.
- 4. Develop and assign seasonal calendars to seasonally affected activities.
- 5. If an activity is weather-sensitive, assign it to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar:

- a. The assignment of the non-work days should be over a 7-day week since weather records are compiled on 7-day weeks, which will cause some of the weather related non-work days to fall on weekends.
- b. Monthly average rain and snow measurements can be obtained from the National Climatic Data Center for the Denver Metropolitan Area or any similar trusted resource.

I. Contract Milestones and Constraints

1. Milestone shall be used for significant project events including, but not limited to, project phasing, project start and end activities, and interim milestone and/or completion dates.
2. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.
3. Mandatory constraints that ignore or affect network logic are prohibited.
4. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to DEN Project Manager for approval on a case-by-case basis.

J. Project Start Date Milestone

1. The first activity in the project schedule shall be a start milestone titled "NTP Issued" with a date equal to the date that NTP was issued to the contractor.

K. Project Finish Milestone

1. The last activity in the schedule shall be a finish milestone titled "Substantial Completion".
2. The project schedule shall be constrained to reflect the last day of the contract duration in such a way that if the schedule calculates an early finish, then the float calculation for "Substantial Completion" milestone reflects positive float.
3. If the project schedule calculates a late finish, then the "Substantial Completion" milestone float calculation reflects negative float.
4. The City is under no obligation to accelerate City activities to support a Contractor's early completion.

L. Interim Completion Dates and Constraints

1. Constrain contractually specified interim milestone completion dates to show negative float when the calculated last finish date of the last activity in that phase is later than the specified interim completion date.

M. Start Phase

1. Use a start milestone as the first activity for a project phase.
2. The start milestone shall be called "Start Phase X" where "X" refers to the phase of work.

N. End Phase

1. Use a finish milestone as the last activity for a project phase.

2. Call the finish milestone "End Phase X" where "X" refers to the phase of work.
- O. Open Ended Logic
1. Only two (2) open ended activities are allowed: the first activity "NTP Issued" shall have no predecessor logic, and the last activity "Substantial Completion" shall have no successor logic.
- P. Default Progress Data Disallowed
1. Actual Start and Finish dates shall not automatically update with default mechanisms included in the scheduling software.
 2. Updating of the percent complete and the remaining duration of an activity shall be independent functions.
 3. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided in the Contractor Quality Control Reports.
 4. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.
- Q. Out-of-Sequence Progress
1. Activities that have been progressed before the preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis and subject to DEN Project Manager approval.
 2. Propose logic corrections to eliminate Out-of-Sequence Progress.
 3. Address Out-of-Sequence Progress and logic changes in the Narrative Report and in the periodic schedule update meetings.
- R. Added and Deleted Activities
1. Do not delete activities from the project schedule or add new activities to the schedule without approval from the DEN Project Manager.
 2. Activity ID and description changes are considered new activities and shall not be changed without approval from the City.
- S. Original Durations
1. Activity Original Durations (OD) shall be reasonable to perform the work item. OD changes are prohibited unless justification is provided to and approved by the DEN Project Manager.
- T. Leads, Lags, and Start to Finish Relationships
1. Lags shall be reasonable as determined by the DEN Project Controls and not used in place of realistic original durations, shall not be in place to artificially absorb float, or to replace proper schedule logic.
 2. Leads (negative lags) and Start to Finish (SF) relationships are prohibited.
- U. Retained Logic

1. Schedule calculations shall retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity starts, and the predecessor activity has not finished (out-of-sequence progress).
2. Software features that, in effect, sever the tie between predecessor and successor activities when the successor has started, and the predecessor logic is not satisfied ("progress override") shall not be allowed.

V. Percent Complete

1. Update the percent complete for each activity started, based on the realistic assessment of earned value.
2. Activities which are complete, but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

W. Remaining Duration

1. Update the remaining duration for each activity based on the number of estimated work days necessary to complete the activity.
2. Remaining duration may not mathematically correlate with percentage found under Paragraph "Percent Complete", above.

X. Work Performed Under Adverse Weather Conditions

1. In accordance with the 2011 Denver General Contract Conditions (GCC) Section 305 Work Performed Under Adverse Weather Conditions, adverse weather conditions are those that are not abnormal weather conditions but that can, depending on the Work to be performed, cause defective Work.
2. High and low temperatures, excessive moisture or unusual drying conditions are examples. Reflect the number of anticipated adverse weather days allocated to a weather-sensitive activity in the activity's calendar.
3. These conditions must be recorded in the Contractor Daily QC Reports, notification of adverse weather shall be given within twenty-four (24) hours of occurrence to the DEN Project Manager for concurrence and the adverse weather day documented in order to be considered for a time extension adjustment.

Y. Time Extensions for Abnormal Weather Conditions

1. In accordance with the 2011 Denver General Conditions (GCC) Section 1105 Time Extensions, if abnormal weather conditions are the basis for a request to extend the Contract Time, such request will be documented by data substantiating that weather conditions were unusually severe for the period of time and could not have been reasonably anticipated.
2. To establish that the existence of abnormal weather, the Contractor must submit documentation that establishes that the weather conditions experienced fall outside of the extreme ranges of weather data published by the National Climatic Data Center for the Denver Metropolitan Area for the ten (10) year period immediately preceding the data of the Contract.

3. Regardless of actual weather conditions, any Day in which the Contractor is able to work eighty percent (80%) or more of its scheduled work force shall not be counted as an abnormal weather Day for purposes of calculating weather related time extensions.

Z. Early Completion Schedule and the Right to Finish Early

1. An Early Completion Schedule is an Initial Project Schedule that indicates the scope of the required contract work will be completed before the contractually required completion date.
2. An Initial Project Schedule indicating an Early Completion will not be accepted without being fully resource-loaded (including crew sizes and manhours) and without the DEN Project Manager agreeing that the schedule is reasonable and achievable.
3. The City is under no obligation to accelerate its own work items to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the Contractor's accelerated work.

3.5 PROJECT SCHEDULE SUBMISSIONS

A. General

1. Submit the electronic data files (.xer), reports, and network diagrams required for each submission as described in Article 1.4 SUBMITTALS.
2. If the Contractor fails or refuses to furnish the information and schedule updates as set forth, the Contractor will be deemed unresponsive and payment may be withheld as described in Article 3.3 WITHOLDINGS / PAYMENT REJECTION.
3. Review comments made by DEN Project Controls on the schedules do not relieve the Contractor from compliance with the Contract.
4. Provide the submissions as described below.

B. Preliminary Project Construction Schedule Submission

1. Within ten (10) days after the issuance of Notice to Proceed (NTP), submit the Preliminary Project Construction Schedule:
 - a. If contract time is greater than 120 calendar days, submit the Schedule defining the planned operations detailed, at a minimum, for the first sixty (60) calendar days of the project for acceptance.
 - b. If contract time is shorter than 120 calendar days. submit the Schedule defining the planned operations detailed for the full contract term for acceptance.
 - c. It shall be early start and late finish constrained and logically tied as specified.
2. The Preliminary Project Construction Schedule shall form the basis for the Initial Project Construction Schedule specified herein and shall include all the required plan and program preparations, submissions and approvals identified in the contract. For example, Quality Control Plan, Site-specific Safety Plan, and Environmental Protection Plan, etc.

3. The DEN Project Manager will respond within 14 days to the Preliminary Schedule submittal with either acceptance or direction to revise and resubmit.
4. In lieu of the Preliminary Project Construction Schedule, the Contractor may, at the Contractor's own discretion, submit the Initial Project Construction Schedule at the Preconstruction Meeting.
 - a. If the Initial Project Construction Schedule is submitted in lieu of the Preliminary Project Construction Schedule, the DEN Project Manager will respond within thirty (30) days with acceptance or direction to revise and resubmit within ten (10) days.
5. Acceptance of Preliminary Project Construction Schedule will not constitute approval of Schedule of Values.

C. Gantt Chart Schedule

1. Submit a time-scaled network diagram printout of the Preliminary Project Construction Schedule at the pre-construction meeting.
2. Preparation
 - a. Indicate each significant construction activity separately.
 - b. Identify first workday of each week with a continuous vertical line.
 - c. Outline significant construction activities for the contract duration.
 - d. Include skeleton diagram for the remainder of the Work, when necessary.
 - e. For a project with contract time greater than 120 calendar days, the Preliminary Schedule shall show all significant Work tasks that occur in the first sixty (60) days including, but not limited to planning, mobilization, shop drawings and technical submittals and approval time, procurement, fabrication and construction.
 - f. For a project with contract time less than 120 calendar days, the Preliminary Schedule shall show all Work tasks that occurs during the contract time including, but not limited to planning, mobilization, shop drawings and technical submittals and approval time, procurement, fabrication and construction.
 - g. It shall identify work items or milestones that affect or are affected by City, other Contractor's work, utilities, and other third parties and it shall list major submittals required by the Contract.

D. Narrative Report

1. For a project with contract time greater than 120 calendar days, the Preliminary Project Construction Schedule shall be accompanied by a narrative describing the Contractor's approach to mobilization, procurement, and construction during the first sixty (60) days.
2. For a project with contract time less than 120 calendar days, the Preliminary Project Construction Schedule shall be accompanied by a narrative describing the Contractor's approach to mobilization, procurement, and construction during the contract time.

3. The narrative shall elaborate based on durations, production rates, major equipment to be used, and shall identify all major assumptions used to develop the schedule.

3.6 Initial Project Construction Schedule Submission

A. General

1. Submit the Initial Project Construction Schedule for acceptance within thirty (30) days after issuance of NTP.
2. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent the Work through the entire contract performance period.
3. The DEN Project Manager will respond within 14 days with acceptance or direction to revise and resubmit.
4. The acceptance of the schedule is for general conformity to the Contract requirements and shall not constitute any relief of any Contract requirements.
5. Upon acceptance from the DEN Project Manager and DEN Project Controls, the Initial Project Construction Schedule shall become the Baseline Schedule for the duration of the project.
6. The Baseline Project Construction Schedule may be changed when one or more of the following events occur:
 - a. When a Change Order significantly affects the contract completion date or sequence of work.
 - b. When the Contractor elects to change the sequence or duration of work items affecting the critical path resulting in a major change that requires DEN PM approval.
 - c. When the City directs a change that affects a milestone dates specified in the Special Conditions or alters the length of a critical path.
7. Failure to include any work item required for performance of this Contract shall not excuse the Contractor from completing all Work within applicable completion dates, regardless of the City's acceptance of the schedule.
8. Failure of the contractor to have an Initial Project Construction Schedule accepted by DEN Project Manager will be considered cause for withholding progress payment.

B. Preparation:

1. Project Duration
 - a. Extend schedule from NTP date to Substantial Completion.
 - b. Contract completion date shall not be changed by submission of a schedule that shows an early or late completion date, unless specifically amended by Change Order.
2. Activities
 - a. Treat each building floor or separate area as a separate numbered activity for each main element of the Work.

- b. Prepare a list of all activities required to complete the Work and indicate the estimated time duration, sequence requirements, and relationships of each activity in relation to the other activities.
3. Activity Duration:
 - a. Define activities so no construction activity is longer than twenty (20) days, unless specifically allowed by DEN Project Manager. Include estimated time frames for the following activities:
 - 1) Preparation and processing of submittals.
 - 2) Mobilization and demobilization.
 - 3) Purchase of materials.
 - 4) Delivery of materials.
 - 5) Fabrication of materials
 - 6) System shutdown request and approval
 - 7) Utility/system interruptions
 - 8) Installation of Work
 - 9) Work by City, other contractors, utilities and other third parties that may affect or be affected by Contractor's activities.
 - 10) Startup, Testing and Commissioning
 - 11) Punch list and Final Completion.
4. Critical Path Activities:
 - a. No more than twenty-five (25) percent of the activities may be on the critical path, unless approved IN WRITING by DEN Project Manager.
 - b. Identify critical path activities, including those for interim completion dates.
 - c. Scheduled start and completion dates shall be consistent with Contract milestone dates.
5. Procurement Activities:
 - a. Include procurement activities for long lead items and major items as separate activities in schedule.
 - b. Procurement cycle activities including, but are not limited to, submittals, approvals, purchasing, fabrication and delivery.
 - c. May have a duration greater than twenty (20) calendar days and should represent the time to complete the procurement cycle as described above.
6. Submittal Review Time:
 - a. Include review and re-submittal times indicated in Technical Specification 013300 "Submittal Procedures" in schedule unless time frame is reduced by approval of the DEN Project Manager.
 - b. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
7. Substantial Completion:
 - a. Indicate date established for Substantial Completion.

8. Milestones:
 - a. Include milestone indicated in the Contract Documents, including, but not limited to, NTP, Phasing Milestones and Substantial Completion.

9. Constraints:
 - a. Include constraints and work restrictions indicated in the Contract Documents and show how the sequence of the Work is affected:
 - 1) Phasing:
 - a) Arrange activities in schedule in Work Breakdown Structure (WBS) by Area, Phase or Bid Schedule.
 - b) Coordinate phasing and constraints with those established in Technical Specification Section 011400 "Work Sequence and Constraints".
 - 2) Products Ordered in Advance:
 - a) Include separate activity for each product.
 - b) Include delivery date indicated in Technical Specification Section 011100 "Summary of Work".
 - c) Delivery dates indicated stipulate the earliest possible delivery data.
 - 3) Owner-furnished Products:
 - a) Include separate activity for each product.
 - b) Include delivery date indicated in Technical Specification Section 011100 "Summary of Work".
 - c) Delivery dates indicated stipulate the earliest possible delivery date.

10. Resource Loading of Construction Schedule:
 - a. Coordinate with DEN Project Controls and DEN Project Manager for the requirements.
 - b. Activities shall be resource loaded with direct man-hours required to perform the physical construction of the project. Indirect man-hours shall not be included as resources to activities.

C. Schedule Narrative Report

1. The Initial Project Construction Schedule shall be accompanied by a narrative describing the Contractor's approach to mobilization, procurement, and construction for the project.
2. It shall elaborate on the original assumptions of estimated quantities and production rates, hours per shift, workdays per week, and types, number and capacities of major construction equipment to be used and whether the Contractor plans to work weekends.

3.7 MONTHLY PROGRESS CONSTRUCTION SCHEDULE UPDATES

- A. The Contractor shall submit a monthly progress schedule at the end of each month following the issuance of NTP.
- B. At the end of each month, the Contractor and DEN Project Manager shall agree on the progress of the work and the Contractor shall update the Construction Schedule accordingly.
- C. This review does not constitute an acceptance of the Monthly Progress Schedule update and shall not be used for the purpose of modifying the accepted Baseline Project Construction Schedule.
- D. Failure of the Contractor to have a Monthly Progress Construction Schedule accepted by the DEN Project Manager will be considered cause for withholding progress payment per Article 306 - Working Hours and Schedules and Article 909 - Additional Withholding of Progress Payments of the General Contract Conditions, 2011 Edition.
- E. The Contractor's monthly progress schedule shall include a written narrative describing the overall progress of the Work, provide a critical path analysis, explain the basis for determining construction logic, discuss significant problems with proposed corrective action, and how the status of major changes and any other changes are affecting the project schedule.
- F. Concurrent with making revision to the schedule, prepare a tabulated report showing the following and include in the narrative report:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations for remaining work activities only.
 - 5. Changes in critical path.
 - 6. Change in total float.
 - 7. Changes in contract time.
- G. Minor revisions submitted at monthly progress review meeting are not considered as changes in this context.
- H. If after submitting a request for change to the Construction Schedule, the DEN Project Manager does not agree with the request, the DEN Project Manager will schedule a meeting with the Contractor to discuss the differences.
- I. If a settlement cannot be reached on the change in the Construction Schedule, or if the Contractor has failed to submit revisions to the network, the DEN Project Manager has the option of providing suggested logic or duration changes in all subsequent update schedules.
- J. The suggested logic and/or duration times will remain in effect until the change in the Construction Schedule is settled or until the logic and duration are superseded.

3.8 THREE WEEK LOOK-AHEAD SCHEDULE

- A. The Contractor shall provide the DEN Project Manager an electronic copy prior to and a minimum of four (4) hard copies of the Contractor's Three (3) Week Look-Ahead Schedule for review at the DEN Project Manager's weekly progress meeting.
- B. The schedule shall be generated from Primavera P6 in time-scaled network diagram bar chart format based on the approved accepted CPM Baseline Project Schedule and shall include dates of activities in progress, work to be completed within the period, percent complete of activities, and responsible subcontractor for the activities, testing activities, and anticipated dates of inspection by DEN and other agencies.

3.9 AS-BUILT CONSTRUCTION SCHEDULE:

- A. After all Contract Work items are complete, the contractor shall submit an as-built Project Construction Schedule that reflects the actual sequence of construction activities, includes all change order scope of work changes and shows actual start and finish dates for all work items and milestones for acceptance by the DEN Project Manager.
- B. The basis for the As-built Construction schedule will be the approved Monthly Progress Schedules.

3.10 RECOVERY SCHEDULE

- A. When a monthly progress schedule update indicates the Work is behind the current approved schedule, submit a separate Recovery Schedule indicating means by which Contractor intends to regain compliance with the schedule.
- B. No additional costs will be allowed if such expediting measures are necessary to meet the agreed completion date or dates except as provided elsewhere in the Contract Documents.
- C. If the early finish date for any work item or the substantial completion date does not fall within the Contract Duration, the sequence of work or duration shall be revised by the Contractor through concurrent operations, additional manpower, additional shifts or overtime, additional equipment, or alternative construction methods until the schedule produced indicates that all significant contract completion dates, occupancy dates and milestone dates will be met.
- D. Provide a narrative indicating changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- E. The narrative shall be submitted in accordance with Article 1105 – Time Extensions in the General Contract Conditions, 2011 Edition.

3.11 REQUEST FOR TIME EXTENSION

A. General:

1. Provide a justification of delay to the DEN Project Manager, in accordance with the Contract provisions and clauses, for approval within 10 days of a delay occurring.
2. Prepare a time impact analysis for each DEN Change Directive, Change Notice and Contractor's Change Request to justify time extensions.
3. Added work by the City does not necessarily entitle Contractor to a Time Extension, unless the Contractor can prove that this new added scope impacts the current critical path without manipulating any of the logic and relationships in the most recent and approved schedule.
4. The City may reject any Time Extension Request that does not include a detailed and a clear time impact analysis that shows direct impact to the most current critical path along with a detailed productivity rate calculation to justify the requested time to execute such added work.
5. If the Contractor is granted an extension of time for completion of any milestone or contract completion date under the provisions of the Contract, the determination of the total number of extended days will be based upon the current analysis of the schedule and upon all data relevant to the extension. Such data shall be incorporated into the next monthly update of the schedule.
6. The Contractor acknowledges and agrees that delays in work items that, according to schedule analysis, do not affect any milestone dates or the Contract completion date shown on the CPM Network Schedule at the time of the delay will not be the basis for a Contract extension.

B. Justification of Delay

1. Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify the schedule activities impacted.
2. Show that the event that caused the delay/impact was the responsibility of the City.
3. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion dates.
4. Multiple impacts shall be evaluated chronologically; each with its own justification of delay. With multiple impacts, consider concurrency of delay.
5. A time extension and the schedule fragment become part of the project schedule and future schedule updates upon approval by DEN Project Controls.

C. Time Impact Analysis (Prospective Analysis)

1. Prepare a time impact analysis for City approval based on industry standard AACE 52R-06. Use a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis.
2. If DEN Project Controls determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis.
3. Unless approved by the DEN Project Controls, no other changes will be incorporated into the schedule being used to justify the time impact.

D. Fragmentary Network (FragNet)

1. Prepare a proposed fragment for time impact analysis. The proposed fragment shall sequence new activities into the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates.
2. Clearly show how the proposed fragment shall be tied into the project schedule, including the predecessors and successors to the fragment activities.
3. Obtain City approval of the proposed fragment before incorporating it into the project schedule.

E. Time Extension

1. Time extensions will not be granted until after the City has approved the Justification of Delay, including the time impact analysis.
2. No time extension will be granted unless the delay consumes the available Project Float and extends the projected finish date ("Substantial Completion" milestone) beyond the Contract Duration.
3. The time extension will be in calendar days.
4. Actual delays that the City determines are caused by the Contractor's own actions and result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or interim milestone date.

F. Impact to Early Completion Schedule

1. No extended overhead will be paid for delay prior to the original Contract Substantial Completion date.

3.12 FAILURE TO ACHIEVE PROGRESS

A. General:

1. If the progress falls behind the approved baseline project schedule for reasons other than those that are excusable within the terms of the Contract, the City may require submittal of a written recovery plan for approval.
2. The plan shall detail how progress shall be recovered, including which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

B. Artificially Improving Progress

1. Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited.
2. Indicate assumptions made and the basis for logic, constraint, duration, and calendar changes used in the creation of the recovery plan.
3. Additional resources, manpower, and daily and weekly work hour changes proposed shall be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

C. Failure to Perform

1. Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and/or may result in Non-Conformance Report for corrective action directed by DEN Project Controls pursuant to other Contract provisions.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 013210

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section summarizes the requirements for the submittal of documents to the DEN Project Manager that are defined in these Specifications. It also describes the procedures for "supplemental" submittals.
- B. The Contractor must follow all the requirements of the procedures and the product details and keep all the submittals current and approved prior to any placement of work.

1.3 SUBMITTAL SCHEDULE

- A. The Contractor shall provide a submittal schedule within 14 days after Notice to Proceed. The Submittal Schedule shall be directly related to the CPM schedule, shall identify all the submittals, and shall include the following information for each submittal item
 1. Specification section, Contract article, or special condition.
 2. Specification Subparagraph.
 3. Item description.
 4. Date the submittal shall be submitted.
 5. Name of subcontractor or supplier.
- B. The submittal schedule shall be kept current by the Contractor and submitted with the progress payment requests.
- C. For large files that cannot be loaded or e-mailed through the electronic Project Manager application (Unifier), submit the files on a CD, DVD, or USB flash drive media.

1.4 ELECTRONIC SUBMITTALS

- A. Before the initiation of the submittal process, coordinate and ensure that all submittals comply and follow the requirements of the DEN Building Information Modeling (BIM) Design Standards Manual (DSM) and the DEN BIM PXP.

- B. Submit request for progress payment applications utilizing TEXTURA software as instructed by DEN Project Manager.
- C. Submit Subcontractor's Contract information required by the City and County of Denver Small Business Office as instructed by DEN Project Manager.
- D. Submit original electronic copies of all City and County of Denver Development Department/ Building Inspection Department Approved drawings including all approvals of Deferred Submittals; including but not limited to shoring plans, Fire Protection distribution plans, and structural shop drawings to DEN Project Manager as Informational Submittals. The lack of approval of the Denver Development Services on any document shall be basis for rejection of Work and non-compliance.
 - 1. NOTE: Only original copies shall be accepted. Scans will not be accepted.
- E. Submit electronically scanned copies of all documents required by Chapter 17 "Special Inspection and Testing" of the International Building Code 2009 as amended by City and County of Denver 2011. Keep scale and clarify dimension where electronic copies are not as originally scaled and dimensioned.
- F. All submittals shall be delivered to the DEN Project Manager utilizing the Primavera Construction Manager program (PCM) as attachments and as separate file when files are too large to attach or of an electronic media that is not supported by PCM or Utilizing the EPPM Unifier software uploaded to the share drive Unifier's project site when directed by DEN Project Manager.
 - 1. Acceptable electronic formats
 - a. Print document format (pdf) shall have no security and bookmark every applicable submittal. All pages shall be completely legible and oriented to correct reading view.
 - 2. Formats are acceptable only with written permission of the DEN Project Manager or required by the BIM PXP. For files in any of the following formats, the corresponding stringency will apply:
 - a. Microsoft Office 2007 or newer. All files shall be fully compatible with Microsoft Office 2007.
 - 1) AutoCAD files shall be self-contained with no external x-references.
 - b. BIM files shall conform to the standards and formats outlined in the BIM PXP and DEN BIM DSM.
 - c. Other files pre-approved by the DEN Project Manager.

1.5 INITIAL SUBMITTAL

- A. Each submittal document shall include a title block showing the following information:

1. Date of submittal and revision dates.
 2. Contract title and number.
 3. The names of Contractor, subcontractor, supplier, manufacturer and when applicable, the seal and signature of an Engineer registered in the State of Colorado, for the involved discipline.
 4. Identification of product by either description, model number, style number or lot number.
 5. Subject identification by Contract Drawing or specification reference.
- B. On each submitted drawing, include a blank space on each sheet, three inches by four inches, in the lower right corner, just above the title block, in which the DEN Project Manager or the Designer of Record may indicate the action taken.
- C. Make submissions sufficiently in advance so that the DEN Project Manager Review may be completed not less than 30 days before Work represented by those submittals is scheduled to be performed.
- D. Allow a minimum cycle of 30 days for review of each submittal by the DEN Project Manager.
- E. Accompany submittal documents with DEN transmittal form CM-30, Submittal, which shall contain the following information:
1. Contractor's name, address and telephone number.
 2. Submittal number and date.
 3. Contract title and number.
 4. Supplier's, manufacturer's, or subcontractor's name, address and telephone number.
 5. Identification of variations from Contract Documents.
 6. Contractor's stamp and signature certifying the Contractor's review.
 7. Identification of submittal:
 - a. If the submittal is being made on a General Condition or Special Condition, reference the General or Special Condition number the first two digits of the specification section shall be 00XXXX.
 - b. If the submittal is being made under a specification section, reference the specification number, paragraph number, and subparagraph number.
 - c. If the submittal is being made under a drawing, reference the drawing(s) number and sub-number.
- F. The Contractor shall describe, at the time of submission, variations from the Contract documents in writing, separate from the submittal document. If the DEN Project Manager approves any such variations, an appropriate Contract change order shall be issued, except that if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued. If a submission contains variations and the variation column is not marked on the transmittal form, it will not be considered for review and acceptance. Along with marking the transmittal as a variation, a description must be included which outlines all the differences including maintenance and utility services along with any cost savings from an item not containing the variation.

- G. Changes in accepted submittal documents will not be permitted unless those changes have been accepted, in writing, by the DEN Project Manager.
- H. The form and quality of submittal documents shall comply with Section 013325 "Shop and Working Drawings, Product Data, and Samples."

1.6 SUPPLEMENTAL SUBMITTALS

- A. Supplemental submittal documents initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals with the appropriate primary transmittal referenced.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. The Contractor shall review all submittal documents, stamp, and sign as reviewed and approved as complying with Contract Documents prior to submission to the DEN Project Manager. Submittal documents that are submitted to the DEN Project Manager **THAT HAVE NOT BEEN REVIEWED BY THE CONTRACTOR** will not be reviewed and will be returned to the Contractor. Contractor is responsible for any delays in the Project due to improperly reviewed, stamped, and signed submittals.
- B. The Owner review period will be limited to ten (10) business days from the time complete submittal documents have been submitted.
- C. The Contractor is responsible to obtain all approvals for all deferred submittals, shop drawings, and significant changes from the CCD Development Service Department.
- D. All submittals must delineate any deviation from the intended design and must submit request for substitution to address any significant variation. Refer to Title 4, Article 405 – Shop Drawings, Product Data, and Samples, and Article 406 – Substitution of Materials and Equipment of the General Contract Conditions, 2011 Edition.

3.2 REVIEW BY DEN PROJECT MANAGER

- A. Submittal documents will be reviewed by the DEN Project Manager, the DEN Project Manager Team, and/or the DOR for conformance to requirements of the Contract Documents. Review of a separate item will not constitute review of an assembly in which the item functions. The DEN Project Manager will withhold approval of submittals that depend on other submittals not yet submitted. Review and acceptance will not relieve the Contractor from the Contractor's responsibility for accuracy of submittals, for conformity of submittal document to requirements of Contract Drawings

and specifications, for compatibility of described product with contiguous products and the rest of the system, or for protection and completion of the Contract in accordance with the Contract Drawings and specifications.

- B. The City, the DOR, and/or the DEN Project Manager will review the submittal documents for general conformance with the Contract Documents and mark the Action Code, sign, and date the transmittal.
- C. The Action Codes have the following meanings:
1. Accepted (ACC)
 - a. The submittal conforms to the respective requirements of the contract documents.
 2. Accepted as Noted (AAN)
 - a. The submittal conforms to the respective requirements of the Contract Documents after changes are made in accordance with reviewer's comments. AAN submittals do not need to be resubmitted.
 3. Revise and Resubmit (R&R)
 - a. The submittal is unacceptable and must be revised and resubmitted.
 4. Rejected (REJ)
 - a. The submittal is not approved and a new submittal in accordance with the Contract Documents must be prepared and submitted.
 5. For Information Only (FIO)
 - a. An item is received by the DEN Project Manager but is not reviewed.

3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Coordinate each submittal document with the requirements of the Work. Place particular emphasis upon ensuring that each submittal of one trade is compatible with other submittals of that trade and submittals of other trades including producing as needed drawings showing the relationship of the Work of different trades.
- B. Contractor's responsibility for errors and omissions in submittal documents and associated calculations is not relieved by the DEN Project Manager's review, correction, and acceptance of submittals.
- C. Contractor's liability to the City, in case of variations in the submittal document from the requirements of the Contract Documents, is not relieved by the DEN Project Manager's review and acceptance of submittals containing variations unless the DEN Project Manager expressly approves the deviation in writing, in which the DEN Project Manager describes the variation.

- D. The Contractor shall maintain a file of all approved submittal documents at the work site. The complete file of approved submittal documents shall be turned over to the DEN Project Manager with the as-built documents at the end of the job.
- E. Schedule impact due to resubmittal requirements is the responsibility of the Contractor.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 013300

SECTION 013325 - SHOP AND WORKING DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section consists of preparing and submitting shop and working drawings, product data, samples, and record documents required by other specifications Sections.
 - 1. The Contractor shall submit all shop drawings, working drawings, product data, and samples, as defined in the General Conditions, to the DEN Project Manager in accordance with the requirements in the technical specifications. The DEN Project Manager will return one (1) copy of the shop drawings, working drawings and product data to the Contractor in Unifier.
- B. The Contractor shall not submit as shop drawings, copies or reproductions of drawings issued to the Contractor by DEN.
- C. Related Requirements
 - 1. Section 013300 "Submittal Procedures
 - 2. Section 012510 "Substitutions"
 - 3. Section 017720 "Contract Closeout"

1.3 SUBMITTALS

- A. All submittals shall be delivered to the DEN Project Manager in electronic format. All submittals must be of a consistent format (all PDF). No combination of electronic file types will be allowed unless required by a specific specification section.
 - 1. Acceptable electronic formats: Comply with the electronic file formats approved by DEN Building Information Modeling (BIM) Design Standards Manual If any of the files are in any of the formats listed below then the version of the software shall be no less than identified below:
 - a. Adobe Acrobat 8.0 or newer. All files shall be fully compatible with Adobe Acrobat 8.0.
 - b. Microsoft Office 2007 or newer. All files shall be fully compatible with Microsoft Office 2007.

- c. AutoDesk AutoCAD 2007 or newer. All files shall be fully compatible with AutoDesk AutoCAD 2007.
 - d. AutoCAD files shall be self-contained with no external x-references.
 - e. BIM format outlined in the BIM Project Execution Plan (PXP)
 - f. Other files pre-approved by the DEN Project Manager.
2. Adobe Acrobat Requirements:
- a. Drawings shall have security set to "No Security." Commenting, printing, adding photos, form fields and document signing must be allowed.
 - b. PDF submittals shall be one continuous file or Portfolio. No external links are allowed.
 - c. All individual components of submittals shall be bookmarked inside the PDF file.
 - d. All original documents shall be directly converted from the original electronic format to PDF. Scanning of files shall only be allowed by the DEN Project Manager when the original electronic information is not obtainable.
 - e. Failure to comply with these requirements will result in a return of file to the Contractor for immediate revision.
3. Electronic files submitted shall correspond with DEN File Control Numbering System available from the DEN Project Manager.

B. Quantities

1. One (1) electronic submittal in Unifier containing electronic files of each shop or working drawing.
2. One (1) electronic submittal in Unifier containing electronic files of manufacturer's standard schematic drawings.
3. One (1) electronic submittal in Unifier containing electronic files of manufacturer's calculations and manufacturer's standard data.
4. One (1) electronic submittal in Unifier containing electronic files of manufacturer's printed installation, erection, application, and placing instructions.
5. Three (3) samples of each item specified in the various specification sections, unless otherwise specified.
6. One electronic submittal in Unifier containing electronic files of inspection, test reports, and certificates of compliance.
7. Note: If manufacturer's printed information is in color, all copies of submittals must be in color.

C. Review:

1. Submittal review comments by the DEN Project Manager will be in electronic form and incorporated into the electronic submittal file.
2. Resubmittals of electronic documents shall modify the original electronic file with new information and include the DEN Project Manager's comments with appropriate responses and additional information.

1.4 CHANGES

- A. Changes in products for which shop or working drawings, product data or samples have been submitted will not be permitted unless those changes have been accepted and approved in writing by the Deputy Manager of Aviation as provided in Section 012510 "Substitutions."

1.5 QUALITY CONTROL

- A. Shop drawings and record documents shall be prepared to the standards of quality outlined in the specifications, DSM and BIM PXP, prepared and printed from Revit and checked in the spatial coordination format specified in the BIM PXP.
- B. Refer to DEN BIM DSM for other requirements that may be applicable to this Article.

PART 2 - PRODUCTS

2.1 SHOP AND WORKING DRAWINGS

- A. Prepare shop and working drawings in an electronic format that is current and approved by DEN to a scale large enough to easily depict and annotate each of the various items.
- B. Comply per other BIM requirements for Shop and Working Drawings as established in the DEN BIM DSM.
- C. Include the following as they apply to the subject:
 - 1. Contract title, work order, and number.
 - 2. Respective Contract drawing numbers.
 - 3. Applicable specification section numbers.
 - 4. Relation to adjacent structure or materials.
 - 5. Field dimensions clearly identified as such.
 - 6. Applicable standards such as ASTM or Federal Specification number, FAA, AASHTO, and pertinent authority specifications or standards.
 - 7. Identification of deviations from the Contract Drawings and specifications.
 - 8. Drawing name, number, and revision.
 - 9. Contractor's stamp, initialed or signed, certifying:
 - a. Verification of field measurements.
 - b. Review of submittals for compliance with Contract requirements.
 - c. Compatibility of the Work shown thereon with that of affected trades.
 - 10. Blank space on each sheet per Technical Specifications Section 013300 "Submittal Procedures."

- D. Drawings of equipment and other items that contain multiple parts shall include exploded views showing the relationship of parts and the description of the parts into the smallest units that may be purchased or serviced.
- E. Comply with all submittal requirements of Section 013300 "Submittal Procedures."

2.2 PRODUCT DATA

- A. Modify manufacturer's standard and/or schematic drawings to delete information that is not applicable to the Contract. Supplement standard information with additional information applicable to this Contract.
- B. Modify manufacturer's standard(s), diagrams, schedules, performance charts, illustrations, calculations, and other descriptive data to delete information that is not applicable to the Contract. Indicate dimensions, clearances, performance characteristics, and capacities. Include with the submittal electrical, plumbing, HVAC, and any other diagrams, as applicable.
- C. Modify erection, application, and placing instructions to delete information that is not applicable to the Contract or work order.
- D. Include the following:
 - 1. Contract title, work order, and number.
 - 2. Respective Contract drawing numbers.
 - 3. Applicable Contract technical specification section numbers.
 - 4. Applicable standards such as ASTM or Federal Specification number, FAA, AASHTO and pertinent authority specifications or standards.
 - 5. Identification of deviations from the Contract Drawings and specifications.
 - 6. Contractor's stamp, initialed or signed, certifying:
 - a. Dimensional compatibility of the product with the space in which it is intended to be used.
 - b. Review of submittals for compliance with Contract requirements.
 - c. Compatibility of the product with other products with which it is to perform or which will be next to it.
 - d. The products electrical, plumbing, control and HVAC requirements conform to Contract Documents and the necessary utilities are provided for in the Contract Documents.

- E. Comply with all submittal requirements of Section 013300 "Submittal Procedures."

2.3 SAMPLES

- A. Submit samples of sizes and quantities to clearly illustrate full color range and functional characteristics of products and materials including attachment devices.

- B. Erect field samples and mockups at the work site as specified in specification Sections and at locations acceptable to the DEN Project Manager. All field samples shall be erected in a location that will be readily visible throughout the life of the Contract to allow comparison of the Work as it progresses to the field sample. Field samples and mockups may be incorporated into the Work at Contractor's risk if approved by DEN Project Manager.
- C. The Contractor shall verify, through appropriate inspections and tests, that the samples submitted meet the specifications and shall provide inspection and test data with the samples. The review and comments on the sample shall not relieve the Contractor of the Contractor's responsibility for completion of the Contract.
- D. Show the following information:
1. Contract title and number.
 2. Respective Contract drawing numbers.
 3. Applicable technical specification section numbers.
 4. Applicable standards such as ASTM or Federal Specification number.
 5. Identification of deviations from the Contract Drawings and specifications
 6. Contractor's stamp, initialed or signed, certifying:
 - a. Dimensional compatibility of the product with the space in which it is intended to be used
 - b. Review of submittals for compliance with Contract requirements
 - c. Compatibility of the product with other products with which it is to perform or which will be next to it
 7. If multiple samples are submitted and the DEN Project Manager is requested to make a choice, each sample shall have a unique identification number attached to it so the returned transmittal can state the identification number of the accepted sample and the Contractor will know which one it is.
- E. Comply with all submittal requirements of Section 013300 "Submittal Procedures."

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, catalog numbers, and similar data.
- B. The Contractor shall not start work for which submittals are required until a transmittal has been received by the Contractor marked with the Action Code ACCEPTED or ACCEPTED AS NOTED by the DEN Project Manager.
- C. Before making submittals, ensure that the products will be available in the quantities and at the times required by the Contract.

- D. Submit final, corrected, electronic copies of Contract and shop and working drawings showing the Work as actually installed, placed, erected, and applied. Refer to Section 017720 "Contract Closeout."

3.2 REVIEW BY THE DEN PROJECT MANAGER

- A. One (1) electronic copy of the marked-up shop and working drawing and one (1) electronic copy of the product data will be returned to the Contractor by the DEN Project Manager. Only the transmittal form appropriately marked with the Action Code and comments, if any, will be returned on sample submittals.
- B. Contractor's responsibility for errors and omissions in submittals for compatibility will not be reduced, waived or otherwise limited by the review and acceptance of submittals by the DEN Project Manager.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. .

END OF SECTION 013325

SECTION 013510 - CONSTRUCTION SAFETY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Work specified in this Section includes construction safety precautions and programs by the Contractor and the basis for reviews by the DEN Project Manager.
- B. For projects enrolled under DEN Rolling Owner Controlled Insurance Program (ROCIP) reference the Contract Special Conditions for all safety requirements.
- C. For projects enrolled under DEN Owner Controlled Insurance Program (OCIP) reference the Contract Special Conditions for all safety requirements.

1.3 RESPONSIBILITY

- A. The Contractor is responsible for the health and safety of the Contractor's personnel, agents, subcontractors and their personnel, and other persons on the worksite, for the protection and preservation of the Work and all materials and equipment to be incorporated therein, and for the worksite and the area surrounding the worksite. The Contractor shall take all necessary and reasonable precautions and actions to protect all such persons and property.
- B. This Section shall be interpreted in its broadest sense for the protection of persons and property by the Contractor and no action or omission by the DEN Project Manager or the DEN Project Manager's authorized representatives shall relieve the Contractor of any of its obligations and duties hereunder.

1.4 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for the submittal process. The Contractor's Site Specific Safety Plan shall be submitted and approved under the general Contract prior to commencing any Work. If a Task Order or Change Order is issued where the Work is not covered by the approved Contractor's Site Specific Safety Plan, then a revision to the Safety Plan specific for the Work in the Task Order shall be resubmitted for approval.

1. No progress payment shall be approved until the Contractor's Site Specific Safety Plan has been accepted by the DEN Project Manager.
- B. The Contractor shall provide one electronic copy of the Contractor's Site Specific Safety Plan to the DEN Project Manager for review at least ten (10) calendar days before on-site construction begins. The Contractor's program must meet, as a minimum, all applicable federal, state and local government requirements, and the following:
1. The Contractor shall provide the following information for acceptance by the DEN Project Manager prior to the commencement of construction activities. The Site Specific Safety Plan must address all aspects listed below. If an item is not applicable, then this must be noted in the plan.
 - a. Name of the Contractor's safety representative.
 - b. If the Contractor is running multiple shifts or working more than (40) hours per week, the name of an assistant safety representative who can act in the absence of the site safety representative.
 - c. Twenty-four (24) hours per day emergency phone numbers of Contractor site management to be used in case of injury or accident. Provide at least four contacts.
 - d. Means of protecting employees working in trenches and excavations, including sloping and shielding.
 - 1) Soil classification will be considered as Type C when designing protective systems, unless the Contractor can prove to the satisfaction of DEN that the soil classification is otherwise. Soil classification change request shall be provided to the DEN Project Manager in writing. The decision of the DEN Project Manager will be provided to the Contractor in writing.
 - e. The Contractor shall show how material shall be stored beside the excavation. Stored material shall include the excavated and backfilled material
 - f. Injury and accident handling, including samples of the reporting form.
 - g. How personnel will be handled who are unable to safely perform their duties, including how the Contractor will determine whether personnel are unable to safely perform duties. This may include the Contractor's disciplinary process and employee's physical capabilities to perform the work safely.
 - h. How and when equipment will be checked to see that it is safe, that all safety guards are in place, and that the equipment is being used for its designed purpose and within its rated capacity.
 - i. How and when all electric devices will be checked for proper grounding and insulation. Describe the methods that will be used to lock out electric systems that should not be energized.
 - j. How trash and human organic waste will be disposed of.
 - k. How snow and ice will be removed by the Contractor in the project area.

- l. How concrete forms will be anchored to ensure their stability, including calculations showing that the forms will safely hold the maximum construction loads.
- m. How flammable materials will be stored and handled, and how any spills will be cleaned up and removed for disposal.
- n. What system will be used to prevent fires and, if fires do occur, who will be trained to fight them. In addition, what firefighting equipment will the Contractor have available and how will this equipment's condition be monitored.
- o. How materials will be received, unloaded, stored, moved, and disposed of.
- p. How personnel working above ground level will be protected from falling.
- q. How people working beneath the construction work will be protected.
- r. What will be done to protect personnel in case of severe weather.
- s. How adequate lighting will be provided and monitored.
- t. How air quality will be monitored to ensure that chemical exposures are below current, established OSHA Permissible Exposure Limits. How personnel will be protected if these limits are exceeded.
- u. How the safety of work platforms, man lifts, material lifts, ladders, shoring, scaffolding, etc., will be ensured relating to load capacity and the protection of personnel using or working around them.
- v. The type of personal protective equipment that will be used to protect personnel from hazards.
- w. The type of safety training that will be provided to personnel to inform them of safe work procedures.
- x. How daily audits and inspections will be performed to ensure compliance with the Contractor's Site Specific Safety Plan and current, applicable OSHA regulations.
- y. Procedures to ensure that welding and other hot work is performed safely.
 - 1) A hot work permit from the Denver Fire Department (DFD) will be required for all welding, soldering, cutting, and brazing and or other processes required by DFD on the project. Contractor will comply with all of the provisions in the permit.
- z. How compressed gases will be safely stored, handled, and used.
- aa. Methods to ensure that personnel safely enter, work in, and exit confined spaces.
 - 1) All confined spaces on DEN property are considered permit required. A permit must be obtained from the DFD before Contractor personnel may enter a confined space. Contractors will comply with all provisions and requirements of this permit.
- bb. How the hazards of chemicals will be communicated to personnel, including the use of material safety data sheets and chemical labels.
- cc. Methods to ensure that forklifts and other powered industrial trucks are operated in a safe manner.
- dd. How an effective hearing conservation program will be used to protect personnel from high noise levels and prevent hearing loss.
- ee. How personnel will be protected from the effects of jet blast.

ff. How hazards will be identified and corrected when reported.

1.5 DEN PROJECT MANAGER'S REVIEW

- A. Prior to the start of any work by contractor or subcontractor personnel, the Contractor shall provide the DEN Project Manager with a list of its personnel, subcontractor's personnel and other personnel the Contractor has requested to work at Denver International Airport, who have signified in writing that they have been briefed on, or have read and understand, the Contractor's Site Specific Safety Plan.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 IMPLEMENT CONTRACTOR'S OPERATIONAL SAFETY PLAN

- A. Implement the approved Contractor's Operational Safety Plan as described in Article 1 of this Section and in Section 011100 "Summary of Work."
- B. If the Contractor experiences lost time or an injury rate greater than 75 percent of the national average for all construction, the Contractor shall notify the DEN Project Manager and audit its safety procedures and submit a plan to reduce its rates.
- C. If at any time the lost time or injury rates experienced by the Contractor are 150 percent or more of the national average for construction, the Contractor shall notify the DEN Project Manager and immediately hire an independent safety professional who shall audit the Contractor's procedures and operations and make a report of changes that the Contractor should implement to reduce the rate including changing personnel.
1. The report shall be submitted to the DEN Project Manager.
 2. The Contractor shall immediately begin implementing the recommendations of the independent safety professional.
 3. A weekly report shall be submitted by the Contractor to the DEN Project Manager on the status of the implementation of the recommendations.
 4. Failure to comply with these requirements is a basis to withhold a portion of progress payments.

3.2 ROLLING OWNER CONTROLLED INSURANCE PROGRAM (ROCIP)

- A. Implement Rolling Owner Controlled Insurance Program (ROCIP) as provided in the Project Manual issued for bid or proposal

3.3 OWNER CONTROLLED INSURANCE PROGRAM (OCIP)

- A. Implement Owner Controlled Insurance Program (OCIP) as provided in the Project Manual issued for bid or proposal

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 013510

SECTION 013520 - CONSTRUCTION SAFETY - AIRSIDE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Work specified in this Section includes construction safety precautions and programs by the Contractor for airside, and the basis for reviews by the DEN Project Manager.
- B. Related Specification Sections:
 - 1. Section 011420 "Security Requirements and Sensitive Security Information".
 - 2. Section 011430 "Vehicle and Equipment Permitting".
 - 3. Section 011810 "Utilities Interface".
 - 4. Section 013510 "Construction Safety". This section covers the work within Concourse A. The airside construction safety covers the transporting of materials and equipment across the airfield.
- C. For projects enrolled under DEN Rolling Owner Controlled Insurance Program (ROCIP) reference the Contract Special Conditions for all safety requirements.
- D. For projects enrolled under DEN Owner Controlled Insurance Program (OCIP) reference the Contract Special Conditions for all safety requirements.

1.3 RESPONSIBILITY

- A. The Contractor is responsible for the health and safety of the Contractor's personnel, agents, subcontractors and their personnel, and other persons on the worksite, for the protection and preservation of the Work and all materials and equipment to be incorporated therein, and for the worksite and the area surrounding the worksite. The Contractor shall take all necessary and reasonable precautions and actions to protect all such persons and property.
- B. This Section shall be interpreted in its broadest sense for the protection of persons and property by the Contractor and no action or omission by the DEN Project Manager or the DEN Project Manager's authorized representatives shall relieve the Contractor of any of its obligations and duties hereunder.

1.4 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for the submittal process. The Contractor's Operational Safety Plan shall be submitted and approved under the general Contract prior to commencing any Work. If a Task Order or Change Order is issued where the Work is not covered by the approved Contractor's Operational Safety Plan, then a revision to the Safety Plan specific for the Work in the Task Order shall be resubmitted for approval.
1. No progress payment shall be approved until the Contractor's Operational Safety Plan has been accepted by the DEN Project Manager.
- B. Scope: The Contractor's Operational Safety Plan shall be developed and submitted by the contractor for the DEN Project Manager's review and approval. The Operational Safety Plan shall be developed according to the guidelines and requirements provided in FAA AC No. 150/5370-2F "Operational Safety on Airports During Construction" and will describe how the Contractor will comply with the requirements of the Construction Safety and Phasing Plan (CSPP). The Operational Safety Plan shall cover the actions of not only the construction personnel and equipment, but the actions of inspection personnel and airport staff for the duration of construction activities.
- C. Definitions:
1. Approach Surface: A surface longitudinally centered on the extended runway centerline and extending outward and upward from either a runway threshold or 200 feet behind a threshold. This surface is needed to define where unobstructed airspace above the runway begins.
 2. Notice To Airmen (NOTAM): A notice to the flying public (airmen) through FAA's NOTAM system. Normally initiated by message to the nearest FAA Flight Service Station. Issuance of the NOTAM will be coordinated through the DEN Project Manager and DEN Operations.
 3. Object Free Area: A two-dimensional ground area surrounding runways, taxiways, and taxi lanes that is clear of objects, except for objects whose location is fixed by function.
 4. Safety Area (see AC 150/5300-13A): A defined surface adjacent to runways, taxiways and taxi lanes prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot or excursion from the paved surface. Each safety area must be cleared and graded and have no potentially hazardous ruts, humps, depressions or other surface variations. Each safety area must be drained by grading or storm sewers to prevent water accumulation. East safety area must be capable under dry conditions of supporting snow removal and aircraft rescue and firefighting equipment and or supporting the occasional passage of aircraft without causing any damage to the aircraft. No objects may be located in any safety area, except for objects that need to be located in a safety area because of their function. These objects must be constructed, to the extent practical, on frangibly mounted structures of the lowest practical height, with the frangible point no higher than three (3) inches above grade.

- D. Policy: Aviation safety is a primary consideration during airport construction. These activities shall be planned and scheduled to minimize disruption of normal aircraft activities. If the clearances and restrictions described in this plan cannot be maintained while construction is underway, action will be taken by the Contractor to perform Work at night or during periods of minimal aircraft activity.
- E. Safety Impacts: The Contractor shall take all necessary steps and precautions to mitigate the impact of hazardous conditions as they may relate to the Work. Potentially hazardous conditions which may occur during airport construction include, but are not limited to, the following:
1. Trenches, holes, or excavations on or adjacent to any active runway, taxiway, taxi lane, apron, or related safety areas.
 2. Unmarked/unlighted holes or excavations on or adjacent to any active runway, taxiway, taxi lane, apron, or related safety areas.
 3. Mounds or piles of earth, construction material, temporary structures, or other objects on or in the vicinity of any active runway, taxiway, taxi lane, apron or related safety, approach, or departure areas.
 4. Pavement drop-offs that would cause, if crossed at normal operating speeds, damage to aircraft that normally use the airport. The maximum drop-off is 3 inches per FAA AC 150/5300-13A.
 5. Vehicles or equipment (whether operating or idle) on any active runway, taxiway, taxi lane, apron or related safety, approach, or departure areas.
 6. Vehicles, equipment, excavations, stockpiles, or other materials that could impinge upon NAVAID-critical areas and degrade or otherwise interfere with electronic NAVAIDS or interfere with visual NAVAIDS facilities.
 7. Unmarked utility, NAVAIDS, weather service, runway lighting, underground power, or signal cables that could be damaged during construction.
 8. Objects or activities anywhere on or in the vicinity of an airport which would be distracting, confusing, or alarming to pilots during aircraft operations.
 9. Unflagged/unlighted low visibility items such as tall cranes, backhoes, scrapers, dump trucks, rollers, compactors, dozers and the ilk, in the vicinity of an active runway, taxiway, taxi lane, apron or related safety, approach, or departure areas.
 10. Dirt, debris, or other transient accumulations that temporarily obscure pavement markings or pavement edges, or derogate the visibility of runway or taxiway markings or lighting or of construction and maintenance areas.
 11. Trash or other materials with foreign object damage (FOD) potential, whether on runways, taxiways, taxi lanes, aprons or in related safety areas.
 12. Failure to control vehicle, human and large animal access to, and nonessential nonaeronautical activities on, open aircraft movement areas.
 13. Failure to maintain radio communication between construction vehicles and air traffic control or other on-field communications facilities.
 14. Construction activities or material which could hamper Aircraft Rescue and Fire Fighting (ARFF) vehicle access from ARFF stations to all parts of the runway/taxiway system, runway approach and departure areas, or aircraft parking locations.
 15. Inadequate fencing or other marking to separate construction areas from open aircraft operating areas.
 16. Bird attractions such as edibles (food scraps, etc.), trees, brush, other trash, grass/crop seeding, or ponded water on or near the airport.

F. Safety Requirements:

1. General:

- a. During performance of this Contract, the airport runways, taxiways, taxi lanes, and aircraft parking aprons shall remain in use by aircraft to the maximum extent possible, consistent with continual safety. Aircraft use of areas near the Contractor's Work will be controlled to minimize disturbance to the Contractor's operation. However, AIRCRAFT HAVE THE RIGHT OF WAY AT ALL TIMES. The Contractor shall not allow employees, subcontractors, suppliers, or any unauthorized persons to enter or remain in any airport area that would be hazardous to persons or to aircraft operations.
- b. Contractor personnel, airport staff and field inspectors directly involved in on-airport construction shall:
 - 1) Be aware of the types of conditions, safety problems, and/or hazards identified each day at the airport. To ensure that all personnel are aware, daily meetings between management and supervisory personnel and their employees shall be scheduled prior to any work commencing on the shift.
 - 2) Inspect daily all work and/or storage areas for which the Contractor is responsible to be aware of current conditions.
 - 3) Promptly take all steps needed to remedy any unsafe or potentially unsafe condition. Coordinate with the DEN Project Manager to insure immediate corrective action is undertaken.
- c. Before commencement of construction activity the Contractor, through coordination with the DEN Project Manager and DEN Operations, shall give notice using the NOTAM system of construction on the airfield. In addition, a NOTAM shall be issued for the completion of construction on the airfield.

2. Construction Area Marking: Temporary lighting, barricades, flagging, and flashers are required as shown on the plans and per FAA AC 150/5370-2F Chapter 2 Section 220.b.(1)(2) Flag lines, traffic cones, flashers, edge lights, and/or signs shall be used as necessary:

- a. To clearly separate all construction from other parts of an air operations area
- b. To identify isolated hazards, such as open manholes, excavations, areas under repair, stockpiled material, waste areas, etc.
- c. Vehicle and pedestrian access routes used for airport construction shall be controlled to prevent any unauthorized entry of persons, vehicles, or animals.
- d. Vehicle parking areas for Contractor employees shall be designated in advance to minimize traffic in open/active aircraft movement areas.

3. Cables and Utilities:

- a. Special attention shall be given to preventing unscheduled interruption of

utility services and facilities. The location of all cables and utilities shall be identified prior to construction activities.

- b. There shall be coordination among the Contractor, the DEN Project Manager, DEN Operations, the FAA, the National Weather Service, utility companies, and any other appropriate entity or organization. NAVAIDS, weather service facilities, electric cables, and other utilities must be fully protected during the entire construction time.
- c. Power, communication, and control cables leading to and from any FAA NAVAIDS, weather service, and other facilities will be marked in the field by the appropriate individuals as identified in Section 011810 "Utilities Interface" for the information of the Contractor before any work in their general vicinity is started. Thereafter, through the entire duration of construction, utilities shall be protected from any possible damage.
- d. At the intersection of expansion joints and centerline lighting circuits on taxiways and runways, the electrical conduit may be within the 21" portion of the Portland cement concrete pavement. Coordination with the DEN Project Manager's representative and the DEN Electrical Department is of utmost importance for both the scheduling of an outage and the removal of conductors while cutting the joint.

4. Vehicle and Employee Identification:

- a. Contractor vehicles and equipment shall be flagged for high daytime visibility and if appropriate, lighted for nighttime operations. Vehicles that are not marked and lighted shall be escorted by a vehicle that is equipped with appropriate marking and lighting devices. Marking and lighting shall be in conformance with FAA AC 150/5210-5D, current edition, or as outlined in Section 011430 "Vehicle and Equipment Permitting" of the Contract Documents.
- b. The Contractor will be required to conform to the specific requirements as outlined in Section 011420 "Security Requirements and Sensitive Security Information (SSI)" of the Contract documents.

5. Radio Communications:

- a. The Contractor's construction superintendent and flag personnel shall be required to coordinate directly with the DEN Project Manager or designated Representative. Only the DEN Project Manager or designated Representative shall monitor transceiver radios tuned to the frequency for communications with DEN Operations and B Tower Control. Radios shall be used to obtain the proper clearance concerning the movement of equipment, trucks, etc., on the airfield. Further, any unusual occurrences in the flight pattern of approaching or departing aircraft shall be acknowledged by all concerned so that operation of the airport and the construction work can be safely carried on at all times.

6. Haul Routes Crossing Active Aircraft Operation Areas:

- a. The Contractor shall provide a minimum of one (1) broom truck to continuously clean the surface of the active taxiway, taxi lane or apron of

any foreign object damage (FOD) or other objectionable debris that may result from hauling activities. Additional broom trucks may be required to expedite the cleanup process. Opening the taxiway, taxi lane, or apron to aircraft operations shall only be approved after a visual inspection of the pavement surface by the DEN Airfield Operations Manager.

- b. The Contractor shall not work within the minimum of the following: 160 ft. of the centerline of an active taxiway, 310 ft. of the centerline of an active runway, or the minimum requirements of the FOD or Safety Zone unless otherwise noted in the Contract Documents and as approved in writing by the DEN Project Manager.
- c. All construction equipment and vehicles shall be flagged for high daytime visibility and if appropriate, lighted for nighttime operations. Vehicles that are not marked and lighted shall be escorted by a vehicle that is equipped with appropriate marking and lighting devices. Marking and lighting shall be in conformance with FAA AC 150/5210-5D, current edition.
- d. All Contractor and Subcontractor employees must be aware of the types of safety problems and hazards associated with aircraft operations and construction activities.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S OPERATIONAL SAFETY PLAN

- A. The Contractor shall provide one electronic copy of the Contractor's Operational Safety Plan to the DEN Project Manager for review at least ten (10) calendar days before on-site construction begins. The airside safety plan shall be combined with the safety plan under Section 013510. The Contractor's program must meet, as a minimum, all applicable federal, state and local government requirements, and the following:
 - 1. The Contractor shall provide the following information for acceptance by the DEN Project Manager prior to the commencement of construction activities. The Operational Safety Plan must address all aspects listed below. If an item is not applicable, then this must be noted in the plan.
 - a. Name of the Contractor's safety representative.
 - b. If the Contractor is running multiple shifts or working more than (40) hours per week, the name of an assistant safety representative who can act in the absence of the site safety representative.
 - c. Twenty-four (24) hours per day emergency phone numbers of Contractor site management to be used in case of injury or accident. Provide at least four contacts.
 - d. Means of protecting employees working in trenches and excavations, including sloping and shielding.
 - 1) Soil classification will be considered as Type C when designing protective systems, unless the Contractor can prove to the satisfaction of DEN that the soil classification is otherwise. Soil

classification change request shall be provided to the DEN Project Manager in writing. The decision of the DEN Project Manager will be provided to the Contractor in writing.

- e. The Contractor shall show how material shall be stored beside the excavation. Stored material shall include the excavated and backfilled material
- f. Injury and accident handling, including samples of the reporting form.
- g. How personnel will be handled who are unable to safely perform their duties, including how the Contractor will determine whether personnel are unable to safely perform duties. This may include the Contractor's disciplinary process and employee's physical capabilities to perform the work safely.
- h. How and when equipment will be checked to see that it is safe, that all safety guards are in place, and that the equipment is being used for its designed purpose and within its rated capacity.
- i. How and when all electric devices will be checked for proper grounding and insulation. Describe the methods that will be used to lock out electric systems that should not be energized.
- j. How trash and human organic waste will be disposed of.
- k. How snow and ice will be removed by the Contractor in the project area.
- l. How concrete forms will be anchored to ensure their stability, including calculations showing that the forms will safely hold the maximum construction loads.
- m. How flammable materials will be stored and handled, and how any spills will be cleaned up and removed for disposal.
- n. What system will be used to prevent fires and, if fires do occur, who will be trained to fight them. In addition, what firefighting equipment will the Contractor have available and how will this equipment's condition be monitored.
- o. How materials will be received, unloaded, stored, moved, and disposed of.
- p. How personnel working above ground level will be protected from falling.
- q. How people working beneath the construction work will be protected.
- r. What will be done to protect personnel in case of severe weather.
- s. How adequate lighting will be provided and monitored.
- t. How air quality will be monitored to ensure that chemical exposures are below current, established OSHA Permissible Exposure Limits. How personnel will be protected if these limits are exceeded.
- u. How the safety of work platforms, man lifts, material lifts, ladders, shoring, scaffolding, etc., will be ensured relating to load capacity and the protection of personnel using or working around them.
- v. The type of personal protective equipment that will be used to protect personnel from hazards.
- w. The type of safety training that will be provided to personnel to inform them of safe work procedures.
- x. How daily audits and inspections will be performed to ensure compliance with the Contractor's Operational Safety Plan and current, applicable OSHA regulations.
- y. Procedures to ensure that welding and other hot work is performed safely.

- 1) A hot work permit from the Denver Fire Department (DFD) will be required for all welding, soldering, cutting, and brazing and or other processes required by DFD on the project. Contractor will comply with all of the provisions in the permit.
- z. How compressed gases will be safely stored, handled, and used.
- aa. Methods to ensure that personnel safely enter, work in, and exit confined spaces.
 - 1) All confined spaces on DEN property are considered permit required. A permit must be obtained from the DFD before Contractor personnel may enter a confined space. Contractors will comply with all provisions and requirements of this permit.
- bb. How the hazards of chemicals will be communicated to personnel, including the use of material safety data sheets and chemical labels.
- cc. Methods to ensure that forklifts and other powered industrial trucks are operated in a safe manner.
- dd. How an effective hearing conservation program will be used to protect personnel from high noise levels and prevent hearing loss.
- ee. How personnel will be protected from the effects of jet blast.
- ff. How hazards will be identified and corrected when reported.

2.2 DEN PROJECT MANAGER'S REVIEW

- A. Prior to the start of any work by contractor or subcontractor personnel, the Contractor shall provide the DEN Project Manager with a list of its personnel, subcontractor's personnel and other personnel the Contractor has requested to work at Denver International Airport, who have signified in writing that they have been briefed on, or have read and understand, the Contractor's Operational Safety Plan.

PART 3 - EXECUTION

3.1 IMPLEMENT CONTRACTOR'S OPERATIONAL SAFETY PLAN

- A. Implement the approved Contractor's Operational Safety Plan as described in Part 1 and Part 2 of this Section and in Section 011100 "Summary of Work."
- B. If the Contractor experiences lost time or an injury rate greater than 75 percent of the national average for all construction, the Contractor shall notify the DEN Project Manager, audit its safety procedures, and submit a plan to reduce its rates.
- C. If at any time the lost time or injury rates experienced by the Contractor are 150 percent or more of the national average for construction, the Contractor shall notify the DEN Project Manager and immediately hire an independent safety professional who shall audit the Contractor's procedures and operations and make a report of changes that the Contractor should implement to reduce the rate including changing personnel.

1. The report shall be submitted to the DEN Project Manager.
2. The Contractor shall immediately begin implementing the recommendations of the independent safety professional.
3. A weekly report shall be submitted by the Contractor to the DEN Project Manager on the status of the implementation of the recommendations.
4. Failure to comply with these requirements is a basis to withhold a portion of progress payments.

3.2 ROLLING OWNER CONTROLLED INSURANCE PROGRAM (ROCIP)

- A. Implement Rolling Owner Controlled Insurance Program (ROCIP) as provided in the Project Manual issued for bid or proposal

3.3 OWNER CONTROLLED INSURANCE PROGRAM (OCIP)

- A. Implement Owner Controlled Insurance Program (OCIP) as provided in the Project Manual issued for bid or proposal

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 013520

SECTION 014100 - REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section identifies primary compliance with the State, City and County of Denver's regulatory requirements including:
1. City and County of Denver / Department of Aviation.
 2. Colorado Department of Public Health and Environment.
 3. City and County of Denver Development Services, including the Department of Public Works and Division of Wastewater Management.
 4. The standards that govern design and construction projects at Denver International Airport.
- B. Construction shall be based on the latest edition of the referenced codes including additions and revisions thereto that are in effect at the time of Project bidding or whichever is latest, and as specifically related.

1.3 RELATED SECTIONS

- A. Section 015719 "Temporary Environmental Controls" for environmental and related permitting requirements.

1.4 BUILDING CODE

- A. All design and construction work shall be governed by the Building Code for the City and County of Denver, latest edition. This is based upon the International Building Code of the International Code Council with Denver Amendments to this code. Appendix N of the Denver Amendments addresses Construction of Airport Buildings and Structures.
1. This Contract shall be based on the most current published version of the ICC series as Amended by The City and County of Denver.

1.5 DENVER BUILDING DEPARTMENT

- A. For review and approval of all construction documents for compliance to the Denver building code:

1.6 DENVER FIRE DEPARTMENT

- A. For review and approval of plans for compliance with the Denver Fire Department's requirements as they apply to the Denver International Airport:

Denver Fire Department
745 West Colfax Avenue
Denver, Colorado 80204
Telephone 720-913-3474

- B. The Contractor is advised that the Denver Fire Department – Fire Prevention Bureau requires permitting for the following activities as they apply to the scope of work. The Contractor is responsible for obtaining the appropriate permits necessary to complete the work. All costs associated with this permitting and policy compliance shall be the responsibility of the Contractor. The policies all reference the International Fire Code (IFC).

1. “Hot work”, which is defined as the operation of any equipment or tool that creates sparks, hot slag, or radiant or convective heat as a result of the work. This includes, but is not limited to, welding, cutting, brazing, or soldering.
2. Use and storage of compressed gas for both temporary storage and permanent facility installation. This includes, but is not limited to, flammable gas (excluding propane-LPG), oxidizer (including oxygen), and inert and/or simple asphyxiates.
3. Tank installation, which includes aboveground storage tanks (AST) and underground storage tanks (UST) for both temporary tanks and permanent facility installations.

- C. In addition to the above permits, the Denver Fire Department may require other permits that are associated with the specific work in the Contract Documents. Policies provided by the Denver Fire Department are meant to provide basic information for the most common conditions and situations. In any given occupancy, many other Uniform Fire Code requirements may be enforced. These should be addressed with the Denver Fire Department before construction begins and during construction with premise inspection(s).

1. The Fire Prevention Bureau web site is denfpb@denvergov.org

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PERMITS AND CERTIFICATIONS

- A. The Contractor shall maintain records on site of all permits acquired by federal, state, and local agencies. Posting of permits shall conform to requirements of the respective agencies.
- B. At the completion of any inspection by other agencies, the Contractor shall forward copies of the status of the inspection and copies of any approved or "signed-off" inspections by the respective agencies to the DEN Project Manager.
- C. At the time of request for Substantial Completion, the Contractor shall forward to the DEN Project Manager all permits approved by the respective agencies.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 014100

SECTION 014210 - REFERENCED MATERIAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 REFERENCED MATERIAL

- A. City and County of Denver, Department of Aviation, Standard Specification for Construction, General Contract Conditions
- B. The following documents may be available for examination at the Owner's offices unless otherwise noted. The referenced material and documents are not part of the Contract Documents unless otherwise specified.
1. Environmental Impact Statement (EIS). Not Applicable
 2. Geotechnical Reports: Not Applicable
 - a. Borings, other field and laboratory explorations, and investigations have been made to indicate subsurface materials at particular locations. Explorations and investigations conducted by designers and their subconsultants are solely for the purpose of study and design.
 - b. The subsurface exploration and investigation information is presented or made available to indicate some of the conditions that may be encountered during construction and is offered as supplementary information only. Geotechnical information presented in the referenced material represents the opinion of soils consultants as to the character of the materials encountered. Subsurface information was directly obtained only at the specified location and necessarily indicates subsurface conditions only at the respective plan location, depths penetrated and only at the time of the exploration.
 - c. Neither the City nor the Designers assume any responsibility whatever in respect to the sufficiency or accuracy of borings made, or of the logs of test borings, or of other investigations, or of the interpretations made thereof, and there is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur. It is expressly understood that the making of deductions, interpretations, and conclusions from all of the accessible factual information, including the nature of the materials to be excavated, the difficulties of doing other work affected by the geology, groundwater elevations and other subsurface conditions at the site of the Work are the Contractor's sole responsibility.

- d. Information derived from inspection of logs of borings, topographic maps, technical memorandum, reports, or plans showing information of the subsurface of site conditions will not relieve the Contractor from any risk or from properly examining the site and making such additional investigations as the Contractor may elect or from properly fulfilling all the terms of the Contract Documents.
3. Available Conceptual Utility and Drainage Reports. Not Applicable
4. DEN Building Information Modeling (BIM) Design Standards Manual (DSM)
5. Woolpert, Inc. Report - "A Low Distortion Projection for Denver International Airport (DEN)", dated 12/10/2010. Not Applicable

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 014210

SECTION 014220 - ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 REFERENCE LIST

- A. Documents published by the following agencies may be referenced within these Contract Documents to define the quality of materials, equipment, workmanship, and other features of Work. Unless otherwise stated, the reference documents shall be of the latest edition as of the date of the Advertisement for Bids.
- B. Wherever used in the Contract Documents, the following abbreviations will have the meanings listed:

| Abbreviation | Definition |
|--------------|--|
| AALA | American Association of Laboratory Accreditation |
| AAN | American Association of Nurserymen |
| AAO | Affirmative Action Officer |
| AASHTO | American Association of State Highway and Transportation Officials |
| ACI | American Concrete Institute |
| ADA | Americans with Disabilities Act |
| AFI | Air-Filter Institute |
| AGTS | Automated Ground Transportation System |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| AITC | American Institute of Timber Construction |
| AMCA | Air Moving and Conditioning Association |
| ANSI | American National Standards Institute, Inc. |
| APA | American Plywood Association |
| APEN | Air Pollution Emission Notes |
| APWA | American Public Works Association |
| ARI | Air Conditioning and Refrigeration Institute |
| ASCE | American Society of Civil Engineers |
| ASHRAE | American Society of Heating, Refrigeration, and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASNT | American Society for Non-Destructive Testing |
| ASPE | American Society of Plumbing Engineers |
| ASSE | American Society of Sanitary Engineering |
| ASTM | American Society for Testing and Materials |

| Abbreviation | Definition |
|--------------|--|
| AWPA | American Wood Preserver's Association |
| AWS | American Welding Society |
| AWWA | American Water Works Association |
| BID | Building Inspection Division, Department of Public Works |
| BIM | Building Information Modeling |
| CAR | Corrective Action Report |
| CCD | City and County of Denver |
| CCR | Contractor Change Request |
| CCRL | Cement Concrete Reference Laboratory |
| CD | Change Directive |
| CDOH | Colorado Department of Highways or Colorado Department of Health |
| CDOT | Colorado Department of Transportation |
| CMEC | Concrete Materials Engineering Council |
| CN | Change Notice |
| CO | Change Order |
| COE | Corps of Engineers |
| CPM | Critical Path Method |
| CR | Change Request |
| CRSI | Concrete Reinforcing Steel Institute |
| CSI | Construction Specifications Institute |
| DEN | Denver International Airport |
| DFD | Denver Fire Department |
| DOT | United States Department of Transportation |
| DOR | Designer of Record |
| DWB | Denver Water Board |
| EEO | Equal Employment Officer or Equal Employment Opportunity |
| EIA | Electronics Industry Association |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| FAA | Federal Aviation Administration |
| FCC | Federal Communications Commission |
| FHWA | Federal Highway Administration |
| FM | Factory Mutual Association |
| FS | Federal Specifications (U.S. General Services Administration) |
| GCC | General Contract Conditions |
| GIS | Geographic Information Systems |
| GMP - | Guaranteed Maximum Price |
| IAPMO | International Association of Plumbing and Mechanical Officials |
| IBC | International Building Code (published by ICC) |
| IBR | Institute of Boiler and Radiator Manufacturer's |
| ICBO | International Conference of Building Officials |
| ICC | International Code Council |
| ICEA | Insulated Cable Engineers Association |
| IEBC | International Existing Building Code (published by ICC) |
| IEEE | Institute of Electrical and Electronic Engineers |
| IES | Illuminating Engineering Society |
| IMC | International Mechanical Code (published by ICBO) |

| Abbreviation | Definition |
|--------------|--|
| IPC | International Plumbing Code (published by ICBO) |
| ISA | Instrument Society of America |
| ITA | Independent Testing Agency |
| MIL | Military Specifications (Naval Publications and Forms Center) |
| MSS | Manufacturers Standardization Society of the Valve and Fittings Industry |
| MUTCD | Manual of Uniform Traffic Control Devices |
| NAAB | National Association of Air Balance |
| NACE | National Association of Corrosion Engineers |
| NBS | National Bureau of Standards (now called National Institute of Standards and Technology) |
| NEC | National Electric Code (NFPA 70) |
| NECA | National Electric Contractors Association |
| NEMA | National Electrical Manufacturer's Association |
| NESC | National Electrical Safety Code |
| NFC | National Fire Code (as published by NFPA) |
| NFPA | National Fire Protection Association |
| NICET | National Institute for the Certification of Engineering Technologies |
| NIST | National Institute of Standards and Technology |
| NGS | National Geological Survey |
| NLMA | National Lumber Manufacturers Association |
| NOAA | National Oceanic and Atmospheric Administration |
| NRMCA | National Ready Mix Concrete Association |
| NTP | Notice to Proceed |
| NVLAP | National Voluntary Laboratory Accreditation Program |
| OSHA | Occupational Safety and Health Administration |
| PCA | Portland Cement Association |
| PCI | Prestressed Concrete Institute |
| PDM | Precedent Diagram Method |
| PS | Product Standard of NIST (U.S. Department of Commerce) |
| PM | Project Manager |
| PMT | Project Management Team |
| PXP | Project Execution Plan |
| QA | Quality Assurance |
| QC | Quality Control |
| RFI | Request for Information |
| RTD | Regional Transportation District |
| SC | Special Contract Condition |
| SDI | Steel Door Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractor's National Association |
| SSPWC | Standard Specifications for Public Works Construction |
| TCP | Traffic Control Plan |
| TSA | Transportation Security Administration |
| UL | Underwriters Laboratories, Inc. |
| USC | United States Code |
| WBS | Work Breakdown Schedule |

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
014220
ABBREVIATIONS AND SYMBOLS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 014220

SECTION 014225 - REFERENCE STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section contains a summary of industry-accepted and recognized standards published by trade associations, government, and institutional organizations that are referred to in the various Sections of these specifications or elsewhere in the Contract Documents.
- B. Standards listed herein are included in the Contract Documents by this reference and become a part of the Contract Documents to the same extent as though included in their entirety unless specific limitations are noted in the individual specifications Sections.
- C. Listings of reference standards include name and address of the organization publishing the standard, and the full name and designator of each of the standards referenced herein.
- D. If a publication date or edition number is listed with the reference standard, that publication date or edition number shall apply. Otherwise, the publication date or edition number in effect at the Contract date shall apply.
- E. Inclusion of reference standards herein does not make the DEN Project Manager an agent of the publishing agency, nor does it obligate the DEN Project Manager to perform inspections required by or to enforce rules or regulations contained in the reference standards.

1.3 SCHEDULE OF REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials (AASHTO), 444 North Capitol Street, NW, Suite 249, Washington, DC 20090:
 - 1. AASHTO T26—Standard Method of Test for Water to be Used in Concrete.
 - 2. AASHTO T84—Specific Gravity and Absorption of Fine Aggregate.
 - 3. AASHTO T85—Specific Gravity and Absorption of Coarse Aggregate.
 - 4. AASHTO T103—Soundness of Aggregates by Freezing and Thawing
 - 5. AASHTO T219—Standard Methods of Testing Lime for Chemical Constituents and Particle Sizes.

- B. American Concrete Institute (ACI) 38800 Country Club Drive, Farmington Hills, MI 48331
1. ACI 211.1—Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 2. ACI 301—Specifications for Structural Concrete for Buildings.
 3. ACI 304—Recommended Practices for Measuring, Mixing, Transporting and Placing Concrete.
 4. ACI 304.2R—Placing Concrete by Pumping Methods.
 5. ACI 305R—Hot Weather Concreting.
 6. ACI 306R—Cold Weather Concreting.
 7. ACI 318—Building Codes Requirements for Structural Concrete
 - a. Reference to ACI 318 may be limited to more stringent requirements of local building code.
- C. American Society for Testing and Materials (ASTM), International 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428:
1. ASTM A 27—Mild to Medium Strength Carbon - Steel Casting for General Application.
 2. ASTM A 36—Structural Steel.
 3. ASTM A 47—Malleable Iron Castings.
 4. ASTM A 82—Specification for Steel Wire, Plain, for Concrete Reinforcement: Replaced by A1064
 5. ASTM A 123—Hot-dip Galvanizing.
 6. ASTM A 184—Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 7. ASTM A 185—Specifications for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement: Replaced by A1064
 8. ASTM A 283—Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
 9. ASTM A 615—Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 10. ASTM A 706—Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
 11. ASTM C 25—Method for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime.
 12. ASTM C29—Unit Weight and Voids in Aggregate
 13. ASTM C 31—Methods of Making and Curing Concrete Test Specimens in the Field.
 14. ASTM C 33—Specification for Concrete Aggregates.
 15. ASTM C 39—Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 16. ASTM C 42—Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 17. ASTM C 76—Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 18. ASTM C 88—Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 19. ASTM C 94—Specification for Ready Mixed Concrete.

20. ASTM C 109—Compressive Strength of Hydraulic Cement Mortars
21. ASTM C 110—Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone.
22. ASTM C 117—Materials Finer than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing.
23. ASTM C 131—Resistance of Abrasions of Small Size Coarse Aggregate by Use of the Los Angeles Machine.
24. ASTM C 136—Method for Sieve Analysis of Fine and Coarse Aggregates.
25. ASTM C 138—Unit Weight, Yield, and Air Content of Concrete.
26. ASTM C 143—Test Method for Slump of Hydraulic – Cement Concrete
27. ASTM C 150—Specification for Portland Cement
28. ASTM C 171—Specification for Sheet Material for Curing Concrete.
29. ASTM C 172—Method of Sampling Fresh Concrete.
30. ASTM C 173—Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
31. ASTM C 231—Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
32. ASTM C 260—Specification for Air Entraining Admixture for Concrete.
33. ASTM C 309—Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
34. ASTM C 443—Joints for Concrete Pipe and Manholes, using Rubber Gasket
35. ASTM C 494—Specification for Chemical Admixtures for Concrete.
36. ASTM C 595—Blend Hydraulic Cements.
37. ASTM C 618—Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete
38. ASTM C 655—Reinforced Concrete D Load Culvert, Storm Drain, and Sewer Pipe.
39. ASTM C 789—Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers: Replaced by C1433
40. ASTM C 803—Test Method for Penetration Resistance of Hardened Concrete.
41. ASTM C 805—Test Method for Rebound Number of Hardened Concrete.
42. ASTM C 977—Specification for Quicklime and Hydrated Lime for Soil Stabilization.
43. ASTM D 75—Sampling Aggregate.
44. ASTM D 422—Test Method for Particle Size Analysis of Soils.
45. ASTM D 516-88—Standard Test Method for Sulfate Ions in Water.
46. ASTM D 693—Crushed Stone, Crushed Slag and Crushed Gravel for Dryer Water-Bound Macadam Base Courses and Bituminous Macadam Base and Surface Courses of Pavements: Withdrawn
47. ASTM D 698—Laboratory Compaction Characteristics of Soil using Standard Effort
48. ASTM D 751—Test Method for Coated Fabrics
49. ASTM D 1556—Test Method for Density of Soil in Place by the Sand-Cone Method.
50. ASTM D 1557—Laboratory Compaction Characteristics of Soil using Modified Effort
51. ASTM D 1682—Ultraviolet Resistance Grab Tensile Strength Grab Tensile Elongation Toughness: Replaced by D5034 and D5035
52. ASTM D 1751—Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

53. ASTM D 1752—Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 54. ASTM D 2167—Test Method for Density of Soil in Place by the Rubber-Balloon Method.
 55. ASTM D 2216—Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures.
 56. ~~ASTM D -79~~ Hydroxypropyl Methylcellulose
 57. ASTM D 2419—Sand Equivalent Value of Soils and Fine Aggregate.
 58. ASTM D 2487—Test Method for Classification of Soils for Engineering Purposes.
 59. ASTM D 2922—Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Method: Replaced by D6938
 60. ASTM D 3017—Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth): Replaced by D6938
 61. ASTM D 3665—Random Sampling of Paving Materials.
 62. ASTM D 4253—Test Method for Maximum Index Density of Soils Using Vibratory Table.
 63. ASTM D 4318—Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 64. ASTM D 4397—Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications.
 65. ASTM D 4546—Test Method for One-Dimensional Swell or Settlement Potential of Cohesive Soils.
 66. ASTM E 329—Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
 67. ASTM F 477—Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 68. ASTM F 758—Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport and Similar Drainage.
- D. American Welding Society (AWS), 550 NW LeJeune Road, Miami, FL 33135 AWS Code for Welding in Building Construction (Structural Welding Code).
- E. Concrete Reinforcing Steel Institute (CRSI) 933 N. Plum Grove Road, Schaumburg, IL 60195, (312) 490-1700:
1. Manual of Standard Practice.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
014225
REFERENCE STANDARDS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 014225

SECTION 014230 - DEFINITIONS AND CONVENTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section contains a list of definitions of words or phrases and grammatical or contextual conventions commonly used in these Contract Documents.

1.3 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Alphabetical Listing of Definitions:
1. As indicated: Shown on the drawings by graphic indication, notes, or schedules, or written in the specifications or elsewhere in the Contract Documents.
 2. As directed, as approved, as requested: Unless otherwise indicated, these terms imply "by the DEN Project Manager" and require that an instruction be obtained by the Contractor from the DEN Project Manager.
 3. Concealed: Embedded in masonry, concrete, or other construction; installed in furred spaces; within double partitions or hung ceilings; in trenches; in crawl spaces or in enclosures.
 4. Ensure: To make certain in a way that eliminates the possibility of error.
 5. Exposed: Not installed underground or "concealed" as defined above.
 6. Furnish or Provide: To supply, install and connect complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
 7. Indicated, Shown, or Noted: As depicted on drawings or specifications.
 8. Install: To erect, mount and connect complete with related accessories.
 9. Or equal, or approved equal: Refers to products which, in the opinion of the DEN Project Manager, are similar in all respects to products specified by proprietary brand name. Refer to Section 012510 "Substitutions" for procedures for submittal of proposed substitutions.
 10. Rework: To repair existing items or work required to be removed and replaced in order to accomplish the Work in accordance with the Contract Documents.
 11. Related Work: Includes, but not necessarily limited to, mentioned work associated with, or affected by, the Work specified.
 12. Reviewed, Satisfactory, Accepted, or Directed: Assumes by or to the DEN Project Manager.
 13. Similar, or Equal: Same in materials, weight, size, design, construction, capacity, performance, and efficiency of specified product.

14. Supply: To purchase, procure, acquire and deliver complete with related accessories.
15. Unless Otherwise Indicated and Unless Otherwise Noted: General note to perform work as indicated or shown on drawings or in specifications unless specifically directed otherwise elsewhere in the Contract Documents; may be abbreviated "U.O.N.", "U.O.I.", or "U.N.O."

C. BIM Model Definitions:

1. Building Information Model (BIM): BIM is a digital representation of the physical and functional characteristics of the Project and is referred as a Model(s), which term may be used to describe a Model Element, a single Model or technology used to create the Model.
2. Design Model: A Model that has reached the stage of completion that would customarily be expressed by an architect or engineer in two-dimensional Construction Documents.
3. Construction Model: The equivalent of shop drawing and other information useful to construction. A model that consists of data imported from a "Design Model or", if none exist, from a designer's "Construction Document".
4. Federated Model: Distinct component models "linked" together in such a manner that the linked data sources so not lose the indent or integrity by being so linked.
5. Level of Development (LOD): LoD describes the level of completeness to which a Model Element is developed.
6. Model Element: Is a portion of the BIM representing a component system or assembly within a building or building site.
7. Model Element Author: The party responsible for developing the content of a specific Model Element to the LoD for a particular phase of the Project.

1.4 BIM REFERENCE STANDARDS

- A. Refer to the DEN BIM Design Standard Manual (DSM) for the proposed minimum requirements of the BIM Execution Plan. The execution plan shall be further developed jointly with DEN and the Contractor to specifically address the administrative steps necessary to provide comprehensive BIM system before, during, and after construction.

1.5 CONVENTIONS

A. Specifications Format:

1. In order to standardize the location of information in the Contract Documents, the specifications generally are organized in one or more of the following formats:
 - a. The "MASTERFORMAT" 2011 Edition published by the Construction Specifications Institute.
 - b. The Standard Specifications for Road and Bridge Construction published by CDOT.
 - c. The alphanumeric system as published by the FAA.

B. Organization of Drawings and Specifications:

1. Organization of the specifications into divisions and sections, and arrangement or numbering of drawings is intended solely for the convenience of the Contractor in the Contractor's responsibilities to divide the Work among subcontractors or to establish the extent of work to be performed by any trade.
2. Neither the City nor the DEN Project Manager assume any liability arising out of jurisdictional issues or claims advanced by trade organizations or other interested parties based on the arrangement or organization of drawings or specifications.

C. Gender and Number:

1. For convenience and uniformity, parties to the Contract, including the City, Contractor, and DEN Project Manager, and their subcontractors, suppliers, installers, consultants or other interested parties are referred to throughout the Contract Documents as if masculine in gender and singular in number. Such reference is not intended to limit the meaning of the Contract Documents to the masculine gender or singular number.

D. Singular vs. Plural:

1. Materials, products, equipment, or other items of work referred to in the singular shall be construed as plural where applicable by the intent of the Contract Documents and shall not limit quantities to be provided by the Contractor.

E. Imperative Mood:

1. Specifications and notes on the drawings or elsewhere in the Contract Documents are generally written in the imperative mood as instructions to the Contractor, whether the Contractor is specifically addressed or not.

F. References to Subcontractors or Trades

1. References to subcontractors, trades or other entities, which are not parties to the Contract, shall be construed as meaning the Contractor whose responsibility it shall be to divide the Work among subcontractors or trades. Such references are used as a matter of convention and are not intended to preclude or direct the Contractor's responsibility to divide the Work.

G. Abbreviations

1. A list of abbreviations used in the Contract Documents is included in Technical Specifications Section 014220 "Abbreviations and Symbols"; an abridged list of abbreviations used on the drawings is included with the drawings.
2. Abbreviations are believed to be those in general use in the construction industry. Contact the DEN Project Manager for clarification of abbreviations for which the meaning is not clear.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 014230

SECTION 014510 - CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section identifies the Quality Control activities to be performed during all phases of the Contract by the Contractor.
- B. The Contractor shall have in place a Quality Control Program as necessary to ensure that all materials and work are completed in compliance with Contract Documents. The Contractor is solely responsible for Quality Control and shall provide the necessary quality control personnel to assure that all materials, workmanship, and tests are in conformance with the Project documents with the exception of those tests and/or audits that may be conducted by the City as defined in the contract documents.
- C. Test schedules and/or testing requirements for materials used on this project are included in the technical specifications. Laboratory and field-testing identified in the specifications shall be conducted by a Testing Agency retained by the Contractor; hereafter is referred to as the Contractor Testing Agency (CTA).
- D. The City or its consultant working as the City agent will employ a testing agency to perform all the required Quality Assurance and Special Inspection Testing of material and Inspection of workmanship required by the Contract Documents and the Building Official to fulfill the code and the regulatory authority's requirements. The Contractor must schedule these tests and provide access to the City agents' inspectors and testers to perform these tests and inspections. The performance of the tests by the City does not relieve the Contractor of the responsibility to deliver a fully functional building meeting all the requirements of the Contract Documents and their intent. The Contractor must develop its own testing program for processing, acceptance from the subcontractor or suppliers at a frequency defined by the contractor for its own process control and to assure delivery of the intended acceptable workmanship. All time impacts of testing and retesting shall be accounted for in the updated schedule and any mitigation of time impacts shall be the responsibility of the Contractor.

1.3 SUBMITTALS

- A. Refer to Section 013300 "Submittals" and Section 013325 "Submittal Procedures" for submittal requirements.

- B. Quality Control Plan: Within ten (10) days after Notice to Proceed, the Contractor shall submit a Quality Control Plan for review and acceptance. The Quality Control Plan shall be accepted by the DEN Project Manager prior to any Work or materials being incorporated into the Project. Acceptance by the DEN Project Manager does not relieve the Contractor of its responsibility to comply with the Contract Requirements. The Contractor Quality Control Plan shall address the following as a minimum:
1. A general description of Quality Control monitoring to be performed until final acceptance by DEN. Include monitoring activities of Work and the work site during times that no construction activity is scheduled to take place.
 - a. No work requiring QC inspection and testing shall take place without QC inspection and testing staff on site.
 2. An individual designated by the Contractor and approved in writing by the DEN Project Manager whose [sole] responsibility is Quality Control Management. This individual shall be highly qualified in all phases of construction as it relates to this Project and shall have the authority to direct work changes required to bring the Work into conformance with Contract requirements, including stopping non-conforming work in progress. A detailed resume of the proposed Quality Control Manager including applicable education, experience, and certifications shall be included in the Quality Control Plan.
 - a. At the discretion of the DEN Project Manager, for Small Projects, Early Work Packages and Task Orders all of value less than \$1,000,000 or a duration which is less than three (3) months, the Contractor may assign one of the Contractor's staff, i.e. Contractor's Superintendent, Office Engineer, Field Engineer, or Contractor's Project Manager as Quality Control Manager. The assigned person must be on site while work requiring QC inspection and testing is being completed and available to discuss quality issues, manage all aspects of the Project Quality Control Plan, coordinate all required Special Inspection and Quality Assurance testing, and provide proposed solutions on all quality issues at any time as to not cause any delay to the project. Any delays caused in part or in all due to defective or no conforming work shall be borne by the Contractor.
 3. Quality Control inspection staff as needed to assist the Quality Control Manager with implementation of the Quality Control Program. Duties of the Quality Control Inspectors shall be limited strictly to inspection of the ongoing work. Sampling and testing of materials shall be performed by Quality Control personnel other than Quality Control Inspectors. Quality Control Inspectors shall inspect only those work elements for which they are qualified. Resumes of the proposed Quality Control Inspectors including applicable education, experience and certifications shall be included in the Quality Control Plan.
 4. An Organization Chart identifying all Quality Control staff by name and function. The chart shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work including tests performed by the CTA or DTA. If necessary, different Quality Control staff can be utilized for specific inspection and testing functions for different items of work. The chart shall show that the Quality Control Manager,

- Quality Control Inspectors, and Quality Control testing personnel are outside of the production staff with clear lines of authority for Quality Control.
5. The City and/or the City Program Management Team acting as the City agent will employ a DTA. The Contractor's testing and inspection shall be performed for the processing, preparation and to request City's inspection and as necessary to produce the required product as specified in the Contract Documents. The Contractor shall meet the minimum inspection and testing frequencies specified in the contract documents. When the contract documents do not specify minimum inspection and testing frequencies the Contractor shall propose in writing to the DEN Project Manager a QC inspection and testing frequencies that meet or exceed industry standards for the material and work being placed or conducted.
 6. Any test performed by any agency on the Project shall be recorded and show a passing re-test of all failing tests.
 - a. All test results shall be made available for inspection by the DEN Project Manager. This includes tests that are above the QC testing frequency required.
 7. Any tests submitted by the Contractor for basis of acceptance, or payment reduction when performed by the Contractor's agency, must meet all standards and must be certified to have followed approved procedure, processed in a certified lab by properly certified or licensed personnel by properly certified testers and on calibrated and certified equipment. Authentications of tests must be preapproved and cannot be selectively submitted. All tests shall be recorded in the field witnessed by DEN inspector to be accepted as a record test of the material in question. Any failing tests could be the sole basis for rejecting the material.
 8. Each technical specification division's requirements for quality control identifying each item requiring submittal and approval/acceptance prior to installation of work, all inspections to be performed during work and prior to acceptance of work, each item of work requiring testing by the independent testing agency or the City provided testing agency, and the testing frequency.
 9. The plan shall address all elements of special inspection required by the statement of special inspection as approved by the Building Official. All special inspections and tests will be performed by agencies employed by the City.
 10. The Contractor is responsible for the complete record of inspection file including but not limited to all manufacturer certificates, certificates of material compliance, Certificates of Material Testing Record, successful re-inspection of all deficiency items, proper deposition of design related Non-Conformance reports (NCR), Structural Engineers' observation reports, certification letters from the DTA, Building Inspectors' records of approvals, permit cards, fire suppression and fire-alarm tests records as witnessed by the authorities of jurisdiction and any record necessary to achieve a certificate of occupancy.
 11. The Contractor must keep track of all logs of discrepancies and submit periodic updates, as required by the DEN Project Manager, of all open issues and track the closure of open items in a timely manner.
 12. Establish controls and documentation format to ensure that items or materials that have been accepted through receiving inspection are used or installed. Identification and traceability shall be provided throughout all inspections, test

- activities, and records. For stored items, provisions shall be made for the control of item/material identification, consistent with the expected duration and type of storage.
13. A methodology of monitoring, testing, and exercising of all equipment, valves, and/or assemblies to ensure the Work installed is in proper working order.
 14. A list of suppliers and subcontractors. This list shall include items to be supplied by each supplier and/or subcontractor and shall identify work to be performed by each subcontractor. The list shall be updated and resubmitted as required.
 15. All approvals related to Special Inspection are subject to the acceptance or approval of the Building Official.
 16. Emergency contact information including name, company, title, work phone number, home phone number, and other means of contact. The Emergency Contact list shall include at least four individuals. The Emergency Contact list shall be maintained on a daily basis. In the event there is any change in any of the information, the Contractor shall forward the updated list to the DEN Project Manager and to DEN Maintenance Control (303-342-2800). The Emergency Contact list shall include the project number, project title, and date of issue.
- C. The Contractor shall transmit the following daily reports to the DEN Project Manager electronically PRIOR TO THE CLOSE OF BUSINESS ON the following work day:
1. CM-13 Contractors Daily Construction Report. The Foreman may add sheets of information to this form as needed.
 2. CM-07 Daily Quality Control Inspection Report and all CTA test results performed that day.
 3. CM-08 Daily DEN Time and Materials Report
- D. Deficiency List: The Quality Control Manager shall establish a deficiency list including the minimum information for each deficiency item; description, date, location, drawings reference, detail reference, specification reference, and superseding document NCR, date of expected solution date repaired date inspected by City representative and accepted.
- 1.4 DOCUMENTATION
- A. The Contractor shall not change or alter approved submittals, procedures, specifications, drawings/MODELS, or other pertinent documentation without the DEN Project Manager's written authorization.
 - B. All records and documents that are quality related shall be prepared, identified and maintained by the Contractor and shall be made available to DEN upon request. Records shall be protected from damage, deterioration, or loss. A copy of the records and documents shall be maintained at the Work site at all times unless the DEN Project Manager has approved other locations in writing. Retention time for all quality records shall be not less than three (3) years from date of Final Acceptance of the Contract.

- C. The Contractor is responsible for the complete record of inspection file including but not limited to all manufacturer certificates, certificates of material compliance, Certificates of Material Testing Record, successful re-inspection of all deficiency items, proper deposition of design related NCRs, Structural Engineers' observation reports, certification letters from the DTAs, Building Inspectors' records of approvals, permit cards, fire suppression and fire-alarm tests records as witnessed by the authorities of jurisdiction and any record necessary to achieve a Certificate of Occupancy.
- D. The Contractor shall maintain records at the actual worksite and at Contractor's office to show the inspection status of materials and items installed in order to ensure that the required inspections and tests have been performed in a timely and correct manner.
- E. The Contractor must keep a record of all deficiency issues and show positive evidence of closure (passing re-inspection or re-test) to every issue.

1.5 INSPECTIONS AND TESTS

- A. Inspections, tests and system shut down requests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of the responsibility and obligation to meet all specifications and the referenced standards. The Contractor's designated Quality Control Representative shall inspect the work and shall ensure the Work complies with the Contract requirements prior to any requests for inspection or testing.
- B. When the specifications, laws, ordinances, rules, regulations or orders of any public agency having jurisdiction require the DEN Project Manager's surveillance of inspections or tests, the Contractor shall notify the DEN Project Manager, in writing, of the place, date and time 48 hours prior to the inspection and/or test. The Contractor shall be responsible for notifying and requesting inspection by other agencies including but not limited to the Denver Building Inspection Division, Denver Fire Department, and Denver Water Department. Prior to request for other agency inspections, the Contractor shall meet and plan inspection times with the DEN Project Manager.
- C. Special inspections or tests may be required by the technical specifications, City, State and/or Federal Agencies in addition to those tests already performed. The Contractor shall notify the DEN Project Manager, in writing, at least 48 hours in advance of the additional inspections or tests.
- D. Quantities will be verified as defined in the Pre-Work Meetings.

1.6 INSPECTION PLAN

- A. The Contractor shall utilize the following six-point inspection plan to ensure the conformance of the Work performed by the Contractor meets the requirements of the Contract Drawings and specifications, the referenced codes and standards and the approved submittals:

1. **Pework Coordination:** Prior to the start of construction work on the Contract and prior to the start of Work under each separate specification section and prior to the start of Work where a change in a construction operation is contemplated by the Contractor, and prior to a new subcontractor starting work, a coordination meeting to ensure that the Contractor's personnel have no misunderstandings regarding their safety and quality procedures as well as the technical requirements of the Contract will be held with the Contractor's superintendent, Quality Control and Safety representatives, and DEN Project Manager. Supervisory, Safety and Quality Control, representatives of all applicable subcontractors will also attend. Prior to the meeting, the Contractor's Quality Control Manager shall provide the DEN Project Manager with a meeting agenda for review. The Contractor's Quality Control Manager shall conduct the meeting and distribute the approved agenda. The Quality Control Manager shall develop and electronically distribute finalized meeting minutes within one business day upon completion of the meeting. The following items shall be presented and reviewed by the Contractor:
 - a. Contract requirements and specifications.
 - b. Shop drawings, certifications, submittals, models, and as-built drawings.
 - c. Testing and inspection program and procedures.
 - d. Contractor's Quality Control program.
 - e. Familiarity and proficiency of the Contractor's and subcontractor's workforce to perform the operation to required workmanship standards including certifications of installers.
 - f. Safety, security, and environmental precautions to be observed.
 - g. Any other preparatory steps dependent upon the particular operation.
 - h. The Contractor's means and methods for performing the Work.

2. **Initial Inspection:** Upon completion of a representative sample of a given feature of the Work and no later than two weeks after the start of a new or changed operation, the DEN Project Manager and/or the DEN Project Manager's designated representatives will meet with the Contractor's Quality Control representative and applicable subcontractor's supervisor and their Quality Control representatives to check the following items, as a minimum:
 - a. Workmanship to established quality standards.
 - b. Conformance to Contract Drawings, specifications and the accepted shop drawings.
 - c. Adequacy of materials and articles utilized.
 - d. Results of inspection and testing methods.
 - e. Adequacy of as-built drawings/MODELS maintained daily.
 - f. Once accepted, the representative sample will become the physical baseline by which ongoing work is compared for quality and acceptability. To the maximum practical extent, approved representative samples of work elements shall remain visible until all work in the appropriate category is complete. Acceptance of a sample does not waive or alter any Contract requirements or show acceptance of any deviation from the Contract not approved in writing by the DEN Project Manager.

3. Follow-up Inspection: The Contractor's Quality Control representative will monitor the Work to review the continuing conformance of the Work to the workmanship standards established during the preparatory and initial inspections.
4. Completion Inspection: Forty-eight (48) hours prior to the completion of an item or segment of work and prior to covering up any work, the Contractor shall notify the DEN Project Manager, in writing, who will verify that the segment of work is substantially complete, all inspections and tests have been completed and the results are acceptable. The purpose of this inspection is to allow further corrective work upon, or integral to, the completed segment of work. THIS IS NOT AN ACCEPTANCE INSPECTION. If any items are determined to be deficient, need correction or are non-conforming, a Deficiency List will be prepared and issued to the respective Contractor for correction, repair, or replacement of any deficient or non-conforming items. The DEN Project Manager and Contractor's Quality Control representative will verify the correction of the deficient and/or non-conforming items prior to the start of the next operation.
5. Pre-Final Acceptance Inspection: Prior to requesting a Pre-Final Acceptance Inspection by DEN, all work and operational systems to be inspected shall be satisfactorily completed and tested by the Contractor. The Contractor's written request for this inspection shall be made seventy-two (72) hours in advance. With the request shall come a list of any known deficiencies and when they will be corrected. If the list is too large or contains too many significant items, in the opinion of the DEN Project Manager, no inspection will be held because of the incompleteness of the Work.
6. The DEN Project Manager will schedule the Pre-Final Acceptance Inspection and will prepare a list of deficient items (punch list) discovered during the inspection. If during the inspection, the list becomes too large or too many significant items are on the list, the inspection will be canceled by the DEN Project Manager. After the inspection is completed, the Deficiency List will be transmitted to the Contractor for correction of the deficient items.
7. Final Acceptance Inspection: After the Contractor has completed all items on the Deficiency List (generated from the Pre-Final Acceptance Inspection), he shall request a Final Acceptance Inspection. The request shall be made in writing at least seventy-two (72) hours in advance of the inspection. All areas must be cleaned and ready for turnover prior to this inspection. The DEN Project Manager, the design consultant, a representative of the funding agency (if applicable) and other interested parties will inspect the subject Work to ensure that all deficiencies have been satisfactorily attended to and that no new deficiencies have appeared and that all systems are completely functional. Any outstanding or additional deficient items will be noted and handled per the requirements of the Pre-Final Acceptance Inspection noted above until the Work is acceptable to the DEN Project Manager.

1.7 CONTRACTOR SUBMITTAL OF PROPOSED CONTRACTOR'S TESTING AGENCIES

- A. Refer to Section 014525 - Material Testing Agency

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. All materials required for the Contract shall be new except where specified otherwise. The DEN Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by DEN shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered a guarantee for acceptance of materials that will be delivered at a later time.
- B. Materials accepted based on a Certificate of Compliance may be sampled and inspected/tested by DEN or its designer at any time. The fact that the materials were accepted based on such certification shall not relieve the Contractor of the responsibility to use materials that conform to the specifications.
- C. The Contractor shall impose upon suppliers the same quality control requirements, including inspection and test procedures, as imposed upon him by the specifications and referenced standards. The Contractor shall apply appropriate controls, designed to ensure that all materials supplied meet the requirements and specifications.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.
- B. Refer to Article 1706 - Removal of Defective Materials and Work in the General Contract Conditions, 2011 Edition.

END OF SECTION 014510

SECTION 014525 - MATERIAL TESTING AGENCY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Contractor shall employ the services of a Material Testing Agency; hereafter referred to as the Contractor Testing Agency (CTA). This Section identifies the requirements for the Contractor to employ a Material Testing Agency and identifies the required activities of the Material Testing Agency.
- B. Laboratory and field-testing requirements to be conducted by the CTA for materials and construction methods used on this project are included in the appropriate technical specifications. Where the Specifications reference the CDOT Standard Specifications for Road and Bridge Construction, the references shall also mean CDOT Field Materials Manual for schedule of tests unless otherwise stated. As a minimum, the CTA described in this Section shall perform all applicable tests listed in the manual including the independent assurance sampling and testing. In the event of such a conflict between the schedule and a specification in these technical provisions, the more comprehensive testing shall govern unless otherwise noted.
- C. Inspections and tests conducted by the CTA shall not in any way relieve the Contractor of the Contractor's responsibility and obligation to meet all specifications and referenced standards. Employment of the CTA does not relieve the Contractor of providing the required Quality Control program.
- D. When inspections or tests by the CTA prove that the item or material does not meet all applicable specifications and requirements, the cost incurred for the re-testing or re-inspection shall be borne by the Contractor as per this Section.
- E. Samples will only be considered if taken at random. The Contractor shall permit representatives of the City to witness the selection of samples. Inspection or tests of items or materials that fail shall be sufficient cause to terminate further inspections/tests of the same brand, make or source of that product.
- F. The Contractor is obligated to correct any item deemed deficient at no additional cost to DEN.

1.3 SUBMITTALS

- A. All submittals shall comply with requirements of Sections 013300 "Submittal Procedures" and 013325 "Shop and Working Drawings, Product Data and Samples" for submittal requirements.

1.4 CONTRACTOR SUBMITTAL OF PROPOSED TESTING AGENCIES

- A. The Contractor shall employ the services of a CTA that has been accredited by AASHTO or CCRL or an approved equal to perform the tests required in the Contract. The CTA may also provide technicians to perform the required inspections. However, inspection and testing cannot be performed simultaneously by the same technician. The Contractor shall receive written acceptance from the DEN Project Manager of the CTA prior to any permanent work being installed or tested.
- B. The Contractor shall not submit for acceptance to the DEN Project Manager any testing agency or laboratory utilized in the design or construction document preparation or presently employed by DEN as part of DEN Quality Assurance, Material Testing, or special inspection agencies.
- C. For consideration of acceptance, the Contractor shall submit to the DEN Project Manager the following items received from the CTA:
 - 1. Affidavit of current accreditation from a national certification and/or accreditation programs.
 - 2. Evidence that the CTA Laboratory is accredited to perform the testing required in the Contract Documents.
 - 3. Resumes and evidence of professional engineer registration and licensing in the State of Colorado for the personnel reviewing and signing test reports.
 - 4. Resumes and current certifications verifying that CTA management and supervisory personnel, laboratory staff, field testing technicians, and inspecting technicians are qualified in accordance with ASTM C 1077, D 3666, D 3740, and E 329 requirements to perform the Work. NICET, ACI, WAQTC, LabCAT, CDOT, NRMCA, PCA, AWS, ASNT certifications or a degree in a related engineering field with construction field experience that can demonstrate qualifications. A list summarizing all management, supervisory, laboratory, field testing, and inspection personnel assigned to the Project including the testing and/or inspection each individual will be performing, certifications held by each individual, and the expiration date of each certification.
 - 5. A matrix indicating each technical specification section, paragraph, quantity and type of sampling and/or testing required.
 - 6. Copies of all laboratory, field testing, and inspection report forms.

1.5 SUBMITTAL OF REPORTS

- A. Test results shall be submitted by the Contractor to the DEN Project Manager after completion of inspections/tests by the CTA and prior to incorporation of the items into the Work unless the test or inspection must be done during or after installation.

- B. All field test results including but not limited to fresh concrete properties and in-place moisture-density shall be reported in legible draft form to the DEN Inspector immediately at the test site. Any failing test shall be reported separately to the DEN Inspector or DEN Project Manager. The draft test results shall also be attached to the Daily Quality Control Inspection Report (reference Section 014510 "Contractor Quality Control") and transmitted to the DEN Project Manager the next workday.
- C. Typed test reports shall be provided to the DEN Project Manager as specified in the "Weekly Reports" Article in this Section. The test reports shall be numbered sequentially in chronological order. Individual tests shall be numbered sequentially. The reports and tests shall also be organized per specification section. All test results must be reviewed and signed by a registered licensed engineer in the State of Colorado. The signature represents that the test procedures used are in strict conformance with the applicable testing standard, the calculated data are true and accurate, the tools and equipment used were in calibration, the sample was not contaminated and the persons running the test were qualified.
- D. Reports of inspections and test activities are record documents and shall be maintained in a manner that provides integrity of item identification, acceptability, and traceability. Reports shall identify the following:
1. Contractor's name.
 2. DEN Contract number and title.
 3. Material Testing Agency name.
 4. Name of items inspected/tested including a physical description and, as applicable, model and make.
 5. Quantity of items.
 6. Inspection/test procedure used. If national standards are used, any deviation from these standards.
 7. Date the sample was taken and the date the test was made.
- E. Location (by coordinates, building grid or station number and elevation) of where tests and/or samplings were performed including environmental condition where applicable. Include plan drawing indicating location of test, lot size and location and work item sampled or tested.
1. Name of inspector/tester.
 2. In the event the testing or sampling is a re-test or re-sampling, reference the previous respective testing or sampling report.
 3. Specified requirements in the Contract that the item must meet. Include reference to technical specification section and paragraphs.
 4. Acceptability.
 5. Deviations/nonconformance.
 6. Evaluation of results.
 7. All information required for the specific test as specified in the applicable ASTM standard.
 8. Signature of authorized evaluator.

1.6 WEEKLY SUMMARY REPORTS

- A. The CTA and Quality Control Manager shall prepare and submit to the DEN Project Manager a weekly summary report each week, which summarizes by specification section all work activities and results for the quality control tests and inspections conducted during that period. The weekly summary report shall be submitted within two (2) weeks from the end of the reporting period. At a minimum, the weekly summary report shall identify all inspections, test types, test locations, testers, test results, specifications, whether the test passed or failed, quantity of materials placed and the number of tests performed for each material, and the material supplier, installer and Contractor. Re-tests shall be identified in a fashion that easily correlates to the failing test. Any failed tests that have not been corrected when the report is published shall be highlighted and noted in the cover letter of the report.
- B. The weekly report shall be submitted per Sections 013000 and 013350 requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REMOVAL OF NONCONFORMING MATERIAL

- A. The Contractor is obligated to correct or remove nonconforming materials, whether in place or not. If necessary, the DEN Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the DEN Project Manager may order correction, removal, and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.

3.2 PERFORMANCE

- A. If the DEN Project Manager determines that the CTA or its personnel are not effectively enforcing or performing the testing and documentation requirements specified in the Contract, the DEN Project Manager will require, in writing, the Contractor to remove and replace CTA or such personnel at no cost to DEN.

3.3 CONTROL OF MEASURING AND TEST EQUIPMENT

- A. The CTA shall select measuring and test equipment in such a manner as to provide proper type, range, accuracy, calibration, and tolerance for determining compliance with specified requirements. Measuring and test devices shall be calibrated, adjusted and maintained at prescribed intervals prior to use based upon equipment stability and other conditions affecting measurement. Provisions shall be made for the proper handling and storage of equipment. Calibration shall be accomplished using certified standards that have a known traceable relationship to the National Institute of Standards and Technology. Every calibrated measuring and test device shall show the

current status, date of last calibration and the due date for the next calibration. Calibration records shall be maintained onsite as quality records and shall be made available for inspection upon the DEN Project Manager's request.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under the Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.
- B. Refer to Title 17 - Inspection and Defects of the General Contract Conditions, 2011 Edition, for guidance on payment methods.

END OF SECTION 014525

SECTION 014545 - SPECIAL INSPECTION AGENCY AND OWNER TESTING AGENCIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Special Inspection Statement issued as part of the application for building permit for the specific task or project.

1.2 SUMMARY

- A. The City will employ the services of Special Inspection Agencies (SIA). This Section identifies the requirements for the Contractor to coordinate, facilitate, and support DEN and its agents and consultants to fulfill the requirements of Special Inspection.
 - 1. Any additional tests deemed necessary by the Building Official, Engineer of Record, Special Inspector or DEN Project Manager to assure these agencies that all material and work on the Project meet the requirements of the Contract and all applicable codes and regulations.
 - 2. Laboratory and field testing requirements to be conducted by the SIA for materials and construction on this Project are included in the drawings.
 - 3. The Contractor shall not perform any work that could cover work or material that has not passed the requirement of special inspection or require the presence of the special inspector to meet the requirements of continuous or periodic inspection.
 - 4. It is the responsibility of the Contractor to plan, coordinate all testing requirements on the project to assure no delays are occurring due to the lack of inspection or testing.
 - 5. The Contractor must allow sufficient time in the schedule to perform all required inspection and testing.
 - 6. All rework due to nonconformance, failing tests or rework to test covered work prior to proper inspection and testing shall be borne by the Contractor.
 - 7. All re-inspections and re-testing costs due to non-conformances or failing tests or revisiting to test covered or incomplete work shall be borne by the Contractor at a cost of \$100 per hour in addition to all direct and indirect costs associated with testing.
 - 8. Periodic welding inspection shall include the minimum of fitting inspection and final inspection at all times.
 - 9. Inspections and tests conducted by the SIA shall not relieve in any way the Contractor of the Contractor's responsibility and obligation to meet all specifications and referenced standards. Employment of the SIA does not relieve the Contractor of providing the required Quality Control program.

10. When inspections or tests by the SIA prove that the item or material does not meet all applicable specifications and requirements, the cost incurred for the re-testing or re-inspection shall be borne by the Contractor. Reference Article 5.1 of this Section.
11. Samples will only be considered if taken at random. The Contractor shall permit representatives of the City to witness the selection of samples. Inspection or tests of items or materials that fail shall be sufficient cause to terminate further inspections/tests of the same brand, make or source of that product.
12. The Contractor is obligated to correct any item deemed deficient at no additional cost to DEN.

1.3 SUBMITTALS

- A. All submittals shall comply with requirements of Section 013300 "Submittals" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal requirements.

1.4 CONTRACTOR SUBMITTAL OF PROPOSED CONTRACTOR'S TESTING AGENCIES

- A. Projects requiring Special Inspection where the Contractor is utilizing certified shop to produce material. DEN requires that testing be performed to satisfy the certification be no less than the following: All material and workmanship meets the requirements of a Contractor Material Testing Agency.
- B. The Contractor shall employ the services of a Testing Agency for process control and acceptance by the subcontractors and suppliers or material delivery for Contractor convenience or contractual obligations with others.
- C. The Contractor's Testing Agency must be accredited agency to perform any test required to be submitted for compliance with a Contract requirement or for use of data by DEN agencies for any official use, for examples and not to grant any obligation on the DEN Project Management Team, any payment reduction factor calculation. Any dispute or requirement to recalibrate testing equipment or machine, proof of compliance of material that was installed in contrary to manufacturer recommendation, any apparent defect due to adverse weather, improper installation, incomplete material record.
- D. Contractor's testing agency must be a qualified entity that has performed testing on similar jobs in size and complexity and has been accredited by AASHTO or CCRL or an approved equal to perform the tests required in the Contract. The CTA may also provide technicians to perform the required inspections. However, inspection and testing cannot be performed simultaneously by the same technician.
- E. The Contractor shall not submit for acceptance to the DEN Project Manager any testing agency or laboratory utilized in the design or construction document preparation or presently employed by DEN as part of DEN Quality Assurance.

- F. For consideration of acceptance, the Contractor shall submit to the DEN Project Manager the following items received from the CTA:
1. Affidavit of current accreditation from a national certification and/or accreditation program.
 2. Evidence that the CTA Laboratory is accredited to perform the testing required in the Contract Documents.
 3. Resumes and evidence of professional engineer registration and licensing in the State of Colorado for the personnel reviewing and signing test reports.
 4. Resumes and current certifications verifying that SIA management and supervisory personnel, laboratory staff, field testing technicians, and inspecting technicians are qualified in accordance with ASTM C 1077, D 3666, D 3740, and E 329 requirements to perform the Work. NICET, ACI, WAQTC, LabCAT, CDOT, NRMCA, PCA, AWS, ASNT certifications, or a degree in a related engineering field with construction field experience can demonstrate qualifications. A list summarizing all management, supervisory, laboratory, field testing, and inspection personnel assigned to the Project including the testing and/or inspection each individual will be performing, certifications held by each individual, and the expiration date of each certification.
 5. A matrix indicating each technical specification section, paragraph, quantity and type of sampling and/or testing required.
 6. Copies of all laboratory, field testing, and inspection report forms.

1.5 SUBMITTAL OF REPORTS

- A. Test results shall be submitted by the Special Inspector and/or DEN Testing Agency to the DEN Project Manager after completion of inspections/tests by the SIA/OTA and prior to incorporation of the items into the Work unless the test or inspection must be done during or after installation.
- B. All field test results including but not limited to fresh concrete properties and in-place moisture-density shall be reported in legible draft form to the DEN/PMT Inspection and the Contractor Quality Control Manager immediately at the test site. Any failing test shall be reported separately to the DEN/PMT Inspector or DEN Project Manager within two (2) hours after the discovery.
- C. The Contractor's Quality Control Manager or his/her Authorized representative must keep track and official record of all tests passed, failed, or defected. The Contractor shall be fully responsible to show passing tests of all required elements. The lack of any passing test record of any required element does not waive the requirement to of testing or inspection as required by the Contract Documents and the IBC. The Contractor shall bear all costs associated with recovering missing tests including but not limited to the cost of the cost of disassembling, testing or inspecting, reassembling, and any indirect time or cost impacts of a missing required test or inspection.
- D. Typed test reports shall be provided by the testing agency to the DEN Project Manager as specified in Part 1 of this Section Weekly Summary Reports. The test reports shall be numbered sequentially in chronological order. Individual tests shall be numbered sequentially. The reports and tests shall also be organized per specification section. All

test results must be reviewed and signed by a registered licensed engineer in the State of Colorado. The signature represents that the test procedures used are in strict conformance with the applicable testing standard, the calculated data are true and accurate, the tools and equipment used were in calibration, the sample was not contaminated and the persons running the test were qualified.

- E. A plan of work and administrative procedure shall be established to assure that all test and inspections frequency required are performed and all defects are tracked and retested and re-inspected to meet all applicable specifications, codes, and standards.
- F. The Contractor shall track all tests performed on the daily reports and shall submit a statement for each phase of the Work showing all elements of Quality have been completed and all defects are addressed or scheduled to be addressed prior to covering the Work.
- G. Reports of inspections and test activities are record documents and shall be maintained in a manner that provides integrity of item identification, acceptability, and traceability. Reports shall identify the following:
1. Contractor's name.
 2. DEN Contract number and title.
 3. Testing Agency name.
 4. Name of items inspected/tested including a physical description and, as applicable, model and make.
 5. Quantity of items.
 6. Inspection/test procedure used. If national standards are used, any deviation from these standards.
 7. Date the sample was taken and the date the test was made.
 8. Location, by coordinates, building grid or station number, of where tests and/or samplings were performed including environmental condition where applicable. Include plan drawing indicating location of test and work item sampled or tested.
 9. Name of inspector/tester.
 10. In the event the testing or sampling is a re-test or re-sampling, reference the previous respective testing or sampling report.
 11. Specified requirements in the Contract that the item must meet. Include reference to technical specification section and paragraphs.
 12. Acceptability.
 13. Deviations/nonconformance.
 14. Corrective action.
 15. Evaluation of results.
 16. All information required for the specific test as specified in the applicable ASTM standard.
 17. Signature of authorized evaluator.

1.6 WEEKLY SUMMARY REPORTS

- A. The SIA/OTA shall prepare and submit to the DEN Project Manager a weekly summary report each week that summarizes by specification section all work activities and results for the quality control tests and inspections conducted during that period.

- B. The weekly summary report shall be submitted within two (2) weeks from the end of the reporting period. At a minimum, the weekly summary report shall identify all inspections, test types, test locations, testers, test results, specifications, whether the test passed or failed, quantity of materials placed and the number of tests performed for each material, and the material supplier, installer and Contractor.
- C. Re-tests shall be identified in a fashion that easily correlates to the failing test. Any failed tests that have not been corrected when the report is published shall be highlighted and noted in the cover letter of the report. The SIA shall identify costs of re-testing or additional site visits required due to scheduling changes by the Contractor. A current Corrective Action Report log (CAR) shall also be included in the weekly summary report.
- D. The weekly report shall be submitted per Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CORRECTION OR REMOVAL OF NONCONFORMING MATERIAL

- A. The Contractor is obligated to correct or remove nonconforming materials, whether in place or not. If necessary, the DEN Project Manager will send written notification to the Contractor to correct or remove the defective materials from the Project. If the Contractor fails to respond, the DEN Project Manager may order correction, removal, and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.

3.2 CONTROL OF MEASURING AND TEST EQUIPMENT

- A. The SIA shall select measuring and test equipment in such a manner as to provide proper type, range, accuracy, calibration, and tolerance for determining compliance with specified requirements. Measuring and test devices shall be calibrated, adjusted and maintained at prescribed intervals prior to use based upon equipment stability and other conditions affecting measurement.
- B. Provisions shall be made for the proper handling and storage of equipment. Calibration shall be accomplished using certified standards that have a known traceable relationship to the National Institute of Standards and Technology. Every calibrated measuring and test device shall show the current status, date of last calibration and the due date for the next calibration. Calibration records shall be maintained onsite as quality records and shall be made available for inspection upon the DEN Project Manager's request.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
014545
SPECIAL INSPECTION AGENCY AND OWNER TESTING
AGENCIES

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for Work under the Section. DEN Project Management Team staff will track all costs and remark the conditions and track all associated impacts for credits to the City. The contractor record of the same is only valid if signed by the DEN Project Manager or authorized representative.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for Work under this Section.
- B. Refer to Title 17 - Inspection and Defects in the General Contract Conditions, 2011 Edition, for guidance on payment methods.

END OF SECTION 014545

SECTION 015050 - MOBILIZATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Section 012910 "Schedule of Values"

1.2 SUMMARY

- A. The Work specified in this Section consists of preparatory work and operations including, but not limited to the following:
 - 1. Those necessary for the movement of personnel, equipment, supplies, and incidentals to the work site.
 - 2. For the establishment of all offices, buildings and other facilities necessary for the Work on the Project.
 - 3. For all other work and operations that must be performed, or costs incurred prior to beginning work on the various Contract items on the work site.

1.3 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- B. Submit a Mobilization Schedule a minimum of fourteen (14) days prior to first billing for mobilization.

1.4 DELIVERY

- A. Delivery to the work site of construction tools, equipment, materials, and supplies shall be accomplished in conformance with all local governing regulations.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Provide construction tools, equipment, materials, and supplies of the type and quantities that will facilitate the timely execution of the Work.

PART 3 - EXECUTION

3.1 EXECUTION AND REMOVAL

- A. Provide personnel, products, construction materials, equipment, tools, and supplies at the work site at the time they are required and scheduled to be installed or utilized.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Refer to Section 013210 - Schedule, for details regarding mobilization scheduling, billing, and payment.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Refer to Article 1104 - Changes in the Work, Contract Price or Contract Time of the General Contract Conditions, 2011 Edition.

END OF SECTION 015050

SECTION 015210 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
1. Section 011000 "Summary of Work" for work restrictions and limitations on utility interruptions.

1.3 DESCRIPTION

- A. The Work specified in this Section consists of furnishing, installing, operating, maintaining, and removing temporary construction barriers, enclosures, and field facilities including the Contractor's construction offices, staging areas, storage areas, electrical power, and fire protection.
- B. Construction Offices, Lay down and Storage Areas:
1. The Contractor's office and laydown area will be located within the walled area surrounding the escalator replacement. DEN will provide a storage area in the basement of Concourse A. as designated by the DEN Project Manager.
 2. The Contractor shall restore any area on DEN property that becomes contaminated as a result of its operations in accordance with Airport Rule and Regulation 180. Restoration shall be either to applicable standards under Federal and State law or to such other levels as may be required by the Manager of Aviation, at the Manager's sole discretion.
 3. All temporary facility sites must be inspected prior to Contract closeout.
 - a. The DEN Project Manager or authorized representative shall conduct an inspection of contractor areas used during the life of the project. These areas include but are not limited to, staging areas, laydown areas, and contractor yards and offices.
 4. Site must be restored to the condition in which the City initially provided to the Contractor.

5. Contractor materials shall be managed in accordance with all applicable Environmental Regulations.
6. Temporary facilities which the Contractor desires to locate in secondary laydown and staging areas adjacent to the Work or within the project limits are subject to approval by the DEN Project Manager.
7. All Contractor Storage Yards must be fenced. Submit fencing plan and typical details to DEN Project Manager at least seven (7) days before planned execution for review and acceptance.
8. In accordance with Denver Fire Department Requirements, all Temporary Facilities shall have signage that lists the following information:
 - a. Company Name
 - b. Contact Telephone Number
 - c. Facility Address

C. Electrical Service

1. Provide lighting and power for field offices, storage facilities and other construction facilities and areas.
2. Provide power centers for electrically operated and controlled construction facilities including tools, equipment, testing equipment, interior construction lighting, heating, cooling and ventilation equipment.
3. Provide night security lighting at secured areas within construction limits at offices, storage facilities and temporary facilities.
4. Provide battery operated or equivalent emergency lighting facilities at construction areas where normal light failures would cause employees to be subjected to hazardous conditions. Test such facilities monthly and maintain a record of these tests for the DEN Project Manager's review.
5. Contractor shall bear all costs of temporary electric service permits, fees, and deposits required by the governing authorities, and connection charges and temporary easements including installation, maintenance, and removal of equipment.

D. Fire Protection:

1. Furnish, install, and maintain temporary portable fire protection equipment throughout the construction period at the project site.
2. Comply with requirements of Division 21 Sections.

1.4 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- B. Submit a shop drawing within five (5) days of the Notice to Proceed that shows the following:
 1. Temporary facilities equipment and materials (include manufacturer's literature).
 2. Details and layout of temporary installations.

3. Lighting plan showing temporary lighting facilities, electrical service panel location, electrical circuit diagram, and anticipated light level under the scaffolding for pedestrian walkway.
4. Copies of all permits for all temporary facilities.

1.5 QUALITY CONTROL

- A. Provide products for, and the execution of, the Work of this Section that will satisfy the requirements of all applicable codes. Provide products that satisfy the requirements of the applicable codes.

PART 2 - PRODUCTS

2.1 ELECTRICAL SERVICE

- A. Provide temporary power and lighting equipment consisting of fixtures, transformers, panel boards, groundings, lamps, switches, poles, conduits and wiring sized and capable of continuous service and having adequate capacity to ensure a complete operating system. Comply with NEMA and Division 26 requirements.

2.2 FIRE PROTECTION

- A. Fire extinguishers shall be UL rated and shall comply with the International Fire Code with City of Denver amendments.

PART 3 - EXECUTION

3.1 ELECTRICAL SERVICE

- A. The Contractor shall locate electrical service where it will not interfere with equipment, storage spaces, traffic, and prosecution of the Work or the work of others. Installation shall present a neat and orderly appearance and shall be structurally sound. Maintain service in a manner that will ensure continuous electrical service and safe working conditions.
- B. Comply with requirements of Division 26 Sections.

3.2 FIRE PROTECTION

- A. Install products in conformance with the requirements of the applicable Denver Fire Department and OSHA regulations.

1. Provide functional, approved fire extinguishers that are clearly identified for fire and an accessible supply of water during the period of construction. These fire extinguishers shall remain in place until permanent fire protection systems are functional.
 - B. Instruct construction personnel as to location and use of temporary fire protection equipment.
 - C. Comply with requirements of Division 21 Sections.
- 3.3 FENCING
- A. Contact all utility service companies prior to planning fence location and post locations for certification of current utilities. Locate pothole posts planned within five (5) feet of known utilities.
- 3.4 SIGNAGE
- A. Contractor shall not provide any signage for temporary facilities without prior approval from the DEN Project Manager.
- 3.5 REMOVAL
- A. The Contractor shall locate all temporary facilities so they can be completely removed without damaging permanent work.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this section.

END OF SECTION 015210

SECTION 015215 - FIELD OFFICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Field office will be located within the walled area surrounding the escalators being replaced.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 015215

SECTION 015719 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Specifications Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Title 8 - Protection of Persons and Property in the General Contract Conditions, 2011 Edition, specifically the following articles:
 - 1. Article 807 - Protection of Environment
 - 2. Article 808 - Hazardous and Explosive Materials or Substances
- C. Denver Municipal Airport System Rules and Regulations, Part 180-Environmental Management.
- D. DEN Environmental Management System (EMS).

1.2 SUMMARY

- A. The Work specified in this Section consists of identifying, and avoiding or mitigating adverse environmental impacts to air, water, soil, and other natural resources caused by construction activities.
 - 1. The Contractor, in conducting any activity on airport property or in conducting work for an airport project not on airport property, shall comply with all applicable airport, local, state, and federal rules, regulations, statutes, laws, and orders.
 - 2. Work shall not commence on any project until all FAA approvals have been received, applicable permits have been issued and signed by permittee, and all inspection requirements have been satisfied in accordance with State and local permitting requirements.

1.3 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- B. Within ten (10) days after Notice to Proceed on a task order, the Contractor shall submit the following if applicable, unless waived by the DEN Project Manager:
 - 1. Copies of any other plans, permits, permit applications, correspondence with regulatory agencies, including violations, waste manifests, results of laboratory analyses, or other environmental documentation required for the Project not previously identified herein.

1.4 RELATED DOCUMENTS

- A. Code of Federal Regulations (CFR) Publications, including, but not limited to, the following:
1. 40 CFR - Protection of Environment.
 2. 49 CFR 171-180 Hazardous Materials Transportation Regulations.
- B. Colorado Revised Statutes, including, but not limited to, the following:
1. Water Quality Control, Title 25, Article 8.
 2. Air Quality Control, Title 25, Article 7.
 3. Hazardous Waste, Title 25, Article 15.
 4. Noise Abatement, Title 25, Article 12.
 5. Solid waste regulations.
- C. City and County of Denver Executive Orders, including, but not limited to, the following:
1. Executive Order No. 115 - Required Use of Denver-Arapahoe Disposal Site (Landfill).
 2. Executive Order No. 123 - Greenprint Denver Office and Sustainability Policy.
 3. Denver Revised Municipal Code, Title II, Sections 48-44 and 48-93 - Solid Waste.
- D. City and County of Denver Construction Sites Program.
- E. City and County of Denver Construction Activities Stormwater Management Plans Information Guide.
- F. Any other applicable rules, regulations, ordinances, and guidance must be followed as applicable.
- G. Refer to Section 013300 "Submittal Procedures" and 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- H. Refer to Section 017419 "Construction Waste Management" for waste management requirements.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Products required for the Work shall meet all Environmental Requirements.

PART 3 - EXECUTION

3.1 AIR POLLUTION CONTROLS

- A. Burning of materials is strictly prohibited on DEN property.

3.2 STORAGE OF OIL, FUELS, OR HAZARDOUS SUBSTANCES

- A. The Contractor shall prevent oil or other hazardous substances, as defined in federal and state regulations, from entering the ground, drainage or local bodies of water, and shall provide containment, diversionary structures, or equipment to prevent discharged oil from reaching a watercourse and take immediate action to contain and clean up any spill of oily substances, petroleum products, or hazardous substances. The Contractor shall provide one or more of the following preventive systems at each petroleum storage site:

1. Dikes, berms, or retaining walls capable of containing at least 100% of the volume of the largest single tank and equipped with sufficient freeboard to contain precipitation events. The secondary containment must be "sufficiently impermeable" to prevent a release to the environment.
2. Culverting, curbing, guttering, or other similar structures capable of containing at least 100% of the volume of the largest single tank and freeboarding from precipitation.

- B. The provision of such preventive systems shall be subject to acceptance by the DEN Project Manager prior to tank installation and shall follow the SPCC regulations (40 CFR Part 112).
- C. Prior to bringing any containers of 55-gallon or above capacity onto DEN property for storage of oil, fuel, or other petroleum substances, the Contractor may be required to prepare an SPCC Plan that conforms to 40 CFR Part 112. The plan must include a certification either from a Professional Engineer or self-certification, if applicable, as well as management approval from the legally responsible Contractor representative.

3.3 SPILL RESPONSE AND NOTIFICATION

- A. The Contractor is responsible for all spills that may result from its activities. For ANY suspected or confirmed release or spill of oil, fuel, solid waste, hazardous waste, unknown materials, lavatory waste, or miscellaneous chemicals, etc., that occurs as the result of the Contractor's activities on DEN property, the Contractor is required to take immediate action to mitigate the release or spill and report it to the DEN Project Manager and to the DEN Communications Center at (303) 342-4200.
- B. The Contractor is responsible for notifying the appropriate regulatory agency in the event suspected and/or confirmed releases are identified, in accordance with regulatory requirements.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.
- B. The Contractor shall be responsible for payment of all fees associated with review of environmental permit applications and processing of environmental permits.

END OF SECTION 015719

SECTION 015810 - TEMPORARY SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for the following:
 - 1. Construction signage visible to the public.
 - 2. Temporary directional, informational, or regulatory signage.
- B. Related Requirements:
 - 1. Section 015210 "Temporary Facilities" for requirements for temporary facilities.

1.3 SUBMITTALS

- A. Submit temporary sign finishes, materials and paint, etc., for review and approval by DEN Project Manager prior to any fabrication.

1.4 QUALITY CONTROL

- A. Construction and other temporary signage visible to the public must be commercial grade quality, professionally fabricated, and installed based on the location of the sign. The Contractor is responsible to maintain this signage until it is no longer needed, and to remove signage from the site.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Interior signs that are visible and not physically accessible to the public may be made of rigid board, such as "Gator Board", with vinyl messages. All edges must be finished, and all fasteners concealed.
 - 1. All non public signs is the responsibility of the Contractor to provide, install and maintain.

- B. Interior signs that are visible and physically accessible by the public must be vandal-proof. Acceptable examples of vandal-proof signs are messages applied second surface with concealed tamperproof fasteners.
 - 1. Public wayfinding signage is provided by DEN signage and installed/maintained by the Contractor.

PART 3 - EXECUTION

3.1 HARDWARE

- A. Interior Signs: Attach with suitable adhesive and/or tape which may be removed without damage to finishes.

3.2 SIGN FINISHES, MATERIALS, AND PAINT

- A. Provide temporary signage to reflect permanent sign design and/or as directed by the DEN Signage Design Project Manager. Submit temporary sign finishes, materials and paint, etc., for review and approval prior to any fabrication.

3.3 MAINTENANCE

- A. The Contractor shall maintain temporary signage until it is no longer needed, as determined by DEN Project Manager.

3.4 REMOVAL

- A. The Contractor shall remove all temporary signs, and clean and refurbish affected areas to their original, or intended, condition.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
015810
TEMPORARY SIGNS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

END OF SECTION 015810

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
1. Section 012510 "Substitutions" for requests for substitutions.
 2. Section 014225 "Reference Standards" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number, title, and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. DEN Project manager's Action: If necessary, DEN Project Manager will request additional information or documentation for evaluation within one week of receipt of a comparable product request. DEN Project Manager will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if DEN Project Manager does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, DEN Project Manager will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Refer to Title 18 - Warranties, Guarantees and Corrective Work of the General Contract Conditions, 2011 Edition.
- B. Submittal Time: Comply with requirements in Section 017720 "Contract Closeout".

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged, and unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," DEN Project Manager will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match DEN Project Manager's sample", provide a product that complies with requirements and matches DEN Project Manager's sample. DEN Project Manager's decision will be final on

whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012510 "Substitutions" for proposal of product.

- D. Visual Selection Specification: Where Specifications include the phrase "as selected by DEN Project Manager from manufacturer's full range" or similar phrase, select a product that complies with requirements. DEN Project Manager will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: DEN Project Manager will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, DEN Project Manager may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

2.3 MATERIALS

- A. General: Comply with requirements specified in other Sections.
1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Section 018113.13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations," Section 018113.16 "Sustainable Design Requirements - LEED for Commercial Interiors," Section 018113.19 "Sustainable Design Requirements - LEED for Core and Shell Development."
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to DEN Project Manager for the visual and functional performance of in-place materials.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
016000
PRODUCT REQUIREMENTS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
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PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 016000

SECTION 016610 - STORAGE AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section consists of providing storage and protection of the materials, products and supplies which are to be incorporated into the construction and indicating such storage areas on the working drawings with the location and dates when such areas will be available for each purpose.
- B. Related Requirements:
 - 1. Section 015210 "Temporary Facilities" for requirements for temporary facilities.

1.3 SUBMITTALS

- A. Refer to Technical Specifications Sections 013300 "Submittal Procedures" and 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- B. Submit working drawings showing locations of storage areas not indicated on the Contract Drawings.
- C. Submit descriptions of proposed methods and locations for storing and protecting products.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials required for the storage and protection of the items specified shall be durable, weatherproof and either factory finished or painted to present an appearance acceptable to the DEN Project Manager and the City. Storage facilities shall be uniform in appearance with similar materials used to the maximum extent possible.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS OF EXECUTION

- A. Palletize materials, products, and supplies that are to be incorporated into the construction and stored off the ground. Material and equipment shall be stored only in those areas that are indicated as storage areas on the Contract Drawings and on the reviewed and accepted working drawings.
1. Store these items in a manner which will prevent damage, and which will facilitate inspection.
 2. Leave seals, tags, and labels intact and legible.
 3. Maintain access to products to allow inspection.
 4. Protect products that would be affected by adverse environmental conditions.
- B. Periodically inspect stored products to ensure that products are being stored as stipulated and that they are free from damage and deterioration.
1. Any damaged or deteriorated materials must be replaced immediately to avoid delays in the project schedule.
- C. Do not remove items from storage until they are to be incorporated into the Work.
- D. The Contractor shall ensure that all protective wrappings and coverings are secure and ballasted to prevent any items from deterioration and/or subsequent dislodgment. All items on the work site that are subject to becoming windborne shall be ballasted or anchored.

3.2 HANDLING AND TRANSPORTATION

- A. Handling:
1. Avoid bending, scraping, or overstressing products. Protect projecting parts by blocking with wood, by providing bracing or by other approved methods.
 2. Protect products from soiling and moisture by wrapping or by other approved means.
 3. Package small parts in containers such as boxes, crates, or barrels to avoid dispersal and loss. Firmly secure an itemized list and description of contents to each container.
- B. Transportation:
1. Conduct the loading, transporting, unloading, and storage of products so that they are kept clean and free from damage.

3.3 STORAGE

- A. Store items in a manner that shall prevent damage to the DEN's property. Do not store hydraulic fluids, gasoline, liquid petroleum, gases, explosives, diesel fuel, and other flammables in excavations. Petroleum products and chemicals must be stored in closed containers within secondary containment.
- B. Provide sheltered weather-tight or heated weather-tight storage as required for products subject to weather damage.
- C. Provide blocking, platforms or skids for products subject to damage by contact with the ground.
- D. All material shall be stored according to the manufacturer's recommendations. Any material that has to be stored within specified temperature or humidity ranges shall have a 24-hour continuously written recording made of the applicable condition. Should the recording show that the material was not stored within the recommended ranges the material shall be considered defective and in nonconformance. If a certification from the manufacturer's engineering design representative is provided stating that the actual variations are acceptable and will in no way harm the material or affect warranties, then the deficiency will be considered corrected.
- E. Store hazardous material separately, with all material marked with a label showing the hazard and how to treat exposure to the material. Store incompatible materials separately.
- F. Extra materials that are left over at the completion of the Work shall be removed from the Project site by the Contractor unless they are required to be delivered to DEN as per Contract Document requirements for maintenance stock.

3.4 LABELS

- A. Storage cabinets and sheds that will contain flammable substances and explosive substances shall be labeled "FLAMMABLE - KEEP FIRE AWAY" and "NO SMOKING" with conspicuous, bold lettering and conforming to OSHA requirements. Flammable substances shall be stored in flammable storage cabinets that conform to OSHA requirements.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
016610
STORAGE AND PROTECTION

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PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. The cost of the Work described in this Section shall be included in the applicable unit price item, work order, or lump sum bid item.
- B. Reference Section 012910 "Schedule of Values" for additional requirements for the possible payment of stored material.

END OF SECTION 016610

SECTION 017330 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Refer to Article 316, Cutting and Patching the Work in the General Contract Conditions, 2011 Edition

1.2 SUMMARY

1.3 SECTION INCLUDES:

- A. Work covered by Contract Documents.
- B. Miscellaneous provisions.

1.4 RELATED REQUIREMENTS:

- A. Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.
- B. Section 015210 "Temporary Facilities" for limitations and procedures governing temporary use of DEN's facilities.
- C. Section 015719 "Temporary Environmental Controls" for environmental control requirements.
- D. Section 024119 "Selective Demolition" for selective demolition of structures and other elements.
- E. Section 099123 "Interior Painting" for interior painting of areas of cutting and patching.

1.5 DEFINITIONS

- A. Cutting: Removal of existing construction to permit installation of or to perform other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.6 SUBMITTALS

1.7 Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.

1.8 Cutting and Patching Proposal: Submit a proposal describing procedures at least thirty (30) calendar days before the time cutting and patching will be performed, requesting approval to proceed. Obtain approval of cutting and patching proposal by DEN Project Manager before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work. The proposal shall include at least the following information:

- A. Identification of the Contract and the Contractor's name.
- B. Description of proposed work:
 - 1. Scope of cutting, patching, alteration, or excavation.
 - 2. The necessity for cutting or alteration.
 - 3. Drawing showing location of the requested cutting or alteration, along with radar or x-ray report.
 - 4. Trades that will execute the work.
 - 5. Products proposed to be used.
 - 6. Extent of refinishing to be done.
 - 7. Alternatives to cutting and patching.
- C. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
- D. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted and proposed dates of interruption of service. Additionally, verify and locate anything in or behind the area prior to cutting.
- E. Proposed Dust Control and Noise Control Measures: Submit a statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- F. Effect on the work and other surrounding work or on structural or weatherproof integrity of Project.
- G. Written concurrence of each contractor or entity whose work will be affected.

1.9 QUALITY CONTROL

- A. Operational Elements: Do not cut and patch ANY operating elements and related components in a manner that results in reducing their capacity to perform as intended

or that results in increased maintenance, decreased operational life or safety unless approved by the DEN Project Manager. Operations elements may include, but are not limited to the following:

1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire protection systems.
 4. Control systems.
 5. Communication systems.
 6. Conveying systems.
 7. Electrical wiring systems.
 8. Operating systems of special construction as described in Divisions 13 and 26.
 9. HVAC systems.
- B. Miscellaneous Elements: Do not cut and patch ANY of the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance, decreased operational life or safety unless approved by the DEN Project Manager. Miscellaneous elements may include, but are not limited to the following:
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels and equipment.
 6. Noise control and vibration control elements and systems.
 7. Stud walls.
 8. Roofing system
- C. Visual Elements: Do not cut and patch ANY construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would reduce, in DEN's sole opinion, the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactorily manner.
1. If possible, retain the original installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage the original installer or fabricator, engage another recognized, experienced, and specialized firm as approved by the DEN Project Manager. Visual elements may include, but are not limited to:
 - a. Stonework and stone masonry.
 - b. Ornamental metal.
 - c. Matched-veneer woodwork.
 - d. Preformed metal panels.
 - e. Firestopping.
 - f. Window wall systems.
 - g. Terrazzo.
 - h. Flooring.
 - i. Wall coverings and finishes.
 - j. HVAC enclosures, cabinets, or covers.

- D. Cutting and Patching Conference: Before proceeding, meet at the Project site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during cutting and patching operations by methods and with materials so as not to void existing warranties.
- B. All effort shall be made to engage the original installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage the original installer or fabricator, engage another recognized, experienced and specialized firm as approved by the DEN Project Manager:
1. Processed concrete finishes.
 2. Stonework and stone masonry.
 3. Ornamental metal.
 4. Matched-veneer woodwork.
 5. Preformed metal panels.
 6. Firestopping.
 7. Window wall systems.
 8. Terrazzo.
 9. Flooring.
 10. Wall coverings and finishes.
 11. HVAC enclosures, cabinets, or covers.

1.11 MATERIALS

- A. General: All patching material shall be of the type specified for the material being patched. Comply with requirements specified in other specifications Sections.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually and texturally match existing adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials as approved by the DEN Project Manager.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. **Compatibility:** Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers. Provide additional substrates or materials if required to achieve desired final results of patching work.
 - 2. Immediately notify the DEN Project Manager, in writing, of unsuitable, unsafe, or unsatisfactory conditions.
 - 3. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
 - 4. Proceed with patching only after construction operations requiring cutting are complete and inspected by the DEN Project Manager.

3.2 PREPARATION

- A. **Temporary Support:** Provide temporary support of Work to be cut to ensure structural value or integrity.
- B. **Protection:** Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. **Adjoining Areas:** Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. **Existing Services:** Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid or minimize interruption of services to occupied areas. Do not interrupt services in without approval from the appropriate authority. Refer to the appropriate Shutdown specification/procedures for applicable services.

3.3 POLLUTION CONTROLS

- A. **Dust Control:** Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations. Reference Section 015719 "Temporary Environmental Controls" for requirements.
 - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions such as ice, flooding, and pollution.
 - 2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosures. Vacuum carpeted areas. Professionally clean carpeted areas if required.

3. For outdoor concrete saw cutting operations, slurry waste must be vacuumed up immediately to prevent migration off-site to pervious surfaces, surface waters or drains.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
1. Concrete slurry waste must be disposed of properly in accordance with applicable airport, local and state rules and regulations.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to the condition existing before selective demolition operations began.
- 3.4 PERFORMANCE
- A. General: Employ skilled workers to perform cutting and patching. Execute cutting and demolition by methods that will prevent damage to other work and will provide a proper surface to receive patching.
1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
 2. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerance, and finishes.
 3. Restore work that has been cut or removed; install new products to provide complete work in accordance with requirements of the Contract Documents.
 4. Fit work airtight and fire safe to pipes, sleeves, ducts, conduit, and other penetrations through surfaces as required by the Contract Documents.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and other similar operations, including excavation, using methods least likely to damage elements retained to adjoining construction. If possible, review proposed procedures with original installer and comply with original installer's written recommendations.
1. In general, use ground fault hand or small power tools designed (to short if metal is hit) for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to the size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete: Use a cutting machine such as an abrasive saw or a diamond-core drill.
 4. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other specification Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing. For continuous surfaces, refinish entire unit to the nearest break line. For an assembly, refinish entire unit.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs on a painted surface, apply primer and intermediate paint coats over the patch and apply the final coat over the entire unbroken surface containing the patch. Provide additional coats until the patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- D. Fire Rated Construction: Where rated elements are cut, reconstruct to approved designs to provide original fire rating.

3.5 CORE DRILLING

- A. The Contractor shall execute a minimum of x-rays or ground penetrating radar (GPR) at each location planned for core drilling prior to submittal to the DEN Project Manager and to utility representatives for approval for core drilling. The request for approval shall be submitted a minimum seven (7) days before Core Drilling. The request for approval shall indicate on the x-ray or radar information regarding alternate locations or core drilling to avoid structural members and any embedded conduit. Embedded conduit may be metallic or plastic. The x-ray or radar system shall be capable of detecting both types of conduit.
- B. Core drilled "cores" and the core-drilled opening shall be inspected by DEN Project Manager Representatives prior to installation of any systems in new openings.
- C. The request for approval shall indicate on the x-ray or radar information regarding alternate locations or core drilling to avoid structural members and any embedded conduit. Embedded conduit may be metallic or plastic. The x-ray or radar system shall be capable of detecting both types of conduit.
- D. X-ray activities may not be performed during hours of activity or occupancy in the area of the x-ray system. The Contractor shall provide all manpower and barriers required to secure the areas affected by x-ray activities.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
017330
CUTTING AND PATCHING

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PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017330

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section describes the requirements for the disposal, recovery, reuse or recycling of non-hazardous and non-asbestos containing construction and demolition waste for both LEED and non-LEED projects. Note that LEED projects may have more specific requirements than identified in this section.
- B. Waste materials shall be managed in accordance with all local, state, and federal regulations.
- C. Related Requirements:
1. Section 013300 "Submittal Procedures" for submittal procedures.
 2. Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
 3. Section 015719 "Temporary Environmental Controls" for environmental control procedures.
 4. Section 024119 "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.

1.3 DEFINITIONS

- A. Solid Waste: means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, air pollution control facility, or other discarded material; including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations, commercial operations or community activities. Solid waste does not include any solid or dissolved materials in domestic sewage, or agricultural wastes, or solid or dissolved materials in irrigation return flows, or industrial discharges which are point sources subject to permits under the provisions of the "Colorado Water Quality Control Act", Title 25, Article 8, CRS or materials handled at facilities licensed pursuant to the provisions on "Radiation Control Act" in Title 25, Article 11, CRS. Solid waste does not include:
1. Materials handled at facilities licensed pursuant to the provisions on radiation control in Article 11 of Title 25, C.R.S.
 2. Excluded scrap metal that is being recycled.
 3. Shredded circuit boards that are being recycled.

- B. Salvaged Materials: Defined as materials that exist on the site that can be reused, either on site or by another entity.
- C. Recyclable Materials: Defined as materials that exist on site or are generated during the construction process that can be recycled and/or remanufactured into another material. Recyclable waste includes, but is not limited to, the following:
1. Concrete.
 2. Asphalt
 3. Ferrous and non-ferrous metals.
 4. Untreated wood, engineered wood.
 5. Gypsum wallboard.
 6. Corrugated cardboard, paper goods.
 7. Plastic.
 8. Glass, insulation.
 9. Carpet.
 10. Paints, fabric.
 11. Rubber.
 12. Stone and brick.
- D. Hazardous Waste: Per 6 CCR 1007-3, those substances and materials defined or classified as such by the Hazardous Waste Commission pursuant to 25-15-302, C.R.S., as amended. Also, see hazardous waste definition per 40 CFR 261.3.
- E. Asbestos Containing Materials: Per 5 CCR 1001-10: Regulation No. 8, The Control of Hazardous Air Pollutants, Part B The Control of Asbestos- material containing more than 1% asbestos.

1.4 SUBMITTALS

- A. The Contractor shall submit a list of materials and products used with Safety Data Sheets (SDS). Examples include chemicals, solvents, fuels, building materials, etc.
1. A hardcopy or electronic link to the SDS for all materials and products used, if applicable.
 2. Identify storage methods for materials, including measures to segregate incompatible materials.
- B. The Contractor shall submit a Waste Management Plan to the DEN Project Manager and DEN Environmental Services. Minimum Waste Management Plan requirements include the following:
1. A list of all waste streams generated by the project
 - a. For each waste stream listed, the Contractor shall identify the handling/transportation method, the disposal method, and the disposal facility utilized.
 - b. If the Contractor anticipates generation of hazardous waste, the Contractor shall provide its USEPA (generator) identification number.

2. Pollution Prevention Measures
 - a. Describe best practices that will reduce waste. For example, waste reduction measures, requiring vendors to deliver materials in reusable packaging, etc.
 3. Waste Management Plan Training.
 4. Storage of materials.
 5. Spill response.
- C. Approval of Contractor's Waste Management Plan does not relieve the contractor of responsibility for compliance with applicable environmental regulations.
1. The contractor shall maintain a record of the amounts of construction and demolition waste generated, recycled, reused, salvaged, or disposed of, in pounds for review.
 2. Hauling manifest records shall be maintained and available for review. Manifest forms are available from the DEN Project Manager

PART 2 - PRODUCTS

- 2.1 A list of all materials and products used. Examples include chemicals, solvents, solvents, fuels, curing compounds, etc.
- A. A hardcopy or electronic link to SDSs for all materials and products used.
 - B. Identify storage methods, including measures to segregate incompatible materials.
 - C. Refer to the Waste Management Plan

PART 3 - EXECUTION

- A. The Contractor shall not wash down equipment in such a manner as to flush grease, oils, detergents, and other contaminants onto the project site or onto airport property unless the waste is properly contained, treated, and disposed of.
- B. DEN maintains two dry concrete and asphalt recycling yards used for the accumulation and crushing of asphalt and concrete. The South Yard is located on 71st Ave just east of Jackson Gap Street. The North Yard is located on the south side of 110th, west of Queensburg Street.
- C. Concrete washwater cannot be discharged to surface waters or to storm sewer systems. Colorado Discharge Permit System (CDPS) coverage conditionally authorizes discharges to the ground of concrete wash water from washing of tools and concrete mixer chutes when appropriate best management practices (BMPs) are implemented.
 1. A bermed containment area that allows discharge water to infiltrate or evaporate;

- a. Alternatives to bermed containment areas include portable concrete washout bins, and industrial washout containment systems where the accumulated waste is removed from the site and disposed of properly.
 2. Use of the washout site should be temporary (less than one year);
 3. The washout site should not be located in an area where shallow groundwater may be present, such as near natural drainages, springs, or wetlands
 4. Upon termination of the washout site, accumulated solid waste, which includes concrete waste and contaminated soils, must be removed from the site and disposed of properly.
- D. Rejected loads and/or other wet concrete or asphalt materials are PROHIBITED TO BE PLACED ANYWHERE on DEN property. These materials must be returned to the facility of origination or other permitted facility for proper disposal.
- E. Concrete saw cutting slurry must be properly contained and disposed of.
- F. Unknown or questionable materials encountered during construction activities, must immediately be reported to the DEN Communications Center at (303) 342-4200 and the DEN Project Manager.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017419

SECTION 017420 - CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this section consists of maintaining a clean, orderly, hazard free work site during construction, and final cleaning for the City's Final Acceptance. Failure to maintain the work site will be grounds for withholding monthly payments until corrected to the satisfaction of the DEN Project Manager.
- B. Refer to Article 325, Cleanup During Construction in the General Contract Conditions, 2011 Edition

1.3 JOB CONDITIONS

A. Safety Requirements

1. Maintain the work site in a neat, orderly, and hazard-free manner in conformance with all federal, state, and local rules, codes, regulations, and orders, including all OSHA requirements, until Final Acceptance of the Work. Keep catwalks, underground structures, work site walks, sidewalks, roadways, and streets, along with public and private walkways adjacent to the work site, free from hazards caused by construction activities. Inspect those facilities regularly for hazardous conditions caused by construction activities.

B. Hazards Control:

1. Store waste materials in properly labeled waste containers. This includes solid wastes, hazardous wastes, universal wastes, etc.
2. Store volatile wastes in covered metal containers and remove those wastes from work site daily.
3. Do not accumulate wastes that create hazardous conditions.
4. If volatile and noxious substances are being used in spaces that are not naturally ventilated adequately, provide artificial ventilation.
5. Hazard controls shall conform to the applicable federal, state, and local rules and regulations.
6. Provide appropriate waste receptacles in all areas in which employees are working. Waste receptacles shall be kept covered at all times. All materials on site shall be anchored and covered to prevent any objects from becoming wind-borne.

C. Access:

1. Maintain the work site to permit access by other City contractors as required and to allow access by emergency personnel.

1.4 SUBMITTALS

A. Washing Plan: The Contractor shall prepare a plan describing the specific procedures and materials to be utilized for any equipment, vehicle, etc., washing activities. The plan must be submitted to the DEN Project Manager and approved by the DEN Project Manager and Environmental Services.

1. Outdoor washing at DEN is not allowed unless the materials will be collected or managed in a manner to ensure that they will not enter the municipally owned separate storm sewer system (MS4). The materials can only be disposed at a location pre-approved by DEN Environmental Services (refer to DEN SWMP). Failure to comply with this requirement would result in the discharge of non-stormwater.
 - a. Outdoor wash materials that contain soaps or other cleaning chemicals must be collected and disposed of off site
2. Indoor washing must be conducted in accordance with the Best Management Practices (BMPs) detailed in the DEN SWMP. Refer to Section 015719 "Environmental Controls". In addition, all indoor washing must be conducted in a manner that ensures that there are no prohibited discharges to the sanitary sewer system.
 - a. All wash-water that will be disposed of into the sanitary sewer must comply with City and County Denver rules and regulations pertaining to prohibited discharges.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

- A. Utilize the type of cleaning materials recommended by the manufacturer for the surfaces to be cleaned.
- B. Maintain current Safety Data Sheets (SDS) on site for all chemicals. DEN Environmental Services must approve the chemicals used prior to discharge to the sanitary sewer system.
- C. Ensure proper disposal of all wastes generated from the use of these materials. The Contractor must ensure compliance with all environmental regulations. No wastes can be disposed of on DEN property.

PART 3 - EXECUTION

3.1 INTERIM CLEANING

- A. Clean the work site every shift/workday for the duration of the construction Contract. Maintain structures, grounds, storage areas and other areas of work site, including public and private properties immediately adjacent to work site, free from accumulations of waste materials caused by construction operations. Place waste materials in covered metal containers. All hard concrete, steel, wood, and finished walking surfaces shall be swept clean daily.
- B. Remove or secure loose material on open decks and on other exposed surfaces at the end of each workday or more often in a manner that will maintain the work site hazard free. Secure material in a manner that will prevent dislodgment by wind and other forces.
- C. Sprinkle waste materials with water or acceptable chemical palliative to prevent blowing of dust.
- D. Promptly empty waste containers when they become full and legally dispose of the contents at dumping areas off the City's property.
- E. Control the handling of waste materials. Do not permit materials to be dropped or thrown from structures.
- F. Immediately remove spillage of construction related materials from haul routes, work site, private property, public rights of way, or on the Denver International Airport site.
- G. Clean only when dust and other contaminants will not precipitate upon newly painted surfaces.
- H. Cleaning shall be done in accordance with manufacturer's recommendation.
- I. Cleaning shall be done in a manner and using such materials as to not damage the Work.
- J. Clean areas prior to painting or applying adhesive.
- K. Clean all heating and cooling systems prior to operations. If the Contractor is allowed to use the heating and cooling system, it shall be cleaned prior to testing.
- L. Clean all areas that will be concealed prior to concealment.
- M. Dispose of all fluids according to the approved Washing Plan.

3.2 FINAL CLEANING

- A. Refer to Article, Clean-up Upon Completion in the General Contract Conditions, 2011 Edition. Additionally, the Contractor, shall at a minimum, complete the following:

1. Inspect interior and exterior surfaces, including concealed spaces, in preparation for completion and acceptance.
2. Remove dirt, dust, litter, corrosion, solvents, discursive paint, stains, and extraneous markings.
3. Remove surplus materials, except those materials intended for maintenance.
4. Remove all tools, appliances, equipment, and temporary facilities used in the construction.
5. Remove detachable labels and tags. File them with the manufacturer's specifications for that specific material for the City's records.
6. Repair damaged materials to the specified finish or remove and replace.
7. After all trades have completed their work and just before Final Acceptance, all catch basins, manholes, drains, strainers and filters shall be cleaned; roadway, driveways, floors, steps and walks shall be swept. Interior building areas shall be vacuum cleaned and mopped.
8. Final cleanup applies to all areas, whether previously occupied and operational or not.
9. Dispose of all fluids according to the approved Washing Plan.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017420

SECTION 017515 - SYSTEM STARTUP, TESTING AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide complete startup, testing, and operator training services to ensure operability of all systems supplied.
- B. Coordinate all start-up and testing with the DEN Project Manager.

1.3 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures. Submit the following:
 - 1. Test procedures.
 - 2. Test reports.
 - 3. Training outline.
- B. Submit Qualification Data: For instructor.
- C. Attendance Record: For each training module submit the following:
 - 1. Module title
 - 2. Module description
 - 3. Length of instruction time
 - 4. Participant names
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, experienced in operation and maintenance procedures and training.
- B. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 014510 "Contractor Quality Control". Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructor's personnel, audiovisual equipment, and facilities needed to avoid delays. Ensure that students are notified at least 14 days prior to the start of instruction.
3. Review required content of instruction.

1.5 COORDINATION

- A. Coordinate instruction schedule with DEN's operations. Adjust schedule as required to minimize disrupting DEN's operations and to ensure availability of DEN's personnel. As required, include multiple classes to accommodate various shifts
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by DEN Project Manager.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 FIELD TESTS AND ADJUSTMENTS

- A. All electrical and mechanical equipment including the interfaces with control systems and the communication system, and all alarm and operating modes for each piece of equipment, shall be tested by the Contractor to the satisfaction of the DEN Project Manager before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned and connected. Any changes, adjustments, or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the Work.
 1. At least thirty (30) days before the time allowed in the construction schedule for commencing startup and testing procedures, the Contractor shall submit to the DEN Project Manager the detailed procedures the Contractor proposes for testing and startup of all electrical and mechanical equipment. These procedures are submitted for review and acceptance by DEN.
 2. The Contractor's startup and testing procedures shall include detailed descriptions of all pre-operational hardware, electrical, mechanical and instrumentation used for testing work.

- a. Each control device, item of electrical, mechanical and instrumentation equipment, and all control circuits shall be considered in the testing procedures which shall be designed in a logical sequence to ensure that all equipment has been properly serviced, aligned, connected, wired, calibrated and adjusted prior to operation.
 - b. Motors shall be tested in accordance with ANSI/IEEE Publication 112. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question, and the Contractor may either be required to demonstrate that the equipment has not been damaged, or replace it as determined by the DEN Project Manager.
3. Testing procedures shall be designed to duplicate as nearly as possible all conditions of operations and shall be carefully selected to ensure that the equipment is not damaged. All filters shall be in place during startup and testing.
- a. Once the DEN Project Manager has accepted the testing procedures, the Contractor shall provide checkout, alignment, adjustment and calibration signoff forms for each item of equipment and each system that will be used.
 - b. The Contractor and the DEN Project Manager shall use the signoff forms in the field jointly to ensure that each item of electrical, mechanical and instrumentation equipment and each system has been properly installed and tested. The Contractor shall cooperate with project-wide systems contractors where startup and testing is to be conducted concurrently.
4. Any special equipment needed to test equipment shall be provided by the Contractor to the City at no cost for a period of thirty (30) days during startup.
- B. Before starting up the equipment, the Contractor shall properly service it and other items, which normally require service in accordance with the maintenance instructions. The Contractor shall be responsible for lubrication and maintenance of equipment and replacement filters throughout the entire equipment "break-in" period described by the manufacturer.
1. The Contractor shall be responsible for the startup, adjustment, preliminary maintenance, and checkout of all equipment and instrumentation. All systems shall be carefully checked for conformance with the design criteria.
 2. If any equipment or system does not operate as specified in the Contract, the Contractor shall immediately replace or repair components until it operates properly.
 3. The Contractor shall submit a test report to the DEN Project Manager within thirty (30) days after completion of the system startup period.
- 3.2 SYSTEMS STARTUP AND TESTING
- A. The Contractor shall provide startup and testing per ASME A17.1 referenced in Section 143100 – Escalators.

3.3 FINAL INSTRUCTIONS AND OPERATION TRAINING

- A. After startup and testing is completed, the Contractor shall demonstrate to the City's personnel the proper manner of operating the equipment, programming messages, making adjustments, responding to alarms and emergency signals, and maintaining the system.
- B. The Contractor shall provide on-the-job training by a suitably qualified instructor to designated personnel and shall instruct them in the operation and maintenance of the systems. In the event qualified instructors on the Contractor's staff are not available, the Contractor shall arrange with the equipment manufacturer for such instruction at no additional cost to the City.
- C. The Contractor shall provide a syllabus to the DEN Project Manager at least seven (7) calendar days prior to the start of each course that outlines topics to be covered, the proposed time allotted to each topic, and the target audience of the training session (technical, casual operator, overview, etc.). The Contractor shall not commence any training courses until the syllabus has been reviewed and approved by the DEN Project Manager.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.
- B. No contractual item requiring startup or testing will be paid until the conditions of this Section are completely satisfied.

END OF SECTION 017515

SECTION 017720 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Special Sections, apply to this Section.

1.2 SUMMARY

- A. Work specified in this Section includes procedures required prior to Final Acceptance of the Work in addition to those specified in Title 20 – Final Completion and Acceptance of The Work in the General Contract Conditions, 2011 Edition, and Technical Specification Section 017840 "Contract Record Documents".
- B. This Section also includes procedures and penalties to ensure prompt completion of the Project Closeout.
- C. Related Sections:
 - 1. Title 20 of the General Contract Conditions, 2011 Edition.
 - 2. Section 017840 "Contract Record Documents" for required record documents.
 - 3. Form CM-75, Closeout Checklist.
- D. SUBMITTALS
 - 1. Submit written Certification to the DEN Project Manager that, in the opinion of the Contractor, the Work is complete.
 - 2. Submit final survey within 60 days after issuance of Substantial Completion.
 - 3. Submit a Final Statement of Accounting to the DEN Project Manager.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION FOR FINAL INSPECTION

- A. Before requesting inspection for Final Acceptance of the Work by the City, the Contractor shall inspect, clean, and repair the Work as required.
- B. The Contractor shall ensure that all items on the Closeout Checklist have been addressed and accepted by the DEN Project Manager.

3.2 FINAL INSPECTION

- A. The Contractor shall submit written certification to the DEN Project Manager when, in the opinion of the Contractor, the Work is complete. Such communication shall certify that:
1. The Work has been inspected by the Contractor for conformance with the Contract Documents.
 2. The Work has been completed in conformance with the Contract Documents, including all punchlist items.
 3. The Work is ready for final inspection by the City.
 4. All as-built documents have been submitted and accepted.
 5. All damaged or destroyed real, personal, public, or private property impacted by the Work has been repaired or replaced.
 6. All Warranties and Bonds have been completed, executed, submitted, and accepted.
 7. All personnel badges and vehicle permits have been returned to DEN Airport Security.
- B. The DEN Project Manager will inspect the Work in accordance with the Section 2002.1 of the City and County of Denver's Department of Aviation's General Contract Conditions.
- C. If the DEN Project Manager finds incomplete or defective Work:
1. The DEN Project Manager may, at the DEN Project Manager's sole discretion, either terminate the inspection, or prepare a punchlist and notify the Contractor in writing, listing the incomplete or defective Work.
 2. The Contractor shall take immediate steps to remedy all identified deficiencies and resubmit a written certification to the DEN Project Manager that Work is complete.
 3. The DEN Project Manager will then re-inspect the Work.

3.3 REINSPECTION FEES

- A. Should the DEN Project Manager be required to perform re-inspections of the Work due to the Contractor prematurely claiming the status of the Work to be complete:
1. The Contractor shall compensate the City for such additional services at the rate of \$125.00 per man-hour, with a minimum charge of \$250.00.
 2. The City shall deduct the amount of such compensation from the final payment to the Contractor.

3.4 LATE CLOSEOUT FEES

- A. Within 100 days after issuance of substantial completion, all documentation required by this Contract to achieve Project Closeout shall be submitted. Failure to submit all required documentation shall result in fees to compensate the City for project management work while the project remains open.

1. Fees at the rate of \$450 per day.
2. The resubmittal of required documents may extend the 100-day time frame at the DEN Project Manager's discretion.

3.5 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a Final Statement of Accounting to the DEN Project Manager.
- B. The Final Statement of Accounting shall reflect all adjustments to the Contract amount and shall include the following:
 1. The original Contract Value.
 2. Additions and deductions resulting from the following:
 - a. Approved Change Orders.
 - b. Allowances.
 - c. Final quantities for unit price items, including required backup for the quantities.
 - d. Deductions for corrected work.
 - e. Penalties.
 - f. Deductions for liquidated damages.
 - g. Deductions for re-inspection payments.
 - h. Other adjustments.
 3. Total Contract Value, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. If required, the DEN Project Manager will prepare a final Change Order, reflecting the approved adjustments to the Contract Value that were not included in previously issued Change Orders.

3.6 FINAL APPLICATION FOR PAYMENT

- A. The Contractor shall submit the final application for payment in accordance with the procedures and requirements detailed in Article 2003, Final Settlement in the General Contract Conditions, 2011 Edition.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
017720
CONTRACT CLOSEOUT

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017720

SECTION 017825 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section consists of preparing and submitting operation and maintenance data for mechanical, electrical, and other specified equipment/products.
- B. Coordinate all the requirements of the required data with DEN Asset Management.

1.3 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.
- B. All submittals must be provided in electronic data as indicated by the DEN Building Information Modeling (BIM) Design Standards Manual (DSM) and as required by the DEN BIM and DEN Asset Management groups.
- C. Submit one (1) electronic copy of the proposed Operation and Maintenance Data Manual not less than 30 days prior to system startup, acceptance tests and final inspection.
 - 1. The submitted copies shall provide the Information following the MasterFormat standard. Equipment/Data shall be organized using Section formatting within the 50 MasterFormat Divisions.
- D. Submit one (1) electronic copy of Operation and Maintenance Data Manual within ten days after commissioning is complete. These copies shall incorporate any comments made on the previous submittals, along with final readings on all settings and gauges taken while the system is in fully satisfactory operation.

1.4 CONTINUOUS UPDATING PROGRAM

- A. Furnish to DEN AIM Asset Management one (1) electronic copy of the Contractor's letter indicating that suppliers have been notified to provide updated operation and maintenance data, service bulletins, and other information pertinent to the equipment, as it becomes available.

PART 2 - PRODUCTS

- A. The following products are the requirements of the Operation and Maintenance Data Manual:
1. Text: Typewritten.
 2. Printed data: Manufacturer's catalog cuts, brochures, operation, and maintenance data. Clear reproductions thereof will be acceptable. If this data is in color, all final manuals must contain color data.
 3. Drawings
 4. Flysheets: Separate each portion of the manual with colored, neatly prepared flysheets briefly describing the contents of the ensuing portion.
 5. Covers: The front covers shall contain the information required in paragraph 3.2 below.

PART 3 - EXECUTION

3.1 GENERAL

- A. Assemble each operation and maintenance manual using the manufacturer's latest standard commercial data, and include all additional information that is unique to the Project.

3.2 COVER

- A. Include the following information on the front cover and on the inside cover sheet:
1. Operation and maintenance instructions.
 2. Title of structure or facility.
 3. Title and number of Contract.
 4. Contractor's name and address.
 5. General subject of the manual.

3.3 CONTENTS OF THE MANUAL

- A. Table of Contents, which references, at a minimum, three heading levels.
- B. Index of Equipment/Data with entries for equipment type and MasterFormat Division and Section.
- C. A Master Index that contains index entries for all submitted Operation and Maintenance Data Manuals.
1. Equipment/Data shall be indexed by equipment type and MasterFormat Division and Section.

2. Name, address, and telephone numbers of Contractor, suppliers and installers along with the manufacturer's order number and description of the order.
3. Name, address, and telephone numbers of manufacturer's nearest service representatives.
4. Name, address, and telephone number of nearest parts vendor and service agency.
5. Copy of guaranties and warranties issued to, and executed in the name of, the City.
6. Anticipated date the City assumes responsibility for maintenance.
7. Description of system and component parts including theory of operation.
8. Pre operation check or inspection list.
9. Procedures for starting, operating, and stopping equipment.
10. Post operation check or shutdown list.
11. Inspection and adjustment procedures.
12. Troubleshooting and fault isolation procedures for on-site level of repair.
13. Emergency operating instructions.
14. Accepted test data.
15. Maintenance schedules and procedures.
16. Test procedures to verify the adequacy of repairs.
17. One (1) copy of each wiring diagram.
18. One (1) copy of each piping diagram.
19. Location where all measurements are to be made.
20. One (1) copy of each duct diagram.
21. One (1) copy of control diagram.
22. One (1) copy of each accepted shop drawing.
23. One (1) copy of software programs imputable or changeable on site.
24. Ordering information.
25. Training course material used to train DEN staff, including slides and other presentation material.
26. Provide the following information, unless the item is covered in the Manufacturer's Operation and Manual:
 - a. Manufacturer's parts list with catalog names, numbers, and illustrations.
 - b. A list of components that are replaceable by the City.
 - c. An exploded view of each piece of the equipment with part designations.
 - d. List of manufacturer's recommended spare parts, current prices, and recommended quantities for two years of operation.
 - e. List of special tools and test equipment required for the operation, maintenance, adjustment, testing and repair of the equipment, instruments and components.
 - f. Scale and corrosion control procedures.
 - g. Disassembly and re-assembly instructions.
 - h. Troubleshooting and repair instructions.
 - i. Calibration procedures.

TECHNICAL SPECIFICATIONS
01 GENERAL REQUIREMENTS
017825
OPERATION AND MAINTENANCE DATA

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017825

SECTION 017835 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section consists of preparing and submitting warranties and bonds required by the Contract and these Specifications.

1.3 SUBMITTALS

- A. Refer to Technical Specifications Section 013300 "Submittal Procedures" and Section 013325 "Shop and Working Drawings, Product Data and Samples" for submittal procedures.

- 1. All warranties shall be executed specifically to the City.
- 2. Photocopies or reproductions of stock manufacturer's warranties will not be accepted, although electronic copies are acceptable when the manufacturer's warranty is contained in the O&M manual.

- B. Submit samples of warranties and bonds for review by the City prior to execution of Work. Do not submit final warranties until sample warranties have been approved by the City.

- 1. Submit the warranties and bonds required by the Contract Documents.
- 2. Prepare and submit a list of all warranties and bonds on the following forms:

- a. CM-10: Contractor Warranty
- b. CM-11: Contractor/Sub-Contractor Warranty

- C. Submit executed warranties and bonds

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 WARRANTIES AND BONDS

- A. Submit executed warranties and bonds required by the Contract Documents, as detailed in Title 15 - Performance and Payment Bonds and Title 18 - Warranties, Guarantees, and Corrective Work in the General Contract Conditions, 2011 Edition.
 - 1. Prepare and submit a list of all warranties and bonds on the following forms:
 - a. CM-10, Contractor Warranty
 - b. CM-11, Contractor/Sub-Contractor Warranty

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017835

SECTION 017840 - CONTRACT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Work specified in this Section consists of maintaining, marking, recording, and submitting Contract record documents that include shop drawings, warranties, Contract Documents, and contractor records.
- B. Refer to DEN Building Information Modeling (BIM) Design Standards Manual (DSM) and Approved BIM execution for data format and file types acceptable for different type of data.
- C. Related Requirements:
1. Section 013100 "Project Management and Coordination".
 2. Section 013223 "Construction Layout, As-built and Quantity Surveys".
 3. Section 013300 "Submittal Procedures".
 4. Section 013325 "Shop and Working Drawings, Product Data and Samples".
 5. Section 017720 "Contract Closeout".
 6. Section 017825 "Operation and Maintenance Data".

1.3 SUBMITTALS

- A. Each submittal of record documents shall contain the following information:
1. Date.
 2. Project title and numbers.
 3. Contractor's name and address.
 4. Title and number of each record document.
 5. Certification that each document as submitted is complete and accurate.
 6. Signature of the Contractor or the Contractor's authorized representative.
- B. At the completion of this Contract, deliver all record documents including the following:
1. As-built shop drawings, diagrams, illustrations, schedules, charts, brochures and other similar data.
 2. Warranties, guarantees, and bonds.
 3. Contract Documents.
 4. Contractor records.

- C. As-built Contract Drawings shall be submitted with each monthly progress payment application, and a complete set shall be submitted prior to final payment.
1. The Contractor shall provide a single electronic copy of each Contract drawing sheet which has been used to produce work during the payment period or work that payment is being requested on, which records the current as-built conditions of work, including the posting of any change orders or change directives not shown on the Contract Documents at the time of Contract signing.
 - a. The Contractor must show as-built work completed through the payment application date including but not limited to utilities, empty conduit, conduit for actual electrical lines, plumbing, HVAC, location of anchor bolts and support points for use by others.
 - b. The Contractor shall be liable for any costs incurred by the City or a third party due to errors or lack of information provided on the as-built drawings.
 - c. All markings on drawings shall be legible to identify the portion of work completed.
 - d. For projects utilizing BIM system by the Contractor or a consultant of the Contractor, all data formats shall be compatible and as approved by the BIM execution plan as required in the DEN BIM DSM.

1.4 QUALITY CONTROL

- A. Submit electronically scanned copies of all documents required by Chapter 17 "Special Inspection and Testing" of the International Building Code 2009 as amended by City and County of Denver 2011. Keep scale and clarify dimension where electronic copies are not as originally scaled and dimensioned.
- B. For projects utilizing BIM for Revit, follow approved BIM execution plan and DEN BIM DSM for record documents, formats, and quality control and assurance procedures.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MAINTENANCE OF DOCUMENTS

- A. The Contractor must follow all the procedures established in the Contract Documents and DEN BIM DSM.
- B. The Contractor shall maintain at the work site on a current basis one (1) record copy of all drawings, specifications, addenda, change orders, approved shop drawings, working drawings, product data and samples in good order and marked currently to record all changes made during construction.
- C. Maintain at the field office one copy of the following record documents:

1. Contract Documents:

- a. Contract Drawings with all clarifications, requests for information, directives, changes, and as-built conditions clearly posted.
- b. Contract Specifications with all clarifications, requests for information, changes, directives and record of manufacturer actually used along with product trade name.
- c. Reference Standards in accordance with Section 014225 "Referenced Standards".
- d. Affirmative Action Plan and documents.
- e. One (1) set of drawings to record the following:
 - 1) Location of internal utilities; include valves, controls, conduit, duct work, switches, pressure reducers, size reducers, transitions, crosses, tees, filters, motors, heaters, dampers, regulators, safety devices, sensors, access doors and appurtenances that are concealed in the construction shall be shown with dimensions given from a visible and recognizable reference to the item being located in all three dimensions. The drawings shall also reference the applicable submittal for the item being located.
 - 2) Field changes of dimensions and details including as-built elevations and location .
 - 3) Details not on original Contract Drawings but obtained through requests for information or by other communications with the City.

2. Contractor Records:

- a. Daily Quality Control Reports.
- b. Certificates of compliance for materials used in construction.
- c. Completed inspection list.
- d. Inspection and test reports.
- e. Test procedures.
- f. Qualification of personnel.
- g. Approved submittals.
- h. Material and equipment storage records.
- i. Safety Plan
- j. Erosion, sediment, hazardous and quality plans.
- k. Hazardous material records.
- l. First report of injuries.

3.2 RECORDINGS

- A. Label each document page or article "PROJECT RECORD" in two-inch high letters.
- B. Keep record documents current daily.
- C. Legibly mark copies of the Contract Drawings to record actual construction.
- D. Legibly mark up each Section of the specifications and Contract Drawings to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item actually installed
2. Changes made by change orders, requests for information, substitutions, and variations approved by submittals.

3.3 DOCUMENT MAINTENANCE

- A. Follow all the required processes of the approved BIM Execution Plan as approved by DEN for this specific project or in formats acceptable to DEN BIM management system.
- B. Do not use record documents for construction purposes.
- C. Make documents available for inspection by the DEN Project Manager and any others having jurisdiction.

3.4 MONTHLY REVIEW

- A. Prior to any application for payment, the DEN Project Manager or the DEN Project Manager's designated representative will inspect the record documents to ensure that they are being maintained and contain the most current correct data with particular attention to as-built drawings.
- B. If, during the inspection, the DEN Project Manager determines that the documents are not being maintained and kept current as to as-built conditions, an amount may be withheld from the payment request and deducted from the Contract value to cover the City's cost of collecting and recording the as-built Contract data. This cost will be determined based on \$100.00 per man-hour of effort.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017840

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing City's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructor's names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Documentation of demonstration and training provided.

1.5 QUALITY ASSURANCE

- A. Instructor Qualifications: A professional instructor/trainer who is experienced in operation and maintenance procedures and training.
- B. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 014510 "Contractor Quality Control". Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructor's personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.

1.6 COORDINATION

- A. Coordinate instruction schedule with City's operations. Adjust schedule as required to minimize disrupting City's operations and to ensure availability of City's personnel.
 - 1. Include multiple classes to accommodate various shifts, as necessary.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by DEN Project Manager.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.

- c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.

7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.

8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017825 "Operation and Maintenance Data."

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct City's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Contractor will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 2. City will furnish an instructor to describe City's operational philosophy.
 3. DEN Project Manager will furnish Contractor with names and positions of DEN participants.

- B. Scheduling: Provide instruction at mutually agreed on times.
 1. Schedule training with City, through DEN Project Manager, with at a minimum of thirty (30) days advance notice.

- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of performance-based test.
- E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section.

END OF SECTION 017900

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.
 - 3. Repair procedures for selective demolition operations.

- B. Related Requirements:

- 1. Section 260505 "Selective Demolition for Electrical" for demolition of electrical systems.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain DEN's property, demolished materials shall become the Contractor's property and shall be removed from the Project site.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at location and time as determined by DEN Project Manager.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data:

1. For firms and persons specified in Section 014510 "Contractor Quality Control" to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate. Indicate proposed locations and construction of barriers.

- C. Submit Schedule of Selective Demolition Activities. Indicate the Following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure DEN's and tenant's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Do not interrupt utility services without prior written request and approval from DEN Project Manager and authorities having jurisdiction.
4. Coordination for shutoff, capping, and continuation of utility services.
5. Use of elevator and stairs.
6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Predemolition Photographs or Video: Submit before Work begins.
- F. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.8 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.

1.9 FIELD CONDITIONS

- A. When there are occupied portions of buildings immediately adjacent to selective demolition area, conduct selective demolition so DEN's or tenant's operations will not be disrupted.
 - 1. Provide not less than 72 hours' notice to DEN Project Manager of activities that will affect DEN's or tenant's operations.
- B. Maintain access to existing stairs, elevators, walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. DEN assumes no responsibility for condition of areas to be selectively demolished. DEN will maintain conditions existing at time of inspection for bidding purpose as far as practical.
- D. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Contractor will remove the following items:
 - a. Digital Monitors: located at soffit wall between Concourse and Apron Level.
 - b. Emergency Communication Speakers.

- E. Notify DEN Project Manager of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- F. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify DEN Project Manager. Hazardous materials will be removed by Owner under a separate contract.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. Smoke Beam Detectors.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.
 - 1. If possible, retain original installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage the original installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Terrazzo.
 - b. Wall covering.
 - c. ProCoat paint finishes.

1.11 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
- B. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that, when installed, will match the visual and functional performance of existing materials, as approved by DEN Project Manager.
- C. Use materials whose installed performance equal or surpass that of existing materials.
- D. Comply with material and installation requirements specified in individual specification sections.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- E. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to DEN Project Manager.
- F. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

G. Survey of Existing Conditions: Record existing conditions by use of measured drawings preconstruction photographs and templates.

1. Comply with requirements for progress photos included in daily reporting.
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. No system component shall be abandoned in place.

B. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions.
2. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by the DEN Project Manager and authorities having jurisdiction.
3. Smoke detection system is required to stay operational during construction.

C. Existing Services/Systems to Be Removed, or Relocated: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities and obtain prior written approval with DEN Project Manager and utility companies.
2. If services/systems are required to be removed, or relocated, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.
 - a. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - b. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

- 1) Emergency Communication Speakers
- 2) Digital Monitors: located at soffit wall between Concourse and Apron Level.

- c. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.3 PREPARATION

- A. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- B. Temporary Enclosures: Provide temporary enclosures for protection of existing building, passengers, and construction project, at all levels of the concourse.
1. Where overhead work is needed provide temporary enclosures while maintaining egress paths.
 2. Contractor shall be responsible for any damage to existing conditions due to inadequate temporary enclosures or due to failure of temporary enclosures.
- C. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without DEN Project Manager's approval.

1. Building Structure and Shell: 5 percent.
2. Nonshell Elements: 5 percent.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Paint equipment to match new equipment, with coatings of equal color, finish and performance of new equipment.
3. Pack or crate items after cleaning and repairing. Identify contents of containers.
4. Protect items from damage during transport and storage.
5. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by DEN Project Manager, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

1. Smoke Beam Detectors.
2. Light fixtures.
3. Ceiling and Soffit, as indicated in drawings.

3.5 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Specification Section 017330 "Cutting and Patching".

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

- E. Floors and Soffits: Where soffits are demolished, extend one finished area into another, patch and repair floor and soffit surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor to the nearest joint, and soffits replace with new material, if necessary, to achieve uniform color and appearance.
1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements as specified in other sections of these specifications.
 2. Where patching occurs on a painted surface, apply primer and intermediate paint coats over the patch and apply a final paint coat over the entire unbroken surface containing the patch. Provide additional coats until the patch blends with adjacent surfaces.
 3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- F. Ceilings: Patch, repair or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least **3/4 inch** at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.9 SELECTIVE DEMOLITION SCHEDULE

- A. Existing Construction to be Removed: Glass railing systems and escalators.
- B. Existing Items to Be Removed and Salvaged:
- C. Existing Items to Be Removed and Reinstalled: Digital Monitors, Emergency Speakers.
- D. Existing Items to Remain: Smoke beam detectors.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Concrete toppings.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data substantiating that materials comply with requirements.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Concrete materials representing current production shall be tested and used to fabricate trial mix data. The testing lab shall submit and certify the results of all tests and/or certificates of all materials and calculations used to develop the 7-day and 28-day compressive strength test results and applicable reference specifications.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the DEN Project Manager. Do not proceed with work unless construction joint shop drawings are approved by Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Curing compounds.
 - 4. Bonding agents.
 - 5. Joint-filler strips.
 - 6. Repair materials.
- B. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
- C. Field quality-control reports.
- D. Minutes of preinstallation conference.

1.6 CLOSEOUT SUBMITTALS

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent testing agency, acceptable to the DEN Project Manager and the City of Denver, and all authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

TECHNICAL SPECIFICATIONS
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- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete,"
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.8 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60**, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source[with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials].
 - 1. Maximum Coarse-Aggregate Size **3/4 inch** nominal.

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2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.

C. Water: ASTM C 94/C 94M.

2.4 ADMIXTURES

A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Monofilament Micro-Fibers:

- 1) Axim Italcementi Group, Inc.; Fibrasol II P.
- 2) Euclid Chemical Company (The), an RPM company; Fiberstrand [100] [150].
- 3) FORTA Corporation; FORTA Econo-Mono.
- 4) Grace Construction Products, W. R. Grace & Co.; Grace MicroFiber.
- 5) Metalcrete Industries; Polystrand 1000.
- 6) Nycon, Inc.; ProConM.
- 7) Propex Concrete Systems Corp.; Fibermesh 150.
- 8) Sika Corporation; Sika Fiber PPM.
- 9) approved equal.

b. Fibrillated Micro-Fibers:

- 1) Axim Italcementi Group, Inc.; Fibrasol F.
- 2) Euclid Chemical Company (The), an RPM company; Fiberstrand F.
- 3) FORTA Corporation; FORTA [Econo-Net] [Ultra-Net].
- 4) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.

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- 5) Nycon, Inc.; ProConF.
- 6) Propex Concrete Systems Corp.; Fibermesh 300.
- 7) Sika Corporation; Sika Fiber PPF.
- 8) approved equal.

B. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. 3M; Scotchcast Polyolefin Fibers
 - b. Euclid Chemical Company (The), an RPM company; Tuf-Strand SF.
 - c. FORTA Corporation; FORTA FERRO.
 - d. Grace Construction Products, W. R. Grace & Co.; Strux 90/40.
 - e. Nycon, Inc.; XL.
 - f. Propex Concrete Systems Corp.; Fibermesh 650.
 - g. Sika Corporation; Sika Fiber MS.
 - h. approved equal.

2.6 LIQUID FLOOR TREATMENTS

A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
 - b. BASF Construction Chemicals - Building Systems; Confilm.
 - c. ChemMasters; SprayFilm.
 - d. Conspec by Dayton Superior; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film (J-74).
 - f. Edoco by Dayton Superior; BurkeFilm.
 - g. Euclid Chemical Company (The), an RPM company; Eucobar.
 - h. Kaufman Products, Inc.; Vapor-Aid.
 - i. Lambert Corporation; LAMBCO Skin.
 - j. L&M Construction Chemicals, Inc.; E-CON.
 - k. Meadows, W. R., Inc.; EVAPRE.
 - l. Metalcrete Industries; Waterhold.
 - m. Nox-Crete Products Group; MONOFILM.
 - n. Sika Corporation; SikaFilm.
 - o. SpecChem, LLC; Spec Film.
 - p. Symons by Dayton Superior; Finishing Aid.
 - q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
 - r. Unitex; PRO-FILM.

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- s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.
 - t. approved equal.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd.** when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
 - b. BASF Construction Chemicals - Building Systems; Kure 200.
 - c. ChemMasters; Safe-Cure Clear.
 - d. Conspec by Dayton Superior; W.B. Resin Cure.
 - e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
 - f. Edoco by Dayton Superior; Res X Cure WB.
 - g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
 - h. Kaufman Products, Inc.; Thinfilm 420.
 - i. Lambert Corporation; AQUA KURE - CLEAR.
 - j. L&M Construction Chemicals, Inc.; L&M Cure R.
 - k. Meadows, W. R., Inc.; 1100-CLEAR.
 - l. Nox-Crete Products Group; Resin Cure E.
 - m. Right Pointe; Clear Water Resin.
 - n. SpecChem, LLC; Spec Rez Clear.
 - o. Symons by Dayton Superior; Resi-Chem Clear.
 - p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
 - q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.
 - r. approved equal.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering].
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Anti-Hydro International, Inc.; AH Clear Cure WB.
 - b. BASF Construction Chemicals - Building Systems; Kure-N-Seal WB.
 - c. ChemMasters; Safe-Cure & Seal 20.
 - d. Conspec by Dayton Superior; Cure and Seal WB.
 - e. Cresset Chemical Company; Crete-Trete 309-VOC Cure & Seal.
 - f. Dayton Superior Corporation; Safe Cure and Seal (J-18).
 - g. Edoco by Dayton Superior; Spartan Cote WB II.
 - h. Euclid Chemical Company (The), an RPM company; Aqua Cure VOX; Clearseal WB 150.

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- i. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
 - j. Lambert Corporation; Glazecote Sealer-20.
 - k. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - l. Meadows, W. R., Inc.; Vocomp-20.
 - m. Metalcrete Industries; Metcure.
 - n. Nox-Crete Products Group; Cure & Seal 150E.
 - o. Symons by Dayton Superior; Cure & Seal 18 Percent E.
 - p. TK Products, Division of Sierra Corporation; TK-2519 WB.
 - q. Vexcon Chemicals, Inc.; Starseal 309.
 - r. approved equal.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, , certified by curing compound manufacturer to not interfere with bonding of floor covering.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Construction Chemicals - Building Systems; Kure-N-Seal W.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec by Dayton Superior; High Seal.
 - d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
 - e. Edoco by Dayton Superior; Spartan Cote WB II 20 Percent.
 - f. Euclid Chemical Company (The), an RPM company; Diamond Clear VOX; Clearseal WB STD.
 - g. Kaufman Products, Inc.; SureCure Emulsion.
 - h. Lambert Corporation; Glazecote Sealer-20.
 - i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - j. Meadows, W. R., Inc.; Vocomp-20.
 - k. Metalcrete Industries; Metcure 0800.
 - l. Nox-Crete Products Group; Cure & Seal 200E.
 - m. Symons by Dayton Superior; Cure & Seal 18 Percent E.
 - n. Vexcon Chemicals, Inc.; Starseal 0800.
 - o. approved equal.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips ASTM D 1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion, or styrene butadiene.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/8 inch** and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

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2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch** or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than **4100 psi** at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/4 inch** and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch** or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than **5000 psi** at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials:[Use fly ash, pozzolan, as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 40 percent Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing,high-range water-reducingorplasticizing admixture in concrete, as required, for placement and workability.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Concrete Toppings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: **4000 psi** at 28 days.
2. Minimum Cementitious Materials Content: **470 lb/cu. yd.**
3. Air Content: Do not allow air content of trowel-finished toppings to exceed 3 percent.

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of **1 cu. yd.** or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than **1 cu. yd.**, increase mixing time by 15 seconds for each additional **1 cu. yd.**.
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Construct forms tight enough to prevent loss of concrete mortar.
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
- C. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- D.
- E. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- F. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- G. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
 - 1.

3.2 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.3 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated, and as approved by DEN Project Manager. Coordinate locations of all construction joints with flooring materials, and review with DEN Project Manager.
 - 1. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated, and as approved by DEN Project Manager. Coordinate locations of all construction joints with flooring materials, and review with DEN Project Manager. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch**. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch**- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than **1/2 inch** or more than **1 inch** below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by DEN Project Manager.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces.
 2. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, **10-ft.-** long straightedge resting on two high spots and placed anywhere on the surface does not **1/8 inch**.

3.6 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching **0.2 lb/sq. ft. x h** before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with **12-inch** lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches**, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.7 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by DEN Project Manager. Remove and replace concrete that cannot be repaired and patched to DEN Project Manager's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
 - 1. .
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Verification of use of required design mixture.
 - 3. Concrete placement, including conveying and depositing.
 - 4. Curing procedures and maintenance of curing temperature.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

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2. Compression Test Specimens: ASTM C 31/C 31M.

- a. Cast and laboratory cure one set of five (2) standard cylinder specimens for each composite sample.

- E. Measure floor and slab flatness and levelness according to **ASTM E 1155** within 48hours of finishing.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 033000

SECTION 050510 - WELDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. Welding is that work defined in American Welding Society (AWS) "Standard Welding Terms and Definitions - AWS A2.4" and as otherwise shown on Drawings.
1. All welding on this project must comply with requirement of this section, and other Contract Documents such as, but not limited to Drawings. If there is a conflict between Project Drawings, codes, and specifications, the more stringent applies.
- B. Extent of welding Work is shown on Drawings, including schedules, notes, and details to show size and location of welds. Welding Symbols must be in accordance with AWS/A2.4-Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- C. Nothing stated in this section should be interpreted as diminishing or eliminating requirements stated in other sections.
- D. Related Sections:
1. This Section 050510 "Welding" will apply to all welding performed under all other sections of this specification.

Related Requirements:

2. Drawings, General and Special conditions, general requirements, and other applicable Technical Specifications apply to Work of this section.
3. IEEE-1992. Only welding machines that have been tested and comply with harmonic distortion requirements of IEEE-1992 are allowed to operate using DEN electrical power system.

1.3 REFERENCE STANDARDS

- A. Welding must comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents.

1. AISC - American Institute of Steel Construction.
2. AWS - American Welding Society.
3. API - American Petroleum Institute.
4. AWWA - American Water Works Association.
5. ASME - American Society of Mechanical Engineers.
6. ASTM - American Society for Testing and Materials.
7. ASNT - American Society for Nondestructive Testing.

1.4 SUBMITTALS

- A. Product Data: Submit producers or manufacturer's specifications and installation instructions for all products, including, but not limited to those listed below. Include laboratory test reports and other data to show compliance with specifications, including specified standards.
1. Welding Electrodes: Submit manufactures specifications, to include recommended parameters and technique, for each electrode to be used on this project.
 2. Include data substantiating that materials comply with requirements.
- B. Shop drawings must clearly indicate profiles, sizes, and locations of structural members, connections, attachments, anchorage's, framed openings, size and type of fasteners, and clearances. Indicate welded connections using standard AWS welding symbols, per AWS A2.4. Clearly indicate net weld lengths and sizes, root openings, bevel angles and other information required to satisfactorily complete welding operations.
- C. Calculations required in other sections must show all pertinent members and pieces. Calculations must be submitted prior to, or with, relevant shop drawing submittals. It is contractor's responsibility to ensure that field construction uses connection design as submitted and reviewed.
- D. Test Reports: Submit copies of all test reports conducted on shop and field welded connections. Include data on types of tests conducted and test results. Reports must be sequentially numbered and submitted to the DEN Project Manager within 48 hours of completion.
- E. Individual Welder Qualifications: Submit Welding Performance Qualification Records (WPQR) for all welders, shop and field, prior to any welding per Paragraph 1.5. B below.
- F. Procedures: Submit Welding Procedure Specifications for all shop and field welding prior to any welding per Part 1 of this section.

1.5 QUALITY REQUIREMENTS

- A. Codes and Standards: Comply with provisions of following, as applicable:
1. AISC - American Institute of Steel Construction:

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- a. AISC "Code of Standard Practice for Steel Buildings and Bridges", 1986.
 - b. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.
2. AWS D1.1 "Structural Welding Code Steel" and all other applicable A.W.S codes, latest editions.
 3. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
 4. All welding must be performed in accordance with the latest addition of applicable AWS, API, ASME code, and ASTM Standards.
- B. Qualifications for Welding Work:
1. All Welders must be qualified through welding tests in accordance with applicable AWS code per paragraph 1.5.A above within one (1) year prior to welding taking place. Evidence of qualification must be through WPQR.
 2. All welder qualifications test must be or must have been administered and witnessed by an Independent Testing Agency (ITA), AWS Certified Welding Inspector (CWI).
 3. If recertification of welders is required, delay costs and retesting costs are borne by the Contractor.
 4. Welding that is to take place at each type of joint shall be per approved AWS procedure for that type of joint. Evidence of intended procedure shall be through written Welding Procedure Specifications.
 5. Any welding done without submission to and approval by the DEN Project Manager of WPQRs of the individual welders doing the welding and Procedure Specifications for the actual welding will be considered defective and subject to the provisions of Title 17 of the DEN General Contract Conditions.
 6. All WPS and WPQR qualification testing must be in accordance with this specification and the applicable welding code requirements.
- C. The Contractor must periodically review each welders work quality and take any steps required to insure high quality work. This is in addition to Quality Control requirements.
- D. Fabricator Qualifications: Minimum of three (3) years' experience specializing in fabrication for similar projects.
- E. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the Work.
1. Promptly notify DEN Project Manager whenever design of members and connections for any portion of structure are not clearly indicated.

- F. Welding and materials must be inspected and tested by an Independent Testing Agency furnished and paid for by the Contractor. The Independent Testing Agency will have authority to reject weldments and materials. Such rejection may be based on visual inspection where, in the Inspector's opinion, the weldment or material would not pass more detailed investigation. Reference Article 3.01 below for inspection and testing requirements. DEN's Quality Assurance Inspectors, per the provisions of General Conditions Title 17, will also inspect welding and materials. Inspections by either the Independent Testing Agency or DEN's Quality Assurance Inspector may take place in the mill, shop, and field.
1. Promptly remove and replace materials or fabricated components that do not comply with requirements as set forth in the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Electrodes for Welding: Comply with AWS Code. Use E70 grade minimum unless otherwise approved. Store all electrodes and welding materials inside and protect from moisture, corrosion, and any other damage. Damaged electrodes cannot be used.

2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble components in shop to greatest extent possible.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Holes for Other Work: Provide holes required for securing other work to components, and for passage of other work through components, as shown on final shop drawings.
1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
 2. Cut, drill, or punch holes perpendicular to metal surfaces. The DEN Project Manager must approve any enlarging of holes by flame cutting

PART 3 - EXECUTION

3.1 ERECTION

- A. Do not enlarge misaligned or undersized holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- B. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members, which are not under stress, as acceptable to DEN Project Manager. Finish gas-cut sections equal to a sheared appearance when permitted.
- C. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Once Independent Testing Agency and DEN Quality Assurance Inspector have approved welds, apply paint to exposed areas using same material as used for shop painting.
- D. No welding machines are to be operated using DEN power until such machines have been tested for harmonic distortion per IEEE-1992 and approved by DEN Project Manager.
- E. Contractor will notify DEN Project Manager or DEN Project Manager's representative at least 48 hours prior to any inspections to be performed by ITA.

3.2 TESTING AND INSPECTION

- A. Independent Testing Agency (ITA):
 - 1. See Division 1 for Independent Testing Agency requirements.
 - 2. The General Contractor must provide the ITA for all subcontractors. Subcontractors cannot contract with a separate ITA.
 - 3. Contractor will engage an Independent Testing Agency to inspect welded connections and to perform tests and prepare test reports. The Contractor's Quality Control Inspector will coordinate the inspections and tests performed by the testing lab inspectors and testing personnel.
 - a. The Contractor's Independent Testing Agency and DEN Project Manager's staff will conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom. All reports must be delivered to the DEN Project Manager. Results not complying with requirements are to be brought to the DEN Project Manager's attention within 24 hours of discovery. All reports must be sequentially numbered.
 - b. Provide access for Independent Testing Agency to places where work is being fabricated or produced so that required inspection and testing can be accomplished.

- c. The Independent Testing Agency must inspect Work at the plant before shipment; however, DEN Project Manager reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
 - 1) Inspections and tests conducted by the ITA or DEN does not in any way relieve the Contractor of the Contractor's responsibility and obligation to meet all specifications and referenced standards. Employment of the ITA does not relieve the Contractor of providing the required Quality Control Program.
 - d. Welding Inspection Personnel Qualifications: All visual welding inspections must be performed by AWS CWI, qualified in accordance with AWS QC1. Inspectors qualified in accordance with the most current edition of the American Society for Nondestructive Testing Recommended Practice No. SNT-TC 1A, must perform all non-destructive inspections other than visual inspections
 - e. Independent Testing Agency Inspectors working for the Contractor must identify with a distinguishing mark all parts and joints they have inspected and accepted. Marks to be visible from at least 50 feet. DEN Project Manager and the Quality Control Inspectors must mutually agree upon identifying marks.
 - f. Independent Testing Agency welding inspector must be on job site however much time it takes to guaranty that all requirements of Project Specifications and codes are being met and provide written reports showing specific requirements have been met. Shop inspections by ITA welding inspector must be performed in such a manner as to guaranty that all provisions of Project Specifications and codes are being met and provide written reports showing specific requirements have been met.
- 4. The Contractor must furnish such facilities and provide such assistance as may be required for carrying out the inspection prescribed herein. The Contractor must notify the Independent Testing Agency and the DEN Project Manager at least two weeks in advance of the start of any qualification testing for welding.
 - 5. The Testing Agency's Inspector will perform the Inspector's duties in such a way that neither fabrication nor erection is unnecessarily delayed or impeded. The Testing Agency must notify the DEN Project Manager of any scheduled inspections at least 48 hours prior to such time. The DEN Project Manager must also be notified as soon as possible prior to any unscheduled inspections. In no case will the inspector recommend or prescribe the method of repair of a defect.
 - 6. Inspection of welding will be such as to assure that all requirements of Project Specifications AWS D1.1, and other applicable welding codes are being complied with. Reports must show the following items as being in conformance, but not be limited to just the items shown:
 - a. Verify that electrodes used for welding conform to the requirements Manufacturer, AWS, and other applicable Welding Codes and Standards.
 - b. Verify that the approved Welding Procedure Specifications and the approved welding sequence are followed without deviation.

- c. Verify that only welding operators and welders who have been properly qualified will perform the welding. The inspection agency will witness such qualification testing of welding operations and welders, as may be required.
 - d. Verify that the fit up, joint preparation, size, contour, extent of reinforcement, and length and location of welds conform to specified requirements such as but not limited to applicable welding codes, Welding Procedure Specifications, and Drawings.
 - e. Review Mill Test Reports of material for compliance with Project Specifications, all applicable Codes, and Drawings.
 - f. ITA inspection reports must list all inspected, nonconforming, repaired, and accepted welds.
7. DEN Project Manager must be informed at least 48 hours prior to shop and field welding so random inspections can be performed as stipulated in these specifications and General Conditions, TITLE 17.
 8. All welders must mark their welds with identifying marks. Contractor must furnish DEN Project Manager with list of welders and their marks. List must be updated each time a welder is added or subtracted.

B. Structural Steel:

1. The Independent Testing Agency will test shop and field welds per ASTM E 543 and applicable welding code requirements as follows:
 - a. All welds: 100% visual.
 - b. Delamination and non-metallic inclusion tests of base metal:
 - 1) Plates and portions of rolled shapes three inches or greater in thickness must be 100% ultrasonically tested in a zone extending six inches in all directions from any full penetration groove weld which transmits stress through the thickness of the material, or any weld which, because of restraint and/or weld shrinkage will, in the opinion of the inspector, cause significant through-thickness (Z-direction) stress in the material. Such tests must be made after completion of welding. Acceptance Criteria for such tests must be in accordance with ASTM A435.
 - c. All full penetration or partial penetration groove welds require 100% ultrasonic testing.
 - d. All fabricated trusses including all fabricated trusses acting, as girders must be 100% magnetic particle tested.
 - e. Studs on all embed assemblies: 100% of studs tested by hammer method and visual inspection.
 - f. All other welded connections: 10% Magnetic Particle.
 - g. Additional Testing must be performed by the Independent Testing Agency.
2. Additional Field Weld Testing:

- a. In addition, if defective welds are discovered, the remaining un-inspected welds must receive such ultrasonic or magnetic particle inspection as may be required by the DEN Project Manager. If more than 10 percent of a welder's welds fail or when a CWI feels that the quality of the qualified welder's work appears to be below the requirements of the applicable AWS Code, he/she must be removed from the job and retested to demonstrate compliance with AWS D1.1 (Latest Edition) or other applicable AWS codes and all other applicable AWS codes.
- b. Additional testing is required if more than 10% of the Magnetic Particle tested welds are rejected. Then an additional 10% will be tested using either Magnetic Particle or Dye Penetrant Testing. This 10% additional testing will be repeated until rejection rate drops below one in 10.
- c. When ultrasonic indications arising from the weld root can be interpreted as either a weld defect or the backing strip, the backing strip will be removed at the expense of the contractor, and if no root defect is indicated on this retest, and no significant amount of the base and weld metal have been removed, the joint needs no further repair or welding. If a defect is still indicated, it must be repaired.
- d. The welding inspector will have the authority to reject weldments. Such rejection may be based on visual inspection where in the welding inspector's opinion the weldment would not pass a more detailed investigation.
- e. Reports by the Independent Testing Agency inspector will contain, as a minimum, an adequate description of each weld tested, the identifying mark of the welder responsible for the weld, a critique of any defects noted by visual inspection or testing, and a statement regarding the acceptability of the weld tested, as judged by current A.W.S. standards. A copy of all tests results, including ultrasonic and x-ray, must be provided to the DEN Project Manager within 48 hours of the test occurrence. This requirement includes all failed tests. Any test that shows work not in conformance with the contract requirement must be retaken after the non-conformity is corrected. The retest must refer to the failed test. Radiographic testing may be substituted for ultrasonic.

C. Metal Fabrications:

1. Welding must be performed in accordance with applicable AWS welding code and these specifications.
2. 100% visual inspection of all welds.
3. 10% Magnetic Particle testing of all welds.
 - a. Additional testing is required if more than 10% of the Magnetic Particle tested welds are rejected. Then an additional 10% will be tested using either Magnetic Particle or Dye Penetrant Testing. This 10% additional testing must be repeated until rejection rate drops below one in 10.
4. Applicable paragraphs of Structural Steel paragraph above must be met also.

TECHNICAL SPECIFICATIONS
05 METALS
050510
WELDING

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO.2020565

3.3 METHOD OF MEASUREMENT

- A. No separate measurement will be made for work under this section.

PART 4 - PAYMENT

4.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this section. The cost of the work described in this section will be included in the applicable unit price item, work order or lump sum bid item.

END OF SECTION 050510

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
- B. Related Sections:
 - 1. Section 050510 "Welding" for general welding requirements.
- C. Extent of structural steel Work is shown on drawings, including schedules, notes, and details to show size and location of members, typical connections, and type of steel required.
- D. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
- E. Members in a structure that carry an imposed load in addition to their own weight.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 REFERENCE STANDARDS

- A. Comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications, including specified standards.

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 2. High strength bolts (each type), including nuts and washers.
 3. Provide fully traceable certificates of compliance with ASTM.
 4. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Show fabrication of structural-steel components. Submit shop drawings for all Work specified herein, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
1. Design construction drawings shall not be re-used as bases for submitted shop drawings. Shop drawings that use reproductions of design plans or details may not be reviewed.
 2. Erection and piece drawings shall be submitted in complete units. Do not submit partial sets. Calculations shall be submitted only with relevant erection plans with clear references between each.
 3. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 4. Include embedment drawings.
 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 7. Shop drawings shall clearly indicate profiles, sizes, and locations of structural members, connections, attachments, anchorages, framed openings, size and type of fasteners, and clearances. Clearly indicate net weld lengths and sizes, root openings, bevel angles and other information required to satisfactorily complete welding operations.
 8. Calculations shall show all pertinent members and pieces. Calculations shall be submitted prior to, or with, relevant shop drawing submittals. It is contractor's responsibility to ensure that field construction uses connection design as submitted and reviewed.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint [whether prequalified or qualified by testing], including the following:
1. Power source (constant current or constant voltage).
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For qualified Installer.
- 1.7 CLOSEOUT SUBMITTALS
- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. AWS states that welding qualifications remain in effect indefinitely unless welding personnel have not welded for more than six months or there is a specific reason to question their ability.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel." Reference Section 050510 "Welding" for general welding requirements.
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Qualifications for welding work shall be in accordance with Specification Section 050510 "Welding" and applicable welding and inspection codes.
- F. The Contractor shall periodically review each welder's work quality and take any steps required to endure high quality work. This is in addition to Quality Control requirements.
- G. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the Work.
- H. Promptly notify DEN Project Manager whenever design of members and connections for any portion of structure are not clearly indicated.
- I. Independent Testing Agency or DEN Project Manager's Quality Control Inspector will have authority to reject weldments. Such rejection may be based on visual inspection where, in the opinion of the Independent Testing Agency or DEN Project Manager, weldment would not pass more detailed investigation.

1.9 Retain article below if required for Project. Coordinate requirements with DEN Project Manager.

1.10 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M
- B. Plate and Bar: ASTM A 36/A 36M. Retain first paragraph below for corrosion-resisting (weathering) structural steel and indicate locations on Drawings.
- C. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B.
- D. Hot Formed Steel Tubing: ASTM A 501.
- E. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
- F. Welding Electrodes: Comply with AWS requirements and with Specifications Section 050510 "Welding", and applicable welding codes and specifications.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: **ASTM A 325**, Type 1, heavy-hex steel structural bolts; **ASTM A 563, Grade C**, heavy-hex carbon-steel nuts; and **ASTM F 436**, Type 1, hardened carbon-steel washers; all with plain finish.

2.3 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

- D. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning. Any enlarging of holes by flame cutting shall be performed only if approved by the DEN Project Manager.

2.4 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work. Reference Section 050510 "Welding" for general welding requirements.
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.2 ERECTION

- A. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and all final connections are made. Provide temporary guidelines to achieve proper alignment of structures as erection proceeds. Temporary shoring and bracing shall be designed by a Licensed Colorado Professional Engineer.
1. The Engineer shall inspect finished shoring and bracing and document compliance with the design plans.
- B. Temporary Planking: Provide temporary planking handrails, nets, anchorages and working platforms as necessary to effectively and safely complete work.

- C. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- E. Splice members only where indicated and approved on shop drawings.
- F. Do not use thermal cutting during erection unless approved by DEN Project Manager. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins, except in secondary members. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
- J. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Where welding to existing steel, clean existing steel surfaces prior to welding.
- K. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to DEN Project Manager. Finish gas cut sections equal to a sheared appearance when permitted.
- L. Beam Members: Deviation of member working point horizontal location and elevation with respect to the supporting member shall not exceed +/- 1/16" from the location and elevation shown on the drawings.
 - 1. Leveling and Plumbing: Based on mean temperature of 70 degrees F.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M[and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work. Reference Section 050510 "Welding" for general welding requirements.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 1. Additional testing, if required, will be performed at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
05 METALS
051200
STRUCTURAL STEEL FRAMING

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 2020565

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Monolithic Glass Railing Assemblies.
- B. Related Sections:
 - 1. Section 057500 "Decorative Formed Metal" for other decorative formed metal items.
 - 2. Section 092900 "Gypsum Board" for metal backing for anchoring railings.

1.3 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Stainless Steel: 60 percent of minimum yield strength.
 - 2. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA's Aluminum Curtain Wall Series No. 12, "Structural Properties of Glass."

- C. Structural Performance: Design, engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems. Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Glazing Guard Rail Panels:
 - a. Uniform load of **100 lbf/ft.** applied in any direction.
 - b. Concentrated load of **300 lbf** applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Intermediate Horizontal Rails: Capable of withstanding a horizontal concentrated load at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.
 - a. Concentrated load of **200 lbf** applied horizontally on an area of **1 sq. ft.**
 - b. Infill load and other loads need not be assumed to act concurrently.
 3. Glass-Supported Railings: Support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: **120 deg F**, ambient; **180 deg F**, material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on laboratory mockups. Payment for these services will be made by Contractor. Retesting of products that fail to meet specified requirements shall be done at Contractor's expense.
1. Build laboratory mockups at testing agency facility; use personnel, materials, and methods of construction that will be used at Project site.
 2. Test railings according to ASTM E 894 and ASTM E 935.
 3. Notify DEN Project Manager seven days in advance of the dates and times when laboratory mockups will be tested.

1.6 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Manufacturer's product lines of railings assembled from standard components.
 2. Grout, anchoring cement, and paint products.
 3. Finishing materials and methods, and detailed sequence of installation.
 4. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Indicate materials, profiles of each ornamental metalwork member and fitting, joinery, finishes, fasteners, anchorages and accessory items.
1. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as unit of Work of other sections.
 2. For illuminated railings, include wiring diagrams and roughing-in details.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required.
1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 2. Each type of glass required.
 3. Fittings and brackets.
 4. Welded connections.
 5. Brazed connections.
 6. Assembled Samples of entire section of each type of railing system, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer.
- B. Qualification data for firms and persons specified "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Owners, plus other information specified.
- C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Installer certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

- E. Welding certificates.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- G. Preconstruction test reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in successfully producing ornamental metalwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.
- B. Installer Qualifications: Arrange for installation of ornamental work specified in this section by same firm that fabricated them.
- C. Testing for recertification is Contractor's responsibility.
- D. Engineer Qualifications: Professional engineer licensed to practice in jurisdiction where project is located and experienced in providing engineering services of the kind indicated which has resulted in the successful installation of assemblies similar in material, design, and extent to that indicated for this Project.
- E. Field Test: Field test mock-up per structural requirements indicated. DEN Project Manager to be present during testing.
- F. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- G. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by DEN Project Manager, except with DEN Project Manager's approval. If modifications are proposed, submit comprehensive explanatory data to DEN Project Manager for review.
- H. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Section 016000 "Product Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by DEN Project Manager, except with DEN Project Manager's approval. If modifications are proposed, submit comprehensive explanatory data to DEN Project Manager for review.

- I. Welding Qualifications: Certify that each welder employed in unit of Work of this section has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification. Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."
- J. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC, another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- L. Preinstallation Conference: Conduct conference at location and time as determined by DEN Project Manager.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay Work.

1.10 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Store components and materials in clean, dry location, away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting in a manner that permits air circulation within covering.
- B. Handle ornamental work on site to a minimum; exercise care to avoid damaging metal finishes.

1.12 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 METALS

- A. General: Provide ornamental work composed of forms and types which comply with requirements of referenced standards and which are free from surface blemishes where exposed to view in the finished unit. Exposed to view surfaces exhibiting pitting, seam marks, roller marks, "oil canning," stains, discolorations or other imperfections on finished units are not acceptable.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Stainless-Steel and Glass Decorative Railings:
 - a. Architectural Arts Mfg., Inc.
 - b. Julius Blum & Co., Inc.
 - c. Downey Architectural Systems
 - d. Zephyr Metal Craft, Inc.
 - e. Tri-Tech, Inc.
 - f. Rippel Architectural Metals, Inc.
 - g. Newman Brothers, Inc.
 - h. Livers Bronse Co., Inc.
 - i. Lavi Industries
 - j. York Metal Fabricators, Inc.
 - k. Custom Enclosures, Inc.
 - l. Clover Glazing Corp., Clear View Rail
 - m. Clearail, Inc.
 - n. or approved equal.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
 - 1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.
 - 3. Provide formed-steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.
 - 4. Provide extruded-aluminum brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

2.4 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
- C. Bars and Shapes: ASTM A 276, Type 304.

2.5 GLASS AND GLAZING MATERIALS

- A. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent flat glass), Quality-Q3. Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR 1201 for Category II materials.
 - 1. Glass Color: Clear.
 - 2. Thickness for Glass Infill Panels: As required by structural loads, but not less than 6.0 mm.

2.6 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
 - 2. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are the standard fastening method for railings indicated].
1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with **ASTM B 633 or ASTM F 1941**, Class Fe/Zn 5, unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Shoe Base: As indicated on details.
1. Finish: Stainless Steel
 - a. 304 Brushed Stainless
- B. Handrail Brackets: Stainless Steel.
1. Basis of Design: CR Laurence bracket HR2FPBS.
- C. Metal Handrail Tubing:
1. Profile: Round 1-1/2 inches (38.1 mm) diameter.
 2. Material: Stainless Steel.
 3. Finish: 304 Brushed Stainless.
- D. Cover Trim: Stainless Steel.
1. Attach with concealed adhesive mounting tape approved by the cover and tape manufacturer for the application.
- E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- F. Polyurethane Topcoat: Complying with MPI#72 and compatible with undercoat.

- G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.8 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Form ornamental work to required shapes and sizes, with true curves, lines, and angles. Provide components in sizes and profiles indicated, but not less than required to comply with requirements indicated for structural performance.
- C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature, in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
1. Temperature Change (Range): 100 deg F.
- D. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- E. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- F. Form work true to line and level with accurate angles and surfaces.
- G. Provide necessary rebates, lugs, and brackets for assembly of units. Use concealed fasteners wherever possible.
- H. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- I. Connections: Fabricate railings with welded connections unless otherwise indicated.
- J. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Comply with AWS for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded joints of all welding flux, and dress on all exposed and contact surfaces.
 2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

3. Obtain fusion without undercut or overlap.
 4. Remove flux immediately.
 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- K. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- L. Form changes in direction as follows:
1. As detailed.
 2. By inserting prefabricated elbow fittings.
 3. By bending to smallest radius that will not result in distortion of railing member.
- M. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
- N. Finish exposed surfaces to smooth, sharp, well defined lines and arrises.
- O. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- P. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- Q. Close exposed ends of hollow railing members with prefabricated end fittings.
- R. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is **1/4 inch** or less.
- S. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- T. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

- U. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.9 GLAZING PANEL FABRICATION

- A. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
1. Clean-cut or flat-grind edges at butt-glazed sealant joints to produce square edges with slight chamfers at junctions of edges and faces
 2. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.
- B. Structural Glass Panels: Factory-bond glass to base channels in railing manufacturer's plant using glazing cement to comply with manufacturer's written specifications, unless field glazing is standard with manufacturer.
- C. Structural Glazing Guard Panels: Provide monolithic tempered glass panels.
- D. Infill Panels: Provide tempered glass panels.

2.10 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.11 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
1. Run grain of directional finishes with long dimension of each piece.
- C. Directional Satin Finish: No. 4.

- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 PREPARATION

- A. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions and directions for installation of items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site.

3.3 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where necessary for securing ornamental metal items to in place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws and other connectors as required.
- B. Fit exposed connections together to form tight, hairline joints, or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding and grinding are required for proper shop fitting and jointing of ornamental metal items, restore finishes to eliminate any evidence of such corrective work.
- C. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction
1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 2. Set posts plumb within a tolerance of **1/16 inch in 3 feet**.
 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed **1/4 inch in 12 feet**.
- D. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

TECHNICAL SPECIFICATIONS

05 METALS

057300

DECORATIVE METAL RAILINGS

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- E. Install concealed gaskets, joint fillers, insulation, and flashings as the work progresses, so as to make work weathertight, soundproof or lightproof as required.
- F. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- G. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.
- H. Restore protective coverings that have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
- I. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.
- J. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds made, and for methods used in correcting welding work. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent rail surfaces.

3.4 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.5 ATTACHING RAILINGS

- A. Attach handrails as indicated. Anchor at spacing required to support structural loads indicated.

3.6 INSTALLING GLASS PANELS

- A. Glass-Panel Railings: Install assembly to comply with railing manufacturer's written instructions.
 - 1. Attach base channel to building structure, then insert glass into base channel and bond with glazing cement unless glass was bonded to base and top rail channels in factory.

- a. Support glass panels in base channel at quarter points with channel-shaped setting blocks that also act as shims to maintain uniform space for glazing cement. Fill remaining space in base channel with glazing cement for uniform support of glass.
2. Adjust spacing of glass panels so gaps between panels are equal before securing in position.
3. Erect glass railings under direct supervision of manufacturer's authorized technical personnel.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Payment for these services will be made from the testing and inspecting allowance, as authorized by Change Orders.
- B. Extent and Testing Methodology: Testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Railings will be tested according to ASTM E 894 and ASTM E 935 for compliance with performance requirements.
- C. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to DEN Project Manager and will comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 CLEANING

- A. Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.

3.9 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

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05 METALS
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PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 057300

SECTION 057500 - DECORATIVE FORMED METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Closures and trim.
2. Corner guards.
3. Escalator enclosures.
4. Metal base.

B. Related Sections:

1. Section 057300 "Decorative Metal Railings."
2. Section 143100 "Escalator" for escalator components made from sheet metal.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design exterior decorative formed metal items, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Decorative formed metal items, including anchors and connections, shall withstand the effects of gravity loads and the following loads and stresses without exceeding the allowable design working stress of materials involved and without exhibiting permanent deformation in any components:
1. Live Loads on Heating-Cooling Unit Enclosures: **100 lbf/sq. ft.** or a concentrated load of **300 lbf** on an area of **4 sq. in.**, whichever produces the greater stress.
- C. Seismic Performance: Exterior decorative formed metal items, including anchors and connections, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor is 1.0.

- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include finishing materials.
 - 1. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Show fabrication and installation details for decorative formed metal.
 - 1. Include plans, elevations, component details, and attachments to other work.
 - 2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
 - a. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as unit of Work of other sections.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required, prepared on 6-inch-square Samples of metal of same thickness and material indicated for the Work.
 - 1. Include 12 inch long samples of linear shapes.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments, and necessary clearances.
- B. Qualification Data: For qualified Installer, fabricator and professional engineer.
- C. Mill Certificates: Signed by stainless-steel manufacturers certifying that products furnished comply with requirements.
- D. Welding certificates.

- E. Warranty: Submit copy of manufacturer's product warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For stainless-steel finish to include in maintenance manuals.
- B. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative formed metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Installer Qualifications: Arrange for installation of ornamental work specified in this section by same firm that manufactured products, to highest degree possible.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.3, "Structural Welding Code - Sheet Steel."
 4. AWS D1.6, "Structural Welding Code - Stainless Steel."
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at location and time as determined by DEN Project Manager.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.
- B. Store products on elevated platforms in a dry location.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.10 COORDINATION

- A. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion, and other causes.

1.11 WARRANTY

- A. Warranty: Installer to warrant all elements of fabrication, including material, anchors, and finish. Provide minimum three (3) year system warranty and five (5) year finish warranty.

1.12 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.

2.2 MISCELLANEOUS MATERIALS

- A. Gaskets: As required to seal joints in decorative formed metal and remain airtight; as recommended in writing by decorative formed metal manufacturer.
 1. ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain seal for application indicated.
 2. Closed-cell polyurethane foam, adhesive on two sides, release paper protected.

- B. Sealants, Interior: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in decorative formed metal; and as recommended in writing by decorative formed metal manufacturer.
1. Sealants shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as necessary for strength, corrosion resistance, and compatibility in fabricated items.
1. Use filler metals that will match the color of metal being joined and will not cause discoloration.
- D. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
1. Provide concealed fasteners for interconnecting decorative formed metal items and for attaching them to other work unless exposed fasteners are unavoidable or are the standard fastening method.
 2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- E. Structural Anchors: For applications indicated to comply with certain design loads, provide chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- F. Nonstructural Anchors: For applications not indicated to comply with design loads, provide metal expansion sleeve anchors or metal-impact expansion anchors of type, size, and material necessary for type of load and installation indicated, as recommended by manufacturer, unless otherwise indicated.
- G. Anchor Materials:
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with **ASTM B 633** or **ASTM F 1941**, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group **1** stainless-steel bolts, **ASTM F 593**, and nuts, **ASTM F 594**.
- H. Backing Materials: Provided or recommended by decorative formed metal manufacturer.
- I. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal and that will prevent telegraphing and oil canning and is compatible with substrate and noncombustible after curing.
1. Contact Adhesive: VOC content of not more than 80 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Metal-to-Metal Adhesive: VOC content of not more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Multipurpose Construction Adhesive: VOC content of not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- J. Isolation Coating: Manufacturer's standard alkali-resistant coating.

2.3 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
- C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature, in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
1. Temperature Change (Range): 100 deg F, (55.5 deg C).
- D. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a **1/2-inch**- wide hem on the concealed side, or ease edges to a radius of approximately **1/32 inch** and support with concealed stiffeners.
- E. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.
1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
 2. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
 3. Provide adequate separation of dissimilar metals subject to galvanic corrosion.
- F. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce decorative formed metal items as needed to attach and support other construction.
- G. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install decorative formed metal items.

- H. Where welding or brazing is indicated, weld, or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.
1. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

2.4 CLOSURES AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fry Reglet Corporation.
 2. Pittcon Industries.
 3. or approved equal.
- B. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.
1. Aluminum Sheet: **0.063 inch**.
 - a. Finish: Mill.
 2. Closures and trim may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view and not exposed to weather.
- C. Conceal fasteners where possible; otherwise, locate where they are as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.
- D. Drill and tap holes needed for securing closures and trim to other surfaces.
- E. Incorporate gaskets where indicated or needed for concealed, continuous seal at abutting surfaces.
- F. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.

2.5 STAINLESS STEEL CORNER GUARDS

- A. Surface-mounted, Metal Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90 degree or 135 degree turn to match wall condition
1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Construction Specialties, Inc.
 - b. IPC Door and Wall Protection Systems; Division of InPro Corp.

- c. Pawling Corp.
 - d. or approved equal.
2. Material: Stainless steel, Type 304.
 - a. Thickness: Minimum **0.0625 in.**
 - b. Finish: Directional satin, No. 4
3. Wing Size: 2".
4. Corner Radius: **1/8 inch.**
5. Mounting: Flat-head, stainless steel, countersunk screws through factory-drilled mounting holes.

2.6 ESCALATOR ENCLOSURES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hi-Tech Metals, Inc.
 2. KPK Stainless.
 3. Metal Sales & Service, Inc.; Metalwerks Division.
 4. Southwest Metalsmiths.
 5. or approved equal.
- B. Form escalator enclosures from metal of type and thickness indicated below. Coordinate size of enclosures, location of cutouts, and method of attachment to adjoining construction.
 1. Stainless-Steel Sheet: **0.062 inch.**
 - a. Finish: No. 4.

2.7 METAL BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Fry Reglet Corporation.
 2. Pittcon Industries.
 3. or approved equal.
- B. Form metal base from metal of type and thickness indicated below:
 1. Stainless-Steel Sheet: **0.050 inch.**
 - a. Finish: No. 4.

2.8 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- E. Finish after assembly where possible.
- F. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2.10 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Directional Satin Finish: No. 4.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Restore protective coverings that have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
 - 1. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.
- B. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.
 - 1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.
- D. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- E. Install concealed gaskets, joint fillers, sealants, and insulation, as the Work progresses, to make interior decorative formed metal items soundproof or lightproof as applicable to type of fabrication indicated.
- F. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.
- G. Apply joint treatment at joints of spackled-seam-type metal column covers. Comply with requirements in Section 092900 "Gypsum Board."
- H. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds made, and for methods used in correcting welding work. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent rail surfaces.
 - 1. Do not field weld without prior approval from DEN Project Manager, with DEN approved safety precautions in place.

3.3 ADJUSTING AND CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

TECHNICAL SPECIFICATIONS
05 METALS
057500
DECORATIVE FORMED METAL

DENVER INTERNATIONAL AIRPORT
DEN CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

- B. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum **2.0-mil** dry film thickness.
- D. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting".
- E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.4 PROTECTION

- A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

PART 4 - MEASUREMENT

A. METHOD OF MEASUREMENT

- 1. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

A. METHOD OF PAYMENT

- 1. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 057500

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes Interior solid phenolic wall panel system.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data substantiating that materials comply with requirements.
- B. Samples for Initial Selection: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns. Please note that samples are only representative for color and pattern and not for thickness or edge finish.
- C. Samples for Verification: For each finish product specified, two samples representing actual product, color, and patterns. Sample edges may vary from field panel edges, and in manufacturer's standard sizes.

1.4 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of panels including related accessories, in a quantity equal to 2 percent of amount installed.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain solid phenolic panel system and accessories from single manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
 - 3. Testing Agency: Acceptable to authorities having jurisdiction.
 - 4. Ignition Temperature: Greater than 650 degree F (350 degree C) above ambient, ASTM D1929.
 - 5. Burning Classification: CC1 or CC2, ASTM D635.
 - 6. When required for compliance with local building codes, the wall cladding assembly shall show no degradation of the rating of Fire Resistant Assemblies, ASTM E119.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements performed by the installer prior to release for fabrication. Recorded measurements to be indicated on shop drawings based on field measurements provided by the installer. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 SOLID PHENOLIC WALL PANEL SYSTEM

- A. General: Solid Phenolic Wall Panels: Solid panel manufactured using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surface or printed décor.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design: Trespa North America, LTD; Meteon.
 - b. or approved equal.

2. Material:

- a. Color on Primary Face: As indicated with black reverse.
- b. Color: As selected by the Architect from manufacturer's standard color palette.
- c. Finish: Satin sheen.
- d. Panel Core: Fire retardant (FR) black core.
- e. Panel Thickness: 5/16 inch (8 mm).

3. Physical Properties:

- a. Modulus of Elasticity: 1,300,000 psi (9000 N/mm²) minimum, ISO 178.
- b. Tensile Strength: 10,100 psi (70 N/mm²) minimum, ISO 527-2.
- c. Flexural Strength: 14,500psi (120 N/mm²) minimum, ISO 178.
- d. Thermal Conductivity: 2.1 BTU/inch/ft².hr.°F, EN 12524.

4. Finish Performance: Electron Beam Cure resin in conformance with the following general requirements:

- a. Color: As selected by the architect/engineer from manufacturer's standard colors or a custom color to be matched by the panel supplier.
- b. Humidity Resistance: No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degree F (38 degree C) for 3000 hours, ASTM D 2247.

2.2 ACCESSORIES

- A. Mounting System: Manufacturer's standard extrusions designed to conceal fastening over fixed depth aluminum sub-framing. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 1. Color: As selected by DEN Project Manager from manufacturer's full range.
- B. Aluminum Sub-Structure: Aluminum sub-structure designed to withstand structural loading due to wind load and the dead load of the panel, painted as required to conceal behind the open joinery of the attachment system.
 1. Extrusions, including corner closures, joint closures and vent screens, formed members, sheet, and plate shall conform with the recommendations of the manufacturer.
 2. Extruded Aluminum Trim: Color as indicated in the drawings.
- C. Fasteners Concealed: Fasteners shall be non-corrosive and as recommended by panel manufacturer. Exposed fasteners shall be colored to match panels where required.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Panels: Solid phenolic impregnated kraft paper wall panels with no voids, air spaces or foamed insulation in the core material. Accessory items in accordance with manufacturer's recommendations and approved submittals.
- B. Panel Weight: 8 mm (2.4 lb/ft²).
- C. Panel Bow: = 2 mm / m (= 0.079 inch/39.38 inches).
- D. Panel Dimensions: Field fabrication shall be allowed where necessary but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
- E. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.

3.2 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Surfaces to receive panels shall be even, smooth, dry and free from defects detrimental to the installation of the panel system.

3.3 PREPARATION

- A. Manufacturers' recommendations for conditioning vary. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- B. Lay out paneling before installing. Locate panel joints where indicated.
 - 1. Mark plumb lines on substrate at sub-framing and panel joint locations for accurate installation.
 - 2. Locate panel joints to allow clearance at panel edges according to manufacturer's written instructions.

3.4 INSTALLATION

- A. Install paneling according to manufacturer's written instructions.

- B. Anchor panels and sub-framing securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary movement and structural support.
- C. Install trim accessories with fasteners approved for use with supporting substrate. Do not fasten through panels.
- D. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- E. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures.

3.5 ADJUSTING AND CLEANING

- A. Remove masking or panel protection as soon as possible after installation.
- B. Adjust final panel installation so that all joints are true and even throughout the installation. Panels out of plane shall be adjusted with the surrounding panels to minimize any imperfection.
- C. Repair panels with minor damage. Remove and replace panels damaged beyond repair as a direct result of the panel installation.
- D. Clean finished surfaces as recommended by panel manufacturer.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 066400

SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes sprayed fire-resistive materials (SFRM).

1.3 DEFINITIONS

- A. Concealed Sprayed on Fireproofing: Concealed sprayed on fireproofing refers to applications where sprayed on materials are applied to surfaces that will be concealed from view when the Work is completed.
- B. Exposed Sprayed on Fireproofing: Exposed sprayed on fireproofing refers to applications where sprayed on materials are applied to surfaces that are exposed to view when the Work is completed.
- C. W/D Ratio: Weight-to-heated-perimeter ratio, the W/D ratio for a steel shape is determined by dividing the **weight per linear foot** by the exposed surface area of the steel member (D); the higher the ratio, the greater the member's fire resistance, thus requiring less protection when calculating rating.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at location and time as determined by DEN Project Manager.
 - 1. Review existing conditions and locations to patch and repair.
 - 2. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.
 - 3. Review coordination of application of fireproofing materials with other trades, project schedule, and project requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include data substantiating that materials comply with requirements.

- B. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions in size.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of fireproofing.
- C. Evaluation Reports: For fireproofing, from ICC-ES.
- D. Preconstruction Test Reports: For fireproofing.
- E. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- B. Testing Laboratory Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to DEN Project Manager's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM E 605, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work and that it complies with Section 01400, "Quality Control Requirements".
- C. Single Source Responsibility: Obtain sprayed on fireproofing materials from a single manufacturer for each different product required.
- D. Fire Performance Characteristics: Provide materials and construction that are identical to those tested for the following fire performance characteristics, per test method indicated, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction.
- E. Fire Resistance Ratings: As indicated by reference to design designation in UL "Fire Resistance Directory" for fire resistance rated assemblies in which sprayed on fireproofing serves as direct applied protection, tested per ASTM E 119.

- F. Surface Burning Characteristics: As indicated for each sprayed on fireproofing product required, tested per ASTM E 84 and listed in UL "Building Materials Directory".
- G. Warranty: Installer to warrant material and installation for two (2) years.
- H. Prior to the start of the application of the sprayed fireproofing a meeting will be held with the DEN Project Manager, Resident Engineer, General Contractor, City Inspector, Third Party Inspector, Fireproofing Applicator, Fireproofing Manufacturer and other parties as deemed necessary to review submittals, sequencing, project conditions and scheduling.
- I. Manufacturer shall submit a certificate that all products specified by the section are 100% asbestos free and mineral wool free.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
 - 1. Verify that manufacturer, through its own laboratory testing or field experience, attests that existing fireproofing is compatible with fireproofing.
 - 2. Bond Strength: Test for cohesive and adhesive strength according to ASTM E 736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 3. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 4. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
 - 5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in original, unopened packages with manufacturers' labels identifying products legible and intact. Include on labels names of products and manufacturers, date of manufacture and shelf life.
- B. Use materials with limited shelf life within period indicated. Remove from project site and discard any materials whose shelf life has expired.
- C. Store materials inside, under cover, off the ground and in a manner to keep them dry until ready to use. Remove from project site and discard any materials that have been exposed to moisture or have otherwise deteriorated.

1.11 FIELD CONDITIONS

- A. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

1.12 SEQUENCING

- A. Sequence and coordinate application of sprayed on fireproofing with other, related work specified in other sections to comply with the following requirements:
1. Provide temporary enclosures to prevent deterioration of sprayed on fireproofing for interior applications due to exposure to unfavorable environmental conditions.
 2. Avoid unnecessary exposure of sprayed on fireproofing to abrasion and other damage.
 3. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, tested, and corrections made to any defective fireproofing.
- B. CONSTRUCTION WASTE MANAGEMENT
1. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fireproofing from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. SFRM: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.
- B. Products manufactured by the Construction Products Division of W.R. Grace and Co., or its approved processing distributors, are specified to establish a standard of material and quality.
- C. Concealed Sprayed-On Fireproofing Materials:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Grace, W. R. & Co. - Conn.; Grace Construction Products; Monokote MK-6 Series
 - b. or approved equal.
 - 1) Manufacturers not listed, who request approval, shall submit a completed Request for "Or Equal" approval form, contained in Part 1, Instructions to Bidders.
 - 2) Listed manufacturers other than the company whose products are specified, W.R. Grace Co., shall submit in addition to requirements of this section, the following:
 - a) Proposed U.L. numbers, W/D calculations.
 - b) A complete description of the process.
 - c) Samples of each product.
 - d) A list of at least three (3) other projects of similar nature to this project where product has been in use.
 - e) Certificate stating that all materials comply with specified requirements, signed by the manufacturer.
 2. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
 3. Bond Strength: Minimum 300 **-lbf/sq. ft.** cohesive and adhesive strength based on field testing according to ASTM E 736.
 4. Density: Not less than **15 lb/cu. ft.** and as specified in the approved fire-resistance design, according to ASTM E 605.
 5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than **0.375 inch.**
 6. Combustion Characteristics: ASTM E 136.
 7. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 10 or less .
 - b. Smoke-Developed Index: 10 or less.

8. Compressive Strength: Maximum 10% deformation when subjected to **1200 lbf/sq. in.** according to ASTM E 761.
9. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
10. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
12. Air Erosion: Maximum weight loss of **0.025 g/sq. ft.** in 24 hours according to ASTM E 859.
13. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 .
14. Finish: As selected by DEN Project Manager to match adjacent existing.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.
- C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.
- E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
 2. For steel, sheet metal ducts and other substrates suspected of being coated with oil, rolling compounds or other substances not readily identifiable but potentially capable of impairing bond, conduct tests recommended by fireproofing manufacturer to determine their presence and effect on adhesion of fireproofing.
 3. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 4. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Do not proceed with installation of fireproofing until unsatisfactory conditions have been corrected.
- C. Verify that concrete work on steel deck has been completed before beginning fireproofing work.
- D. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Provide temporary enclosure as required to confine spraying operations, protect the environment, and to ensure adequate ambient conditions for temperature and ventilation.
- C. Clean substrates of substances that could impair bond of fireproofing, including oil, grease, rolling compounds, incompatible primers, and loose mill scale, or any other conditions that may affect proper application of fireproofing materials.

- D. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
- E. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

- A. Coordinate installation of fireproofing with other work in order to minimize the need for other trades to cut or remove fireproofing. As other trades successively complete installation of their work, maintain protection of structure afforded by fireproofing by patching any areas that have been removed or damaged prior to concealment of fireproofing by other work.
- B. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- C. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- D. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- E. Metal Decks:
 - 1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.
- F. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- G. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- H. Extend fireproofing in full thickness over entire area of each substrate to be protected.

- I. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- J. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fireproofing that differs in color from that of encapsulant over which it is applied.
- K. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.
- L. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- M. Cure fireproofing according to fireproofing manufacturer's written recommendations.
- N. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- O. Finishes: Where indicated, apply fireproofing to produce the following finishes:
 - 1. Provide a uniform finish complying with description indicated for each type of material and matching DEN Project Manager's sample, or if none, finish approved by DEN Project Manager for field-erected mockup.
 - 2. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
 - 3. Spray-Textured Finish: Finish left as spray applied with no further treatment, unless indicated.
 - 4. Use trowel-on only in small areas for patching.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the IBC, 1704.10.
- B. Extent and Testing Methodology: Arrange for testing of completed fireproofing in successive stages in areas of extent described below. Do not proceed with fireproofing of next area until test results for previously completed work evidence compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Extent of Each Test Area: Once every 10,000 sq. ft. of floor area, and no less than once per story, whichever produces the greatest number of test areas.
- D. Within each area, testing laboratory shall randomly select a typical bay, and test each fireproofed structural element within it for thickness and density per ASTM E 605.

- E. Within each area, testing laboratory shall randomly select one typical structural element of each type and test fireproofing for cohesion/adhesion per ASTM E 736.
- F. Testing Laboratory shall report test results within 48 hours of test in writing to Contractor and DEN Project Manager.
- G. Fireproofing will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- H. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect fireproofing, according to advice of manufacturer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.
- C. All patching and repairing of sprayed fireproofing, due to damage by other trades, shall be performed under this section and paid for by the trade(s) responsible for the damage.
- D. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.
- E. Repair fireproofing damaged by other work before concealing it with other construction.
- F. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
07 THERMAL AND MOISTURE PROTECTION
078100
APPLIED FIREPROOFING

DENVER INTERNATIONAL AIRPORT
DEN CONOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 078100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Silicone joint sealants.
2. Latex joint sealants.

- B. Related Sections:

1. Section 092900 "Gypsum Board" for sealing perimeter joints.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
3. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
4. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by DEN Project Manager.
2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.

3. Notify DEN Project Manager seven (7) days in advance of dates and times when test joints will be erected.
4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.5 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
 1. Include data substantiating that materials comply with requirements.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in **1/2-inch-** wide joints formed between two **6-inch-** long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field-Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.
- 1.7 CLOSEOUT SUBMITTALS
- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
- 1.9 QUALITY ASSURANCE
- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.10 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.11 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Minimum two (2) years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Minimum twenty (20) years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

1.12 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- G. Colors of Exposed Joint Sealants: As selected by DEN Project Manager from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:

- a. Dow Corning Corporation; [790] [NS Parking Structure Sealant].
- b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
- c. May National Associates, Inc.; [Bondaflex Sil 290] [Bondaflex Sil 728 NS].
- d. Pecora Corporation; [301 NS] [311 NS] [890] [890FTS].
- e. Sika Corporation, Construction Products Division; SikaSil-C990.
- f. Tremco Incorporated; [Spectrem 1] [Spectrem 800].
- g. or approved equal.

2.3 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolac.
 - b. Bostik, Inc.; Chem-Calk 600.
 - c. Pecora Corporation; AC-20+.
 - d. Schnee-Morehead, Inc.; SM 8200.
 - e. Tremco Incorporated; Tremflex 834.
 - f. or approved equal.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than **3/8 inch**. Hold edge of sealant bead **1/4 inch** inside masking tape.
 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in stone flooring.
 - b. Control and expansion joints in terrazzo flooring.
 - c. Other joints as indicated.
 2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing
 3. Joint-Sealant Color: As selected by DEN Project Manager from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of walls and partitions.
 - d. Other joints as indicated.
 2. Joint Sealant: Latex.
 3. Joint-Sealant Color: As selected by DEN Project Manager from manufacturer's full range of colors.

TECHNICAL SPECIFICATIONS
07 THERMAL AND MOISTURE PROTECTION
079200
JOINT SEALANTS

DENVER INTERNATIONAL AIRPORT
DEN CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 079200

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Interior gypsum board and non-load-bearing steel framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.
 - 1. Include data substantiating that materials comply with requirements.
- B. Certificate from manufacturer stating that all materials are per contract requirements and providing proof of minimum five (5) years experience manufacturing products required of similar size.
- C. Certificate from installer evidencing a minimum five (5) years successful experience installing this type of work on projects.

1.4 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.5 QUALITY ASSURANCE

- A. Fire Rated Assemblies: Where framing units are components of assemblies indicated for a fire resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities having jurisdiction.
- B. Pre-installation conference: Prior to installation of work, meet at the project site or other mutually agreed location with installer, contractor, DEN Project Manager and other job related contractors.
- C. Warranty: Installer to warrant system for two (2) years, including framing and finish.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- D. CONSTRUCTION WASTE MANAGEMENT
 - 1. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Interior Gypsum Board
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Corp.
 - c. Georgia-Pacific Gypsum LLC.

- d. Lafarge North America Inc.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland.
 - h. USG Corporation.
 - i. or approved equal.
2. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - a. Thickness: 5/8 inch (15.9 mm).
 - b. Long Edges: Tapered.
 3. Anti-Sag Gypsum Ceiling Board: ASTM C 1396/C 1396M.
 - a. Thickness: 1/2 inch (12.7 mm).
 - b. Long Edges: Tapered.
 - c. Type: Anti-sag.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed flange receives joint compound.
 - c. L-Bead: L-shaped; exposed flange receives joint compound.
 - d. U-Bead: U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use where indicated.
 - e. Expansion (control) joint: One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

- a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.5 NON-LOAD-BEARING STEEL FRAMING

- A. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 2. Protective Coating: ASTM A 653/A 653M, **G40**, hot-dip galvanized, unless otherwise indicated.
- C. Studs and Runners: ASTM C 645.
 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: **0.027 inch**.
 - b. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints: Where indicated, provide[one of] the following:
 1. Single Long-Leg Runner System: ASTM C 645 top runner with **2-inch**- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within **12 inches** of the top of studs to provide lateral bracing.
 2. Double-Runner System: ASTM C 645 top runners, inside runner with **2-inch**- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
 - 2) MBA Building Supplies; FlatSteel Deflection Track.
 - 3) Steel Network Inc. (The); VertiClip SLD Series.
 - 4) Superior Metal Trim; Superior Flex Track System (SFT).
 - 5) Telling Industries; Vertical Slip Track.
 - 6) or approved equal.

- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: **0.027 inch**.

- F. Cold-Rolled Channel Bridging: Steel, **0.053-inch** minimum base-metal thickness, with minimum **1/2-inch-** wide flanges.
 - 1. Depth: **1-1/2 inches**.
 - 2. Clip Angle: Not less than **1-1/2 by 1-1/2 inches**, **0.068-inch-** thick, galvanized steel.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.

- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

- C. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
 - 2. Powder-Actuated Anchors: Powder-actuated fasteners are not permitted and shall not be used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, with Installer present, including structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fireproofing."
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
- B. Do not bridge building expansion joints with wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted doorstops, and similar items that cannot be supported directly by shaft wall assembly framing.
 - 1. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with **0.033-inch** minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.
- D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by DEN Project Manager while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than **1/8 inch** from the plane formed by faces of adjacent framing.

3.4 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

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1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 092900

SECTION 096623 - RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thin-set, epoxy-resin terrazzo flooring.
- B. Related Requirements:
 - 1. Section 079200 "Joint Sealants" for sealants installed with terrazzo.
 - 2. Section 033000 "Cast-In-Place Concrete" for concrete topping slab.

1.3 DEFINITIONS

- A. Aggregate: Marble chips.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at location and time as determined by DEN Project Manager.
 - 1. Review methods and procedures related to terrazzo including, but not limited to, the following:
 - a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Review special terrazzo designs and patterns.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data substantiating that materials comply with requirements.

- B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:
1. Divider strips.
 2. Control-joint strips.
 3. Accessory strips.
 4. Terrazzo patterns.
- C. Samples: For each exposed product and for each color and texture specified, **6 inches** in size.
- D. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type.
- E. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare Samples of same thickness and from same material to be used for the Work, in size indicated below:
1. Terrazzo: **6-inch-** square Samples.
 2. Accessories: **6-inch-** long Samples of each exposed strip item required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each type of terrazzo material or product, from manufacturer.
- C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For terrazzo to include in maintenance manuals.
- B. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Engage an installer who is a contractor member of NTMA.
 2. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.

- B. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with sources or manufacturer's name, material or product brand name, and lot number if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- C. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- D. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

1.11 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

- B. FloorScore Compliance: Terrazzo floors shall comply with requirements of FloorScore Standard.

2.2 EPOXY-RESIN TERRAZZO

- A. Epoxy-Resin Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Crossfield Products Corp., Dex-O-Tex Division; Cheminert Terrazzo.
 - b. General Polymers Corporation; Terrazzo 1100.
 - c. Key Resin Company; Key Epoxy Terrazzo.
 - d. Master Terrazzo Technologies LLC; Morricite.
 - e. Quadrant Chemical Corporation; Quadset Epoxy Terrazzo.
 - f. TEC Specialty Construction Brands, Inc.; Tuff-Lite Epoxy Terrazzo.
 - g. Terrazzo & Marble Supply Companies; Terroxy Resin Systems.
 - h. or approved equal.
2. Thickness: **3/8 inch** nominal.
3. Formulated Mix Color and Pattern: As selected by DEN Project Manager from NTMA thin-set terrazzo plates.
4. Custom Mix Color and Pattern: Match DEN Project Manager's sample.

B. Materials:

1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate-crack preparation and reflective-crack reduction.
 - a. Reinforcement: Fiberglass scrim.
2. Primer: Manufacturer's product recommended for substrate and use indicated.
3. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.
 - a. Physical Properties without Aggregates:
 - 1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
 - 2) Minimum Tensile Strength: **3000 psi** per ASTM D 638 for a **2-inch** specimen made using a "C" die per ASTM D 412.
 - 3) Minimum Compressive Strength: **10,000 psi** per ASTM D 695, Specimen B cylinder.
 - 4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.
 - a) Distilled water.
 - b) Mineral water.
 - c) Isopropanol.

- d) Ethanol.
 - e) 0.025 percent detergent solution.
 - f) 1.0 percent soap solution.
 - g) 10 percent sodium hydroxide.
 - h) 10 percent hydrochloric acid.
 - i) 30 percent sulfuric acid.
 - j) 5 percent acetic acid.
- b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide"; comply with the following:
- 1) Flammability: Self-extinguishing, maximum extent of burning **1/4 inch** per ASTM D 635.
 - 2) Thermal Coefficient of Linear Expansion: **0.0025 inch/inch per deg F** for temperature range of **minus 12 to plus 140 deg F** per ASTM D 696.
4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
- a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
 - b. 24-Hour Absorption Rate: Less than 0.75 percent.
 - c. Dust Content: Less than 1.0 percent by weight.
 - d. Recycled Content of Epoxy-Resin Terrazzo: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert number> percent.
5. Finishing Grout: Resin based.
- 2.3 STRIP MATERIALS
- A. Thin-Set Divider Strips: L-type angle, **1/4 inch** deep.
- 1. Material: White-zinc alloy.
 - 2. Top Width: As indicated on drawings.
- B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.
- C. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
- 1. Base-bead strips for exposed top edge of terrazzo base.
 - 2. Edge-bead strips for exposed edges of terrazzo.

2.4 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
 - 1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- C. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
- E. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type.
 - 1. Basis of Design Product: Diversey CareFree Matte Low Gloss Floor Finish.
 - a. Provide basis of design product or other approved product meeting the requirements.
 - 2. Surface Friction: Not less than 0.6 according to ASTM D 2047.
 - 3. Acid-Base Properties: With pH factor between 7 and 10.
 - 4. Sealers shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.

B. Concrete Slabs:

1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
 - c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests indicated below.
 - a. Calcium Chloride Test: Perform anhydrous calcium chloride test per ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft.** in 24 hours.
 - 1) Perform tests so that each test area does not exceed **200 sq. ft.**, and perform not less than two tests in each installation area and with test areas evenly spaced in installation areas.
 - b. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.
 - c. Test Method: Test for moisture content by method recommended in writing by terrazzo manufacturer. Proceed with installation only after substrates pass testing.

D. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.
- B. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."

- C. Installation Tolerance: Limit variation in terrazzo surface from level to **1/4 inch in 10 feet**; noncumulative.
- D. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
- E. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
- F. Flexible Reinforcing Membrane:
1. Prepare and prefill substrate cracks with membrane material.
 2. Install membrane to produce full substrate coverage in areas to receive terrazzo.
 3. Reinforce membrane with fiberglass scrim.
 4. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
- G. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
- H. Strip Materials:
1. Divider and Control-Joint Strips:
 - a. Locate divider strips in locations indicated.
 - b. Install control-joint strips back to back directly above concrete-slab control joints.
 - c. Install control-joint strips with **1/4-inch** gap between strips, and install sealant in gap.
 - d. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
 2. Accessory Strips: Install as required to provide a complete installation.

3.4 REPAIR

- A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by DEN Project Manager.

3.5 CLEANING AND PROTECTION

- A. Cleaning:
1. Remove grinding dust from installation and adjacent areas.
 2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.

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B. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
2. Apply sealer according to sealer manufacturer's written instructions.

C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 096623

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Gypsum board.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include data substantiating that materials comply with requirements.
- B. Samples for Initial Selection: For each type of topcoat product.

- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
1. Submit Samples on rigid backing, **8 inches** square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
 5. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 6. Resubmit until required sheen, color, and texture are achieved.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
 3. VOC content.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F**.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between **50 and 90 deg F**.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than **5 deg F** above the dew point; or to damp or wet surfaces.

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1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.7 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 1. Benjamin Moore & Co.
 2. ICI Dulux Paints.
 3. Kelly-Moore Paints.
 4. M.A.B. Paints.
 5. PPG Architectural Finishes, Inc.
 6. Sherwin-Williams Company (The).
 7. Sico, Inc.
 8. or approved equal.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated, or equal approved by DEN Project Manager.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Colors: Match existing color and finish

2.3 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

1. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils.
2. ICI Dulux Paints; 1000-1200 Dulux Ultra Basecoat Interior Latex Wall Primer: Applied at a dry film thickness of not less than 1.2 mils.
3. ICI Dulux Paints; 1030-1200 Ultra-Hide PVA Interior Primer Sealer General Purpose Wall Primer: Applied at a dry film thickness of not less than 1.9 mils.
4. Kelly-Moore; 971 Acry-Prime Interior Latex Primer/Sealer: Applied at a dry film thickness of not less than 1.6 mils.
5. M. A. B. Paint; Fresh Kote Vinyl Primer 037-100: Applied at a dry film thickness of not less than 1.5 mils.
6. Pittsburgh Paints; 6-2 SpeedHide Interior Quick-Drying Latex Sealer: Applied at a dry film thickness of not less than 1.0 mil.
7. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils.
8. or approved equal.

2.4 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.

1. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275: Applied at a dry film thickness of not less than 1.2 mils.
2. ICI Dulux Paints; 1200-XXXX Dulux Professional Velvet Matte Interior Flat Latex Wall & Trim Finish: Applied at a dry film thickness of not less than 1.4 mils.
3. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint: Applied at a dry film thickness of not less than 1.8 mils.
4. M. A. B. Paint; Fresh Kote Latex Flat 402 Line: Applied at a dry film thickness of not less than 1.5 mils.
5. Pittsburgh Paints; 6-70 Line SpeedHide Interior Wall Flat-Latex Paint: Applied at a dry film thickness of not less than 1.0 mil.
6. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series: Applied at a dry film thickness of not less than 1.4 mils.
7. or approved equal.

B. Latex, Interior, Eggshell, (Gloss Level 2): MPI #44.

1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274: Applied at a dry film thickness of not less than 1.3 mils.
2. ICI Dulux Paints; 1402-XXXX Dulux Professional Acrylic Eggshell Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than 1.4 mils.
3. Kelly-Moore; 1610 Sat-N-Sheen Interior Latex Low Sheen Wall and Trim Finish: Applied at a dry film thickness of not less than 1.6 mils.
4. Kelly-Moore; 1686 Dura-Poxy Eggshell Acrylic Enamel: Applied at a dry film thickness of not less than 1.6 mils.
5. M. A. B. Paint; Fresh Kote Latex Satin Eggshell Enamel 405 Line: Applied at a dry film thickness of not less than 1.5 mils.

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6. Pittsburgh Paints; 6-400 Series SpeedHide Eggshell Acrylic Latex Enamel:
Applied at a dry film thickness of not less than 1.25 mils.
7. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20W200 Series:
Applied at a dry film thickness of not less than 1.6 mils.
8. or approved equal.

2.5 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements.
 4. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials.
 5. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Contractor's acceptance of surfaces and conditions within a particular area.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

- E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
 - a. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 - b. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 - c. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
 6. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 7. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 8. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 9. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- C. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing, and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.
 3. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by DEN Project Manager, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- E. Provide "Wet Paint" signs, warning tape and any other measures required to protect newly painted finishes and prevent the public from encountering freshly painted surfaces. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board Substrates:
1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.

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09 FINISHES
099123
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- d. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
- e. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.
- f. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.
- g. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
- h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
- i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 099123

SECTION 143100 - ESCALATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes **high-traffic, interior** escalators.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Section 051200 "Structural Steel Framing" for attachment plates, angle brackets, and other preparation of structural steel to support escalator trusses.

1.3 DEFINITIONS

- A. High-Traffic Escalators: Designed specifically for high-traffic-volume use that produces dense occupancy resulting in structural, machinery, and brake loads much higher than normal.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, safety features, finishes, and similar information.
 - 1. Include data substantiating that materials comply with requirements.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and details indicating coordination with building structure and relationships with other construction.
 - 2. Indicate maximum loads imposed on building structure at points of support, and power requirements.
 - 3. Indicate access and ventilation for escalator machine space.
- C. Samples for Initial Selection: For exposed materials involving color selection.

- D. Samples for Verification: For exposed escalator finishes, 3-inch- (75-mm-) square Samples of sheet materials, and 4-inch (100-mm) lengths of running trim members.
- E. Delegated-Design Submittal: For escalators.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For escalator equipment, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Manufacturer Certificates: Signed by manufacturer certifying that escalator layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for escalator system being provided.
- D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For escalators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 017825 "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted escalator use.
- C. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Escalator manufacturer **or an authorized representative who is trained and approved by manufacturer.**

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.9 COORDINATION

- A. Coordinate installation of sleeves, block outs, escalator equipment with integral anchors, and other items that are embedded in concrete or masonry for escalator equipment. Furnish templates, sleeves, escalator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to escalators including: electrical service; and electrical outlets, lights, and switches in pits.

1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace escalator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: Minimum one year from date of Substantial Completion.

1.11 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. KONE Inc.
 - 2. Otis Elevator Co.
 - 3. Schindler Elevator Corp.
 - 4. ThyssenKrupp Elevator.

- B. Source Limitations: Obtain escalators from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Braking Performance: Provide brakes that stop escalator in up-running mode at a rate no greater than **3 ft./s²** (0.91 m/s²).
- C. Braking Performance: Provide brakes that produce a stopping force on escalator in up-running mode that is one-third that used in down-running mode.
- D. Step/Skirt Performance Index: Not more than 0.15.
- E. Delegated Design: Engage a qualified professional engineer to design escalators.
- F. Seismic Performance: Escalators shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.
1. Design earthquake spectral response acceleration short period (Sds) for Project is 0.17.
 2. Project's Seismic Design Category: **B**.
 3. Escalator Component Importance Factor: 1.0.
- G. Structural and Mechanical Performance for High-Traffic Escalators: For the purposes of structural design, driving machine and power transmission calculations, and brake calculations, design high-traffic escalators for loads not less than **two** times the design loads required by ASME A17.1/CSA B44.
- H. Structural Performance of Balustrades, Deck Barricades, and Handrails: Provide components and assemblies capable of withstanding the effects of loads indicated in ASCE/SEI 7 for handrail assemblies and guardrail systems.

2.3 ESCALATORS

- A. Escalators, General: Manufacturer's standard escalators complying with requirements. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard escalator systems and as required for complete system.
- B. High-Traffic Escalators, General: Manufacturer's high-traffic escalators complying with requirements. Unless otherwise indicated, manufacturer's heavy-duty components shall be used, as included in standard high-traffic escalator systems and as required for complete system.
- C. Design and equip escalators to run in either direction.
- D. Provide escalators with **two** flat steps at top and bottom landings.
- E. Rated Speed: **100 fpm** (0.5 m/s).

2.4 COMPONENTS

- A. Fabricate exposed metalwork, including deck covers, balustrade panels, and trim to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use; increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as necessary. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
- B. Transparent Balustrades: Manufacturer's standard profile or arrangement of moving handrails on guide rail that is supported by tempered glass panels, with deck covers, skirts, trim, and accessories. **Prepared for exterior finish below the deck covers; exterior finish specified in another Section.**
- C. Direction Indicator Lights: Provide red and green indicator lights at least **2 inches** (50 mm) in diameter in **both** balustrade newels at both upper and lower landings. Green light indicates entrance end, and red light indicates exit end. When escalator is stopped, red lights are illuminated at both ends.
- D. Guards at Ceiling Intersection: Clear plastic.
- E. Handrails: Smooth, jointless, reinforced neoprene.
1. Color: **Black**.
- F. Deck Covers and Trim: **Satin stainless steel**.
- G. Antislip Devices: **Satin stainless steel**.
- H. Interior Decks: **Satin stainless steel**.
- I. Exterior Decks: **Satin stainless steel**.
- J. Skirt Panels: **Satin stainless steel with exposed surface coated with clear PTFE**.
- K. Skirt Deflector Devices: Manufacturer's standard brush-type device.
- L. Steps: One-piece, die-cast aluminum with demarcation grooves at front and rear of tread surface.
1. Finish: Powder-coated, **black**.
 2. Step Demarcation: **1-1/2- to 2-inch-** (38- to 50-mm-) wide yellow stripe at sides and backs of step treads.
 3. Nosing Demarcation: **2-inch-** (50-mm-) wide yellow stripe at nosings of step treads.
- M. Combs: **Cast aluminum with powder-coated finish**.
1. Comb Color: **Yellow**.

- N. Combplate Lights: Provide recessed light fixtures with flush lenses mounted in skirt panels at each side of combplates, designed to illuminate combplate steps.
- O. Floor Plates: **Cast or extruded aluminum** with grooved or patterned surface **and with abrasive material embedded in or metallurgically bonded to floor-plate surface.**

2.5 FEATURES

- A. Operational Control: Provide key-operated starter switches **and key-operated switches for directional control** located on exterior deck above newel base at both upper and lower landings of escalators.
- B. Fault Indicator: Provide escalators with a microprocessor unit that monitors safety devices, motor temperature, and escalator speed and records in nonvolatile memory the date, time, and device identification if a safety device is activated or escalator malfunctions.
 - 1. Provide built-in **or plug-in** unit to display recorded information.
- C. Reduced-Current Starting: Provide escalator motors with wye-delta or solid-state starting.
- D. Energy-Saving Feature: Provide escalator motors and controls designed for motors running on partial windings (at reduced power) when not under full load.
- E. Provide motors complying with NEMA MG 1, Insulation Class B.
- F. Brake-Saving Feature: Provide stopping mechanism that allows escalator to coast to a stop before applying brakes, unless stopping is initiated by a safety device.
- G. Equip step drive mechanism with automatic step-chain lubricators.
- H. Oil Drip Pan: Provide metal pan under full width and length of escalator to collect and hold oil and grease drippings from lubricated components. Design and fabricate drip pan to sustain a load of **250 lbf (1.1 kN)** on a **1.0-sq. ft. (0.9-sq. m)** area at any location without permanent deflection.
- I. Overspeed Governor: Provide units with overspeed governor that is activated if speed of steps exceeds rated speed by more than 20 percent.
- J. Upper-Landing, Step Upthrust Device: Activated if a step is displaced against upthrust track at upper curve in passenger-carrying line of track system.
- K. Comb-Step Impact Device: Activated if a horizontal force in direction of travel is applied exceeding **400 lbf (1780 N)** at either side or exceeding **800 lbf (3560 N)** at center of front edge of combplate, or a resultant force in upward direction is applied exceeding **150 lbf (688 N)** at center of front edge of combplate.
- L. Comb-Step Impact Device: Activated if a horizontal force in direction of travel is applied exceeding **112 lbf (500 N)** at either side or exceeding **225 lbf (1000 N)** at center

of front edge of combplate, or a resultant force in upward direction is applied exceeding **150 lbf (688 N)** at center of front edge of combplate.

2.6 MATERIALS

- A. Stainless Steel: ASTM A 240/A 240M, **Type 304**.
1. Satin Finish: No. 4 directional satin.
 2. Polished Finish: No. 8 mirror polish.
 3. Gold-Colored Satin Finish: No. 4 directional satin with gold-colored oxide or titanium nitride finish.
 4. Gold-Colored Mirror Finish: No. 8 mirror polish with gold-colored oxide or titanium nitride finish.
- B. Satin Bronze Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal), fine satin finish, lacquered.
- C. Satin Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze), fine satin finish, lacquered.
- D. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- E. Clear Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 1 (clear), Quality q3 (glazing, select), Kind FT (fully tempered), **12.0** mm thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine escalator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine supporting structure, machine spaces, and pits; verify critical dimensions; and examine conditions under which escalators are to be installed.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.

- B. Set escalators true to line and level, properly supported, and anchored to building structure. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.
- C. Adjust installed components for smooth, efficient operation, complying with required tolerances and free of hazardous conditions. Lubricate operating parts, including bearings, tracks, chains, guides, and hardware. Test operating devices, equipment, signals, controls, and safety devices. **Install oil drip pans and verify that no oil drips outside of pans.**
- D. Repair damaged finishes so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of escalator installation and before permitting escalator use, perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by authorities having jurisdiction.
 - 1. For escalators specified to comply with requirements more stringent than those of ASME A17.1/CSA B44, perform tests for compliance with specified requirements. Test safety devices that are not required by ASME A17.1/CSA B44 as well as those that are.
- B. Advise Owner, DEN Project Manager, and authorities having jurisdiction in advance of dates and times that tests are to be performed.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate escalators.
 - 1. Schedule training with Owner, through DEN Project Manager, with at least seven (7) days advance notice.
- B. Check operation of escalators with Owner's personnel present before date of Substantial Completion **and again not more than one month before end of warranty period**. Determine that operation systems and devices are functioning properly.

3.5 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of escalator Installer. Include monthly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper escalator

operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.
2. Perform emergency callback service during normal working hours with response time of **two** hours or less.
3. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of **two** hours or less.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

PART 6 - SPARES AND MAINTENANCE STOCK

6.1 SUMMARY

| | | |
|---------------------------|--|------------------------|
| Diagnostic equipment | | 1 set ea. type |
| Handrail | | 1 each size |
| Steps | | 15 each kind |
| Replaceable Relay | | 4 |
| Stop Switches | | 8 |
| Start/Stop Keyswitches | | 4 |
| Microswitch Safety Device | | 8 |
| Plastic Trim Extrusion | | 200' |
| Glass "Bullets" | | 4 |
| Glass Straights/Rectangle | | 8 |
| Combplate Sections | | 24 |
| Handrail Inlets | | 12 |
| Overload Relays | | 4 |
| Handrail Drive Chains | | 4 |
| Step Rollers | | 1 set for highest rise |

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| | | |
|--|--|-----------------------------|
| Step Chain Rollers | | 1 set for highest rise unit |
| Demarcation Lamps/Fixture and Ballast | | 2 complete units |
| Skirt Brush Inserts | | 10 sections |
| Skirt Brush End Caps | | 1 ea. type |
| "Deck" Screws | | 500 |
| Handrail Tensioning Racks | | 2 |
| Brake Assembly | | 1 ea. size |
| Step Demarcation Strips | | 50 |
| Handrail Newel Rollers | | 36 |
| Skirt lighting lamps/fixtures and ballasts | | 2 complete sets |
| Chain Lube | | |
| Drive Motor and Gear Box assembly | | 1 set ea. size |
| Drive Sprockets | | 1 set for ea. size |
| Fuses/Lamps | | 12 ea. size |
| Printed circuit board | | 1 ea. type |
| Handrail Drive | | 1 set ea. type |

END OF SECTION 143100

SECTION 210400 - BASIC FIRE-SUPPRESSION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and DEN BIM models and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Basic requirements common to the Work in general of Division 21 and other Divisions and Sections of the Specification where referenced.
 2. Provide, unless specified otherwise, all labor, materials, and equipment necessary for completely finished and operational fire protection systems described and specified under other Sections of this Division 21.
 3. Provide all minor incidental items such as offsets, fittings, and accessories required as part of the Work even though not specified or indicated.
 4. Inspection: Inspect Work preceding or interfacing with work of Division 21 and report any known or observed defects that affect the Work to the General Contractor. Do not proceed with the Work until defects are corrected.

1.3 REFERENCES

- A. General:
1. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable Codes.
 2. The date of the standard is that in effect as the date of the Contract Documents, except when a specific date is specified.
 3. When required by individual Specifications Section by means of reference for cleaning or installation requirements, etc., obtain a copy of the standard. Maintain the copy at job site during Work until substantial completion. Copy shall be in electronic format.
 4. Schedule of Referenced Organizations: The following is a list of the acronyms of organizations referenced in these Specifications:
 - a. ABMA—American Bearing Manufacturers Association

- b. ACI–American Concrete Institute
- c. ASA–American National Standards on Acoustics and Vibrations
- d. ASME–American Society of Mechanical Engineers
- e. ASTM–American Society for Testing of Materials
- f. ANSI–American National Standards Institute
- g. ASME–American Society of Mechanical Engineers
- h. ATA–Air Transport Association of America
- i. AWS–American Welding Society
- j. EPA–Environmental Protection Agency
- k. CISPI–Cast Iron Soil Pipe Institute
- l. FM–Factory Mutual Insurance Association
- m. IFC–International Fire Code
- n. MSS–Manufacturers Standardization Society of the Valve and Fittings Industry
- o. NACE–National Association of Corrosion Engineers
- p. NAPCA–National Association of Pipe Coating Applicators
- q. NFPA–National Fire Protection Association
- r. NIST–National Institute of Science and Technology
- s. SSPC–The Society for Protective Coatings
- t. UL–Underwriters' Laboratories

1.4 DEFINITIONS

- A. Conform to Division 01: These Specifications are of abbreviated, simplified, or streamlined type and include incomplete sentences. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the Contract Documents so indicates.
- B. The following words are re-defined and/or elaborated on for the context of Division 21 work:
 - 1. Furnish: Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
 - 2. Install: Except as otherwise defined in greater detail, term "install" is used to describe operations at Project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
 - 3. Provide: Except as otherwise defined in greater detail, term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.
 - 4. General Contractor: The term "General Contractor" used in Division 21 and elsewhere in the Contract Documents means the party with whom the Owner has executed the Owner-Contractor Agreement.

1.5 QUALITY CONTROL

- A. Conform to Division 01. Materials and apparatus required for the Work to be new and

of first-class quality; to be furnished, delivered, erected, connected and finished in every detail; and to be so selected and arranged so as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article shall be furnished.

- B. Unless otherwise specifically indicated, equipment and materials to be installed in accordance with the recommendations of the Manufacturer. This includes the performance of tests as recommended by the Manufacturer.

1.6 REGULATORY REQUIREMENTS

- A. Comply with latest editions of all applicable Codes, Standards, Ordinances and Regulations in effect as of the date of the Contract Documents adopted by City and County of Denver, Building Department and Fire Department, including but not necessarily limited to the following:
1. National Electrical Code NFPA-70.
 2. NFPA.
 3. Underwriters Laboratories.
- B. If discrepancies occur between the Contract Documents and any applicable Codes, Guidelines, Ordinances, Acts, or Standards, the most stringent requirements shall apply.
- C. Where hourly fire ratings are indicated or required, provide components and assemblies meeting requirements of the International Building Code for "F" and "T" ratings within an "L" rating of less than 1 CFM/Ft² at 400°F and at ambient temperature. American Insurance Association, Factory Mutual Insurance Association and all assemblies shall be listed by Underwriters Laboratories, Inc or other nationally recognized tested laboratory.

1.7 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Substitutions: Refer to Division 01, General Requirements.
- B. Some materials and equipment are specified by Manufacturer and catalog numbers. The Manufacturer and catalog numbers are used to establish a degree of quality and style for such equipment and material.
- C. When alternate or substitute materials and equipment are used, Contractor shall be responsible for space requirements, configurations, performance, changes in bases, supports, structural members and openings in structure, electrical changes and other apparatus and trades that may be affected by their use.
- D. When providing a product and/or service under the qualification of "acceptable equal," Contractor shall be entirely responsible for additional costs incurred due to modifications to the civil, architectural, structural, mechanical, electrical, or any other system design that may be required to accommodate the "acceptable equal."

- E. Substitute materials and equipment are only allowed to be provided from the manufacturers listed as approved.

1.8 SHOP DRAWINGS AND PRODUCT DATA

- A. General: Comply with the General Conditions of the Contract and with Division 01 General Requirements.
 - 1. All documents shall be submitted in electronic format. Each submittal shall be in a single security free PDF document. PDF documents shall be compatible with the latest version of Adobe Acrobat. All as-built documents shall be submitted in the latest version of Revit format.

1.9 CONTRACT RECORD DOCUMENTS

- A. General: Comply with the General Conditions of the Contract and with Division 01 General Requirements,

1.10 OPERATING AND MAINTENANCE DATA

- A. Division 21 Contractor shall submit electronic record, in accordance with Division 1 requirements, a single PDF file of the entire maintenance manual to the DEN Project Manager and General Contractor for their approval.
- B. The manual shall have as a minimum the following:
 - 1. Alphabetical list of all system components including the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year's operation.
 - 2. Operating instructions for complete system, including emergency procedures for fire or failure of major equipment and procedures for normal starting/operating/shutdown and long-term shutdown.
 - 3. Maintenance instructions, including valves, valve tag, and other identified equipment lists, proper lubricants and lubricating instructions for each piece of equipment and necessary cleaning/replacing/adjusting schedules.
- a. Manufacturer's data on each piece of equipment, including:
 - 1) Installation instructions.
 - 2) Drawings, specifications, and approved shop drawings.
 - 3) Complete parts lists.
 - 4. Complete wiring and control diagrams (approved shop drawings) with sequence of operation.
 - 5. Each piece identified on any schedule shall be bookmarked in the electronic file by its scheduled tag ID.
- C. In addition to the maintenance manual, and keyed to it, the equipment shall be

identified and tagged as specified elsewhere. Insert a copy.

1. Identify all starters, disconnect switches, and manually operated controls, except integral equipment switches with permanently applied, legible markers corresponding to operating instructions in the "Maintenance Manual".
 2. Tag all manual operating valves with 1-1/2" diameter brass tags attached with chains. Tags are to be sequence numbered with legible metal stamps. Obtain latest tag identification schedule from the DEN Project Manager.
 3. Provide a typed tag list or schedule mounted under glass in the room designated by DEN Project Manager stating number, location, and function of each tagged item. Insert a copy of tag list in each "Maintenance Manual".
- D. Division 21 Contractor shall be responsible for scheduling instructional meetings for maintenance personnel on the proper operation and maintenance of all fire suppression systems, using the maintenance manual as a guide. These meetings must be scheduled through the DEN Project Manager, and General Contractor far enough in advance so that all personnel can be notified.
- E. Division 21 Contractor shall provide proof of performance certification, including all NFPA standard system test certificates, of all fire suppression systems to demonstrate that all fire suppression systems are operating to the intent of the design.

1.11 FINAL OBSERVATION

- A. Comply with the requirements of Division 01 and the following.
- B. Prior to the request for final observation, all Work under the contract shall be completed, all systems shall be in proper working order, pressure tested and placed in operation (System Startup of 48 hours).
- C. All equipment shall be cleaned. All debris and construction materials shall be removed from the DEN property to a suitable landfill off-airport.
- D. The Fire Alarm System provided for control and monitoring of fire suppression system components shall be complete and in proper working order. All instruments shall be properly and accurately field calibrated.
- E. At the request of the DEN Project Manager, a representative of the Contractor who is thoroughly familiar with the Project and operation of the various systems shall be present during the final observation to demonstrate proper operation of the equipment and Fire Alarm System Interface. If requested by the DEN Project Manager, the Contractor shall have representatives from the Contractor's subcontractors present to assist during final observation.

1.12 PROJECT CONDITIONS

- A. Accessibility:

1. Division 21 Contractor shall be responsible for the sufficiency of the size of shafts and chases and the adequate clearance in double partitions and hung ceilings for proper installation of the Contractor's Work. The Contractor shall cooperate with Contractors of other Divisions of the Work whose work is in the same space and shall advise the General Contractor of the Contractor's requirements. Such spaces and clearances shall, however, be kept to the minimum size required.
2. Division 21 Contractor shall locate all equipment, which must be serviced, operated, or maintained in fully accessible positions. Such equipment shall include (but not be limited to) valves, shock absorbers, traps, cleanouts, motors, controllers, switchgear, and drain points. If required for better accessibility, furnish access doors for this purpose, minor deviations from Drawings may be allowed to provide for better accessibility. Any changes shall be approved by the DEN Project Manager prior to making the change.
3. Division 21 Contractor shall provide the General Contractor with the exact locations of access doors for each concealed valve, shock absorber control, damper, or other device requiring service. Locations of these doors shall be submitted in sufficient time to be installed in the normal course of work.
4. Provide carpentry, masonry, concrete and metal work required for Work of this Division where not specifically called for under other Sections.

B. Fabrication:

1. Before any piping is fabricated and before running and/or fabricating any pipe networks, the Contractor shall assure himself and coordinate with the Engineer of Record that they can be run as contemplated in cooperation with Contractors of other Divisions of the Work and the physical constraints of existing conditions and new structural and architectural Work.

C. Freeze Protection:

1. Do not run water filled piping in outside walls, or locations where freezing may occur without protection. Water filled system piping next to outside walls shall be in furred spaces with insulation between the piping and the outside wall. Piping insulation alone shall not be considered freeze protection. Only piping insulation with a Listed Heat-Trace system will be considered acceptable freeze protection.

D. Scaffolding, Rigging and Hoisting:

1. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment and apparatus furnished; remove same from premises when no longer required. Conform to OSHA requirements and standards.

1.13 COORDINATION

- A. General: Coordinate and order the progress of fire protection Work to conform to the

progress of the Work of the other trades. Complete the entire installation as soon as the condition of the building will permit.

- B. Coordination with Electrical Work: Section 210500 "Common Work Results for Fire Suppression".
- C. Existing System Interruptions: Comply with Division 01.
- D. Cutting and Patching: Section 210500 "Common Work Results for Fire Suppression", Division 01 requirements, and Section 017330 "Cutting and Patching".
- E. Drawings and Specifications: The Fire Protection Drawings indicate the design and arrangement of piping, equipment, systems, etc. As the information shown or referenced from other disciplines may be diagrammatic in character the fire suppression system drawings may not necessarily indicate every required offset, fitting, etc. Do not scale the Drawings for dimensions. Review dimensions, measurements, locations, levels, etc., on the drawings provided from other disciplines and equipment to be furnished. Field verify all dimensions prior to fabrication and installation of the required system. Notify Engineer of Record immediately if discrepancies are discovered.
- F. Discrepancies: Examine Drawings and Specifications for other parts of the Work, and if any discrepancies occur between the plans for the Work of this Division and the plans for the work of others, report such discrepancies to the DEN Project Manager and obtain written instructions for any changes necessary.
- G. Order of Precedence: The precedence of construction documents are as Specified in the General Conditions.

1.14 START-UP PROCEDURES

- A. Before start-up, each piece of equipment comprising a part of the system shall be checked for proper lubrication, drive rotation, belt tension, proper control sequence, and any other condition, which may cause damage to equipment or endanger personnel.
- B. Ensure that all control systems are fully operational in automatic mode.
- C. If systems are not to continue in use following the start-up procedures, steps should be taken to ensure against accidental operation or operation by unauthorized personnel.
- D. Factory personnel shall be notified as appropriate to start systems requiring their services.
- E. Notify the DEN Project Manager in writing a minimum of 72 hours prior to start-up of all major fire protection equipment and systems.
- F. Should there be any equipment found which had not been properly started up, it will be the responsibility of this Contractor to arrange for the appropriate personnel to start up the equipment at the Contractor's expense and at a time as scheduled by the DEN

Project Manager.

1.15 SCHEDULE OF TESTING

- A. Provide testing in accordance with the General Conditions of the Contract.
- B. A schedule of testing shall be drawn up by the Division 21 Contractor in such a manner that it will show areas tested, test pressure, length of test, date, time and signature of testing personnel.
- C. Notify the DEN Project Manager, DEN Inspector, and DEN Mechanical Engineer in writing a minimum of 72 hours prior to testing of any fire protection equipment and systems.
- D. All testing must be performed in the presence of the DEN Project Manager and or the DEN Project Manager's designated representative; DEN Project Manager's signature for verification of the test must appear on the schedule.
- E. All testing must be performed in accord with the procedures set forth in Division 21 and other Sections of the Specifications where referenced. At completion of testing, the schedule shall then be submitted in triplicate to the DEN Project Manager.
- F. Make all specified tests on piping, ductwork, and related systems as necessary.
- G. Make sure operational and performance tests are made on seasonal equipment.
- H. Complete all tests required by Code Authorities, such as health codes, building codes, and safety codes.
- I. After test runs have been completed and systems have been demonstrated to be satisfactory and ready for permanent operation, all permanent pipeline strainers and filters shall be cleaned, air filters cleaned or replaced, valve and pump packing properly adjusted, belt tensions adjusted, drive guards secured in place, lubrication checked and replenished if required.

1.16 CLEANING AND FINISHING

- A. Provide cleaning in accordance with the General Requirements of the Contract.
- B. Cleaning shall include but not be limited to removing grease, dirt, dust, stains, labels, fingerprints, and other foreign materials from sight-exposed piping, ductwork, equipment, fixtures and other such items installed under Division 21 of the Work. If finishes have been damaged, refinish to original condition and leave everything in proper working order and of intended appearance.

1.17 WARRANTIES

- A. Conform to Division 01: Provide a written warranty covering the entire fire protection

Work to be free from defective materials, equipment, and workmanship for a minimum period of two (2) years after date of acceptance. During this period, provide labor and materials as required to repair or provide labor and materials required to repair or replace defects. Provide certificates for such items of equipment, which have or are specified to have warranties in excess of one (1) year.

PART 2 - PRODUCTS

2.1 CATHODIC PROTECTION

- A. Provide joints and connections in compliance with cathodic protection requirements. Reference Section 260526 "Grounding and Bonding for Electrical Systems".

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Percent of work complete based on the approved schedule of values.

END OF SECTION 210400

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following basic fire protection materials and methods to complement other Division 21 Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Sleeves.
 - 5. Escutcheons.
 - 6. Nonshrink grout for equipment installations.
 - 7. Flowable backfill for underground piping.
 - 8. Field-fabricated metal equipment supports.
 - 9. Concrete bases
 - 10. Installation requirements common to equipment specification Sections.
 - 11. Fire protection demolition.
 - 12. Cutting and patching.
 - 13. Touch up painting and finishing.
 - 14. Pipe and pipe fitting materials are specified in piping system Sections.

1.3 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including General and the Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 050510 "Welding"
- C. Section 210553 "Identification for Fire-Suppression Piping and Equipment" for labeling and identifying plumbing systems and equipment.

1.4 DEFINITIONS

- A. Pipe, pipe fittings, and piping include tube, tube fittings, and tubing.
- B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- C. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- D. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- E. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- F. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.5 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 01 Specification Sections:
 - 1. Shop drawings detailing fabrication and installation for metal supports and anchorage for fire protection materials and equipment.
 - 2. Prepare coordination drawings according to Division 01 Section "Submittals" to a 1/4 inch equals 1 foot scale or larger. Detail major elements, components, and systems of fire protection equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Show where sequence and coordination of installations are important to the efficient flow of the Work. Include the following:
 - a. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
 - b. Pump metal support details.
 - 3. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the Quality Assurance Article.
 - 4. Floor x-rays and/or ground penetrating radar reports.
 - 5. "As Built" Plans shall be provided in the same format and manner as described above.
 - 6. Contractor shall submit fully dimensioned spool drawings for all welded piping work. Drawings shall indicate all weld types, sizes, and materials to be used. The spool drawing size shall match the full size contract documents of either 24 x 36 or 34 x 44. Spool drawings shall be submitted in either the latest version of Revit or the latest version of Adobe Acrobat (pdf). Adobe Acrobat files shall not contain

- security. Other file formats will not be accepted.
7. Field Test Reports: Written reports of each pressure tests specified in Division 21 Sections. Include the following:
- a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Failed test results and corrective action taken to achieve requirements.

1.6 QUALITY CONTROL

- A. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing by the DEN Project Manager and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.
- B. Unless specified otherwise, all materials and equipment shall be of domestic (USA) manufacture and shall be of the best quality used for the purpose in commercial practice.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.
- C. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- D. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate fire protection equipment installation with other building components.
- B. Coordinate the installation of required supporting devices.
- C. Sequence, coordinate, and integrate installations of fire protection materials and equipment for efficient flow of the Work.
- D. Coordinate connection of electrical services.
- E. Coordinate installation of identifying devices after completing covering and painting

where devices are applied to surfaces.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

- A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

- A. Refer to individual piping system specification Sections in Division 21 for special joining materials not listed below.
- B. Grooved Mechanical Couplings: Acceptable only for fire protection piping; not acceptable for any other applications.
- C. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, except where thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250 cast-iron and steel flanges.
- D. Brazing Filler Metals: AWS A5.8.
 - 1. BCuP Series: Copper-phosphorus alloys.
 - 2. BAg1: Silver alloy.
- E. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded. All welding rod is to be kept in an operable rod oven at all times.

2.3 MECHANICAL SLEEVE SEALS

- A. Reference Section 210517 "Sleeves and Sleeve Seals for Fire Suppression Piping" for sleeve seals.

2.4 SLEEVES

- A. Reference Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping" for sleeves.

2.5 ESCUTCHEONS

- A. Reference Section 210518 "Escutcheons for Fire-Suppression Piping" for escutcheons.

2.6 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory-packaged.

2.7 BACKFILL

- A. Flowable Backfill: Designed in accordance with ASTM C 94 and ASTM D 4832.
1. Refer to Section 033000 "Cast in Place Concrete" for material and installation requirements.
 2. Minimum Requirements:
 - a. Compressive Strength: 50-100 psi
 - b. Slump: 6-8 inches.
 3. Required for all piping installed below concrete slabs, apron paving and roadways.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 21 specify piping installation requirements unique to the piping system.
- B. Locations and Arrangements: Drawings indicate the location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.
- C. Install piping at indicated slope.
- D. Install piping free of sags and bends.

- E. Install piping plumb and at right angles and plumb or parallel to building walls. Diagonal runs are prohibited, except where indicated.
- F. Install piping tight to slabs, beams, joists, columns, walls, and other building elements.
- G. Install fittings for changes in direction and branch connections.
- H. Install couplings according to manufacturer's printed instructions.
- I. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping system Sections.
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, rust, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:
 - a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- J. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
 - 1. Install unions in piping 2 inches and smaller adjacent to each valve and at final connection to each piece of equipment having a 2-inch or smaller threaded pipe connection.
 - 2. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
- K. Piping below apron, concrete slabs or paving shall be encased in flowable backfill. Refer to Section 033000 "Cast in Place Concrete".

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide the maximum possible headroom where mounting heights are not indicated.

- B. Install equipment according to approved submittal data. Portions of the Work may be shown only in diagrammatic form. Refer conflicts to the DEN Project Manager for review.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.
- D. Install Fire Suppression equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- E. Install fire protection equipment giving right-of-way to piping systems installed at a required slope.

3.3 PAINTING AND FINISHING

- A. Refer to Division 09 Sections for field painting requirements. Paint color schedule shall conform to ASME A13.1-1996, "Scheme for the Identification of Piping Systems."
- B. Damage and Touch Up: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE PENETRATIONS

- A. Reference Section 017329 "Cutting and Patching" for core drilling and saw cutting requirements.
- B. Reference Section 024119 "Selective Demolition" for demolition and removal of selected portions of a building or structure, and repair procedures for selective demolition operations.
- C. All penetrations required through completed concrete construction shall be core drilled or saw cut at minimum size required. All penetrations in concrete require an x-ray or ground penetrating radar to determine if the location is clear of reinforcing steel and embedded systems. Precautions shall be taken when drilling to prevent damage to structural concrete.
 - 1. The Contractor shall provide an interpretation of the x-rays or radar shot and obtain written acceptance from the DEN Project Manager before proceeding with drilling.

3.5 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches

- larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03.

3.6 WELDING

- A. Qualify welding processes and operators for structural steel according to AWS D1.1 Structural Welding Code - Steel. See Division 05 for additional requirements.
- B. All welding shall be inspected in process by a contractor provided, Certified, Independent Testing Agency by an AWS certified welding inspector.
- C. Qualify welding processes and operators for piping according to ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications.
 1. Comply with provisions of ASME B31 Series "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Refer to Division 05 for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire protection materials and equipment.
- C. Field Welding: Comply with AWS D1.1 Structural Welding Code - Steel, as referenced in Part1.
- D. Double nut all suspended assemblies.

3.8 DEMOLITION

- A. Refer to Division 01 for general demolition requirements and procedures.
- B. Where pipe, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

- C. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.
- D. Disconnect, demolish, and remove fire protection systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping and associated supports indicated to be removed, provide a shutoff valve with plug or cap in pressurized systems and cap or plug remaining piping with same or compatible piping material. No piping shall be abandoned in place. Repair insulation.
 - 2. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 3. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.
 - 4. Repair structure floor, ceilings, roof, slabs from removed supports in accordance with Division 03, Division 05, and Division 09

3.9 GROUTING

- A. Mix and install grout for fire protection equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

TECHNICAL SPECIFICATIONS
21 - FIRE SUPPRESSION
210500
COMMON WORK RESULTS FOR FIRE SUPPRESSION

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCLATOR REPLACEMENT
CONTRACT NO.20205618

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Percent of work complete based on the approved schedule of values.

END OF SECTION 210500

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Include all sleeves, sleeve seals, fittings, and accessories to provide a complete seal system. If conflicts occur in this specification or between this specification and other contract documents, the most stringent requirement shall apply.
- B. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Grout.
- C. Related Sections
 - 1. Section 210500 "Common Work Results for Fire Suppression" for work results.
 - 2. Section 211313 "Wet Pipe Sprinkler Systems" for wet pipe sprinkler system work.
 - 3. Division 7 Sections for fire stopping, fire sealants, fire proofing for materials and methods for sealing pipe penetrations through walls and fire/smoke barriers.

1.3 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish pipe sleeves, complete with drawing(s) locating all sleeves and indicating sleeve size to Division 3, 4 or 9, contractors, or other contractors as required, for placement.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data substantiating that materials comply with requirements.

- B. Shop drawing(s) locating all sleeves and indicating sleeve size and type to Division 3, 4 or 9 contractors as required, or other contractors, for placement.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect sleeves and sleeve seals from moisture and dirt.

1.6 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, with plain ends.
- D. Galvanized-Steel Sheet: 0.0478-inch (18 gage) minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Smith, Jay R. Mfg. Co.
 2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
- B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with set screws.

2.3 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Metraflex Co.
 2. Pipeline Seal and Insulator, Inc.
 3. PSI-Thunderline/Link-Seal.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include once for each sealing element

2.4 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07 Section "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 GROUT INSTALLATION

- A. Install grout in strict compliance with manufacturer's instructions, industry standards, and all applicable codes and standards.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Cure placed grout.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6 Galvanized-steel-pipe sleeves
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6 Cast-iron wall sleeves with sleeve-seal system
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6 Cast-iron wall sleeves with sleeve-seal system
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6 Stack-sleeve fittings.

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- b. Piping NPS 6 Larger: Stack-sleeve fittings
5. Interior Partitions:
- a. Piping Smaller Than NPS 6 : Galvanized-steel-pipe sleeves
 - b. Piping NPS 6 Galvanized-steel-sheet sleeves

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Payment per contract terms based on an approved schedule of values.

END OF SECTION 210517

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data substantiating that materials comply with requirements.
- B. Samples: For each type requested by DEN Project Manager.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect escutcheons from moisture and dirt.

1.5 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With rough-brass finish and setscrew fastener.

- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- D. Split-Casting Brass Type: With rough-brass finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with rough-brass finish.
 - f. Bare Piping in Equipment Rooms: One-piece, cast-brass or split-casting brass type with rough-brass finish.
 - 2. Escutcheons for Existing Piping:
 - a. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
 - b. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
 - c. Bare Piping in Unfinished Service Spaces: Split-casting brass type with rough-brass finish.

- d. .
- e. Bare Piping in Equipment Rooms: Split-casting brass type with rough-brass finish.

- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Payment per contract terms based on an approved schedule of values.

END OF SECTION 210518

SECTION 210529 – HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Pipe and equipment hangers and supports.
2. Anchors, equipment bases and supports.
3. Firestopping.

- B. Related Sections:

1. Section 210500 "Common Work Results for Fire Suppression".
2. Section 210517 "Sleeves and Sleeve Seals for Fire Suppression Piping".
3. Section 211313 "Wet-Pipe Sprinkler Systems" for wet-pipe sprinkler piping.

1.3 REFERENCES

- A. Materials and workmanship shall conform to the latest issue of all industry standards, publications, or regulations referenced in this section and with the following references as applicable. Appendices and/or Annexes referenced by these standards shall apply.
- B. International Building Code (IBC) with the Denver Amendments.
- C. International Fire Code (IFC) with the Denver Amendments.
- D. National Fire Protection Association (NFPA):
1. NFPA 13 - Installation of Sprinkler Systems, 2016 Edition.
 2. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems
 3. NFPA 415 – Standard on Airport Terminal Buildings, Fueling Ramp drainage, and loading walkways, 2016 Edition.
 4. The most stringent interpretations shall apply. All appendices and/or Annexes shall apply.
- E. UL Fire Resistance Directory, latest edition.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 1. Include data substantiating that materials comply with requirements.
- A. Submit shop drawing of hanger and support spacing, framing and attachment methods.
 - 1. Supports not addressed by NFPA 13 or 14: Submit pipe support shop drawings bearing the wet stamp of a Licensed Colorado Professional Structural Engineer for approval. All welding and drilling of existing structural components must be reviewed and approved by the DEN Project Manager prior to proceeding.
- B. Submit firestopping systems for every application.

1.5 INFORMATIONAL SUBMITTALS

- A. Current Welders' qualification certificates and procedures. Reference Section 059990 "Welding".

1.6 QUALITY ASSURANCE

- A. Comply with Division 21 Section "Common Results for Fire Suppression."
- B. Supports for Sprinkler Piping: Comply with NFPA 13.
- C. Installation to conform to Denver Fire Department requirements.
- D. Equipment and Components: Bear UL, FM GLOBAL label or marking.
- E. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS B2.1, Specifications for Procedure and Performance Qualifications.

PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS

- A. General: Provide materials for hangers and supports or factory-fabricated products of sizes, types, load ratings, tensile strength and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide materials which match pipe materials used in fire protection systems.
- B. All equipment used on this project shall be new and UL Listed, unless noted or specified otherwise.

2.2 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products from one of the following:
1. Pipe Hangers and Supports:
 - a. B-Line Systems Inc.
 - b. Carpenter and Patterson, Inc.
 - c. Grinnell Corp.
 - d. PHD Manufacturing, Inc.
 - e. Elcen Metal Products Company
 - f. Michigan Hanger Company
 - g. Anvil International
 - h. Unistrut Metal Framing Systems
 - i. Hilti, Inc.
 2. Concrete Inserts and Anchors:
 - a. Phillips Drill Company
 - b. Michigan Hanger Company
 - c. Unistrut Metal Framing Systems
 - d. Elcen Metal Products Company
 - e. ITW Ramset/Red Head
 - f. Hilti, Inc.
 - g. Simpson Strong-Tie, Inc.

2.3 BASIC SUPPORTS AND ANCHORS

- A. General: Hangers, anchors and supports, including sway bracing to meet seismic requirements shall be provided per NFPA 13-2016 and NFPA 14-2016.
- B. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-58.
1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.
 2. Pipe attachments shall have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.
- C. Adjustable Clevis Hanger: MSS Type 1
1. Steel Pipe, size 3/8-inch thru 12-inch, Anvil Fig. 260
 2. Cast Iron Pipe, size 4-inch thru 24-inch, Anvil Fig. 590
- D. Adjustable Swivel Ring: MSS Type 10
1. Steel Pipe, size 1/2-inch thru 2-inch, Anvil Fig. 69; size 2-1/2 inch thru 8-inch, Anvil Figs. 69 or 70
- E. Pipe Clamps: MSS Type 8

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1. Steel Pipe, size 3/4-inch thru 20-inch, Anvil Fig. 261
- F. U Bolts: MSS Type 24
 1. Steel Pipe, size 1/2-inch thru 36-inch, Anvil Fig. 137
- G. Straps: MSS Type 26
 1. Steel Pipe, size 1/2-inch thru 4-inch, Anvil Fig. 262
- H. Pipe Stanchion Saddle: MSS Type 37
 1. Steel Pipe, size 4-inch thru 12-inch, Grinnell Fig. 259
- I. Yoke and Roller Hanger: MSS Type 43
 1. 2-1/2 inch thru 20-inch, Grinnell Fig. 181
- J. Hanger Rods: Continuous threaded steel, sizes as specified.
- K. Hangers:
 1. Supports for Horizontal Pipe:
 - a. 1/2-Inch thru 3-Inch: Adjustable wrought steel ring.
 - b. 4-Inch and Over: Adjustable wrought steel clevis.
 2. Multiple or Trapeze: Structural steel channel (with web vertical), with welded spacers and hanger rods. Provide cast iron roller and stand for hot pipe sizes 6-inch and over. Provide hanger rods one (1) size larger than for largest pipe in trapeze. If the deflection at center of trapeze exceeds 1/360 of the distance between the end hangers, install an additional hanger at mid-span or use a larger channel.
- L. Wall Supports for Horizontal Pipe:
 1. 1/2-Inch thru 3-Inch: Steel offset hook.
 2. 4-Inch and Over: Welded steel bracket and wrought steel clamp. Provide adjustable steel yoke and cast iron roll for sizes 6-inch and over.
- M. Supports for Vertical Pipe: Steel riser clamp.
- N. Upper Attachments:
 1. For attaching hanger rods to structural steel I-beams:
 - a. Provide adjustable beam clamp with set screw and locknut, B-Line B3033 or equal. Attach to top flange of beam.
 2. For attaching hanger rods to bar joists:
 - a. Provide adjustable beam clamp with set screw and locknut, B-Line B3033 or equal. Attach to top chord of bar joist.
- O. Miscellaneous Materials:
 1. Steel Plates, Shapes, and Bars: ASTM A 36.
 2. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix ratio shall be 1.0 part

cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

3. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS Standards.
4. Fasteners: All bolts and nuts, except as otherwise specified, shall conform to ASTM Standard Specifications for Low Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Bolts shall have heavy hexagon heads, and nuts shall be of the hexagon heavy series. All bolts, washers, nuts, anchor bolts, screws and other hardware used outdoors or inside the building shall be galvanized, and all galvanized nuts shall have a free running fit. Provide bolts of ample size and strength for the purpose intended. All ferrous metal components below grade shall be stainless steel.

P. Concrete Inserts and Anchors:

1. Cast in Place Internally Threaded Inserts: Case shall be of galvanized or stainless carbon steel with internally threaded concrete insert nut for hanger rod connection; nail holes for attaching to forms. Minimum thread engagement should be equal to the nominal diameter of the threaded insert. Hilti KWIK CAST KCM-MD or equal. This type of upper attachment may be used for all areas having poured in place concrete construction.
 - a. Size inserts to suit threaded hanger rods.
 - b. Provide long plate (LP) model for required installations in lower flute.
 - c. Provide long plate (LP) or short plate (SP) models for required installations in the upper flute.
2. Drop-In Internally Threaded Inserts: Case shall be of galvanized carbon steel or stainless steel, internally threaded body for hanger rod connection and expander plug. Minimum thread engagement should be equal to the nominal diameter of the threaded insert. Provide Simpson Strong-Tie Model DIABL37 for 3/8-inch rod, DIABL50 for 1/2-inch rod and Hilti model HDI for 5/8-inch rod or equal.
 - a. Size inserts to suit threaded hanger rods.
3. Anchors: Carbon steel, zinc plated. Installation shall be in holes drilled with carbide-tipped drill bits or by use of self-drilling anchors.
 - a. Provide anchors suitable for the location of installation and designed to withstand all forces and movements acting in the anchor. Manufacture pipe anchors in accordance with MSS SP 58. Provide a safety factor of four (4) for the anchor installation.
4. Provide fasteners attached to concrete ceilings that are vibration and shock resistant. Provide hangers for piping and cuts attached to concrete construction with one (1) of the following types.
 - a. Concrete insert per MSS SP 58, Type 18.
 - b. Self-drilling expansion shields. The load applied shall not exceed one-fourth the proof test load required.
 - c. Machine bolt expansion anchor. The load applied shall not exceed one-fourth the proof test load required.

2.4 FIREPROOFING OF FLOOR AND WALL PENETRATIONS

- A. Materials and installation shall comply with U.L. "Fire Resistance Directory", for Through-Penetration for Firestop Devices, latest edition.

2.5 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers for installation without disengagement of supported pipe.

2.6 FINISHES

- A. Prime-paint exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- B. Hot-dip galvanized outdoors.
- C. Repair damage to galvanizing at welds, scratches, etc. using Z.R.C. (no known equal) cold galvanizing compound.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

3.2 HANGERS AND SUPPORTS

- A. Concrete Structure: Locate anchors from any edge condition and at a spacing to obtain maximum working loads specified in the applicable ICC report.
 - 1. See structural drawings for additional restrictions for locating anchors.
- B. Submit for structural review all pipe hanger locations, point loads and structural attachment details for pipes 6 inches and larger that deviate from the location indicated on the drawings.
- C. Coordinate installation so that attachments to structure are made prior to fireproofing. If attachments must be made after fireproofing, then thoroughly clean area of fire proofing before welded or bolted attachments are made and replace fireproofing as necessary. Fireproofing material shall match existing.

- D. Where point loads, imposed by work of Division 21, are greater than can safely be carried by the roof or deck, provide structural steel spreader beams tied to the building structure. Submit details of all such spreader beams for approval.
- E. Support all pipe from the building structure so that there is no apparent deflection in pipe runs. Fit piping with steel sway braces and anchors to prevent vibration and/or horizontal displacement under load when required. Do not support from, or brace to, ducts, other pipes, conduit, or any materials except building structure. Piping or equipment shall be immobile and shall not be supported or hung by wire, rope, plumber's tape, plastic ties, or blocking of any kind. Vertical piping running between floors shall be additionally supported at mid points in a rigid and immobile fashion. Any exposed or concealed piping which can be physically moved, and which is not properly supported will not be accepted, and additional support or bracing will be required. Install seismic bracing as at locations as specified in the contract drawings.
- F. Installation of Building Attachments:
1. Install building attachments within concrete or on structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.
 2. New Construction:
 - a. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.
 - b. Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying pipe over 4-inch or ducts over 60-inch wide.
 - c. Where concrete slabs form finished ceiling, finish inserts flush with slab surface.
 - d. Where inserts are omitted, drill through concrete slab from below and provide rod with recessed square steel plate and nut above slab, if construction above permits.
 3. Existing Construction:
 - a. In existing concrete construction, drill into concrete slab and insert and tighten expansion anchor bolt. Connect anchor bolt to hanger rod. Care must be taken in existing concrete construction not to sever reinforcement rods or tension wires.
- G. Installation of Hangers And Supports:
1. Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69, SP-89, NFPA – 13 and NFPA -14. Arrange for grouping of parallel runs of horizontal piping to be supported together on field fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacings complying with NFPA - 13. Where piping of various pipe sizes is supported together by trapeze hangers, space hangers for smallest pipe size or

- install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
2. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.
 3. Support fire-water piping independently from other piping systems.
 4. Install hangers straight and true and piping parallel to building lines.
 5. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
 6. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31.9 Building Services Piping Code is not exceeded.
 7. Support vertical runs at each floor.
 8. Place a hanger within 1-foot of each horizontal elbow.
 9. Use hangers, which are vertically adjustable 1-1/2 inch minimum after piping is erected.
 10. Support vertical steel and copper piping at every story height but at not more than 15-foot intervals for steel and 10-feet for copper.
 11. Where several pipes can be installed in parallel and at same elevation, provide trapeze hangers.
 12. Where practical, support riser piping independently of connected horizontal piping.
 13. Install anchors and fasteners in accordance with manufacturer's recommendations and the following:
 - a. In the event a self-drilling expansion shield or machine bolt expansion shield is considered to have been installed improperly, the Contractor shall make an acceptable replacement or demonstrate the stability of the anchor by performing an on-site test under which the anchor will be subjected to a load equal to twice the actual load.
 - b. Powder-driven fasteners may be used only where they will be concealed after the construction is complete. Where an occasional fastener appears to be improperly installed, additional fastener(s) shall be driven nearby (not closer than six (6) inches) in undisturbed concrete. Where it is considered that many fasteners are improperly installed, the Contractor shall test load any fifty (50) successively driven fasteners. If 10 percent or more of these fasteners fail, the Contractor shall utilize other fastening means as approved and at no additional cost to the Owner.
 - c. Hangers for piping shall be attached to cellular steel floor decks with steel plates and bolted rod conforming to the steel deck manufacturer's requirements. Where the individual hanger load exceeds the capacity of a single floor deck attachment, steel angles, beams or channels shall be provided to span the number of floor deck attachments required.
 - d. Welding may be used for securing hangers to steel structural members. Welded attachments shall be designed so that the fiber stress at any point of the weld or attachment will not exceed the fiber stress in the hanger rod.

H. Installation of Anchors:

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1. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31.9, and to prevent transfer of loading and stresses to connected equipment.
2. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31.9 and with AWS Standards D1.1.
3. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Percent of work complete based on the approved schedule of values.

END OF SECTION 210529

SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Stencils.
 - 5. Valve tags.
 - 6. Warning tags.

1.3 REFERENCES

- A. Materials and workmanship shall conform to the latest issue of all industry standards, publications, or regulations referenced in this section and with the following references as applicable. Refer to Section 014225 "Referenced Standards" for listing of issuing organizations or agencies.
- B. Applicable Standards:
 - 1. American Society of Mechanical Engineers (ASME).
 - 2. ASME A13.1 - Scheme for the Identification of Piping Systems.
 - 3. International Building Code (IBC) with the Denver Amendments.
 - 4. International Fire Code (IFC) with the Denver Amendments.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Provide manufacturers catalog literature for each product required.
 - 1. Include data substantiating that materials comply with requirements.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.

- C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.
 - 1. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- D. Valve Schedules: Valve numbering scheme.
 - 1. Include valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each piping system to include in maintenance manuals.
- B. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".
 - 1. Record actual locations of all tagged valves.

1.6 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

1.7 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 SIGNAGE AND LABELING - GENERAL

- A. Signage shall be per the requirements of NFPA - 13, FM Global, and any applicable Insurance underwriter.
- B. Signs shall be pre-manufactured metal, approximately 2" x 6", located at all valves,

main drains, auxiliary drains, air, alarm, and similar devices.

2.2 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. W.H. Brady Co.
 2. Panduit Corp.
 3. Seton Name Plate Corp.
 4. Marking Services, Inc.

2.3 MATERIALS

- A. Color: Unless specified otherwise, conform to ASME A13.1.
- B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- C. Metal Tags: Brass or aluminum, with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Chart: Typewritten letter size list in anodized aluminum frame.
- E. Stencils: With clean cut symbols and letters of 2-1/2 inch size.
- F. Stencil Paint: In accordance with Section 099123 "Interior Painting, semi-gloss enamel.
- G. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed.
- H. Underground Plastic Pipe Markers:
1. Bright colored continuously printed plastic ribbon tape of not less than 6 inch wide by 4 mil thick, manufactured for direct burial service.
 2. For non-metallic buried piping provide printed foil type tape, enabling locating of runs by use of a metal detector.

2.4 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; pipe size; and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.
- E. Pipe-Label Colors:
 - 1. Background Color: Red.
 - 2. Letter Color: White.

2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, thick, with predrilled holes for attachment hardware.
 - 2. Fasteners: Brass beaded chain.
 - 3. Valve-Tag Color: Red.
 - 4. Letter Color: White.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: Approximately 4 by 7 inches .
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.
- B. Prepare surfaces in accordance with Division 09 sections for stencil painting.

3.2 LABEL INSTALLATION

- A. Every drain and control valve shall be permanently labeled with the DEN designated system I.D. number and a consecutive number indicating quantity of drains on the system, i.e. T-4-43 / 3 of 7 in the terminal or FZ – 03 / 2 of 2 .
- B. Hydraulic plaques shall be provided at all risers with the appropriate information.
- C. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- D. Coordinate installation of identifying devices with locations of access panels and doors.
- E. Install or permanently fasten labels on each major item of mechanical equipment.
- F. Locate equipment labels where accessible and visible.
- G. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting."
- H. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Near each valve and control device.
 - 3. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
 - 4. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 5. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 6. Near major equipment items and other points of origination and termination.
 - 7. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 8. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- I. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners and

adhesive.

- J. Metal Tags: Install with corrosive-resistant chain.
- K. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.
- L. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade or paving, directly above buried pipe.
- M. Controls: Identify control panels and major control components outside panels with plastic nameplates. Key to control schematics.

3.3 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems. List tagged valves in a valve-tag schedule.
- B. Valves Identification:
 - 1. Identify all valves, including fire protection valves, in main and branch piping located inside the building. Use tags secured with brass 'S' hooks or brass chains.
 - 2. Stamp tags with a unique prefix to identify system to which applied, followed by a number (Example: CW-1, CW-2, etc.). In general, prefix shall match system abbreviations used on drawings where applicable.
 - 3. Provide a typewritten listing of valves including: valve identification number, location, function, normal position, service, and area served. Mount list as specified and directed. Include additional copy in operation and maintenance manuals.
 - 4. Show valve tag designations on the project record document drawings, including schematic flow diagrams where included with construction documents.
- C. Piping: Identify piping, concealed or exposed, with plastic pipe markers. Tags may be used on 1/2" or smaller diameter non-insulated piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.
- D. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:
 - 1. Valve-Tag Size and Shape:
 - a. Fire-Suppression Standpipe: 1-1/2 inches round.
 - b. Wet-Pipe Sprinkler System: 1-1/2 inches round.
 - c. Dry-Pipe Sprinkler System: 1-1/2 inches round.

- 2. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed by DEN Project Manager.

3.4 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

3.5 PIPING IDENTIFICATION SCHEDULE

- A. Pipe identification and color coding for fire-suppression piping systems shall be in accordance with the following schedule:

| Classification: | Band Color: | Stenciled Legend: |
|---------------------------|--------------------|--------------------------|
| Fire Protection Piping | Red | Fire Line |
| Fire Sprinkler Piping | Red | Fire Sprinkler. Line |
| Fire Hose Cabinets: | | |
| Outside Trim/Hose Bracket | Red Enamel | |
| Interior | White Enamel | |

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Percent of work complete based on the approved schedule of values.

END OF SECTION 210553

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Sprinklers.
4. Alarm devices.
5. Manual control stations.
6. Control panels.
7. Pressure gages.

B. Related Sections:

1. Section 210500 "Common Work Results for Fire Suppression".
2. Section 210517 "Sleeves and Sleeve Seals for Fire Suppression Piping".
3. Section 210518 "Escutcheons for Fire Suppression Piping".
4. Section 210529 "Hangers & Supports for Fire Suppression Piping and Equipment".
5. Section 210553 "Identification for Fire Suppression Piping and Equipment".
6. .

C. Work furnished under other Sections:

1. Furnish pipe sleeves, complete with drawing(s) locating all sleeves and indicating sleeve size to Divisions 03, 04 or 09 contractors for placement.
2. Fireproofing repair.
3. Fire sealants.
4. Painting.

- D. Include fabrication and installation of all wet-pipe fire protection systems in association with fire pump installation, dry-pipe sprinkler installation, and all fire and smoke alarm interface in accordance with approved hydraulic calculations and shop drawings prepared by Killebrew | Killebrew, Inc. and submitted by the Fire Protection Work Contractor (FPWC) and fire/smoke zoning requirements indicated on drawings. The FPWC shall provide all special tools required for installation or maintenance for the equipment provided. If conflicts occur in this specification or between this specification

and the contract documents, the most stringent requirement shall apply.

- E. Work on all systems require DEN Shut Down Requests be completed and filed five (5) days before work is to be done. Work on wet systems must be done during off hour periods, 10:00 p.m. to 6:00 a.m. Sunday night through Friday morning. No system may be shut down for periods longer than ten (10) hours. The Fire Sprinkler Contractor is responsible for the required fire watch and must remain ON SITE for the entire period of time that the system is not in service. Failure to comply may be reason for immediate suspension of work privileges.

1.3 REFERENCE STANDARDS

- A. Materials and workmanship shall conform to the latest issue of all industry standards, publications, or regulations referenced in this section and with the following references as applicable. Appendices and/or Annexes referenced by these standards shall apply.
- B. International Building Code (IBC) with the Denver Amendments.
- C. International Fire Code (IFC) with the Denver Amendments.
- D. National Fire Protection Association (NFPA):
1. NFPA 13 - Installation of Sprinkler Systems.
 2. NFPA 415 – Standard on Airport Terminal Buildings, Fueling Ramp drainage, and loading walkways.
 3. The most stringent interpretations shall apply. All appendices and/or Annexes shall apply.

1.4 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.
- B. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig , but not higher than 250 psig.
- C. Pipe sizes used in this specification are Nominal Pipe Size (NPS).
- D. Working plans as used in this Section refer to documents, including drawings and calculations, prepared pursuant to requirements in NFPA 13 and City and County of Denver Code agencies for obtaining approval of authority having jurisdiction.
- E. Other definitions for fire protection systems are included in referenced NFPA standards.

1.5 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.6 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. High-Pressure Piping System Component: Listed for 250-psig (1725-kPa) minimum working pressure.
- C. Obtain approval from authority having jurisdiction for fire protection systems specified.
- D. Minimum Pipe Sizes: Not smaller than existing pipe sizes of sprinklers being relocated.
- E. Sprinkler system zone shall not serve multiple smoke control zones. Verify that the no conflict exists between the design drawings and this requirement.
- F. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13.

1.7 REGULATORY REQUIREMENTS

- A. Comply with NFPA 13 - Standard for the Installation of Sprinkler Systems, latest edition.
- B. Comply with NFPA 72 - Installation, Maintenance, and Use of Protective Signaling Systems.
- C. Comply with City and County of Denver Code Agency requirements.
- D. UL and FM Global Compliance: Fire protection system materials and components shall be UL listed and labeled, and FM Global approved.
- E. Hydraulic Calculations, Product Data, Shop Drawings, Dry Pipe System Equipment, and Low Air Switch, Air Maintenance Device: Bear stamp of approval of Designer of Record, DEN Life Safety Team and Owner's Representative and Denver Fire Department.
- F. All applicable insurance authorities underwriting requirements.

1.8 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 1. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Killebrew | Killebrew, Inc. (KKI) is the Engineer of Record for the Fire Protection systems specified for this project. The Contractor shall work with KKI to make any required changes to the bid documents for constructability only. The Contractor will then submit the KKI prepared drawings for permit.
 - 2. Contractor shall indicate pipe materials used, joint methods, supports, floor, and wall penetration seals. Indicate installation, layout, weights, mounting and support details and piping connections.
- C. Obtain DEN Life Safety Team review and stamp prior to submittal for permit.
- D. Submit working plans and product data to Denver Fire Department for approval. Subject to approval, submit copy of approved submittal and permit to the DEN Project Manager.
- E. Submit additional non-returnable copies of current permits and agency approved working plan drawings with System Interruption Request.
- F. Contractor shall submit fully dimensioned spool drawings for all welded piping work. Drawings shall indicate all weld types, sizes, and materials to be used. The spool drawing size shall match the full size contract documents of either 24x36 or 34x44. Spool drawings shall be submitted in either the latest version of Revit or the latest version of Adobe Acrobat (pdf). Adobe Acrobat files shall not contain security. Other file formats will not be accepted.
- G. Supports not addressed by NFPA 13 or 14: Submit pipe support shop drawings bearing the wet stamp of a Licensed Colorado Professional Structural Engineer for approval. All welding and drilling of existing structural components must be reviewed and approved by the DEN Project Manager prior to proceeding.

1.9 INFORMATIONAL SUBMITTALS

- A. Subject to approval, submit copy of permit and submittal approved by Denver Fire Department to the DEN Project Manager.
- B. Current Welders' qualification certificates and procedures. Reference Section 059990 "Welding".
- C. Test reports and certificates including "Contractor's Material and Test Certificate for Aboveground Piping" as described in NFPA 13.

- D. Qualification Data: For qualified Installer.
- E. Installer's Qualifications: Firms qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. A qualified firm is one that is experienced in such work, with minimum of five (5) previous projects similar in size and scope to this Project, is familiar with precautions required, and in compliance with the requirements of the authority having jurisdiction. The firm shall be in possession of City and County of Denver Fire Protection License Class A or B. Refer to Division 01 Section Reference Standards and Definitions for definition of Installer.
1. The qualified installer shall be licensed for the installation for the specific type of system in the City and County of Denver and the State of Colorado and have been in business under the current name for five (5) years.
 2. All field personnel must be a current holder of the City & County of Denver Fire Department Fire Protection Installers license.
- F. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years' documented experience.
- G. Welding certificates.
- H. Copy of City and County of Denver Fire Protection Contractors License, and Fire protection Supervisor's certificate for class of equipment being installed.
- I. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- J. Field quality-control reports.

1.10 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.
1. Maintenance data for each type sprinkler head, valve, piping specialty, fire protection specialty, fire department valve, and hose cabinet specified, for inclusion in operating and maintenance manual specified in Division 01.
 - a. Include written maintenance data on components of system, servicing requirements, and Record Drawings.
 - b. Include pump operation, maintenance, and inspection data, replacement part numbers and availability, and location and telephone numbers and website of service depot.
- B. Test reports and certificates including "Contractor's Material and Test Certificate for Aboveground Piping" as described in NFPA 13.

- C. All sprinkler system record drawings shall be submitted in the form of hard copies and electronic format in compliance with DEN requirements.

1.11 MAINTENANCE MATERIAL SUBMITTALS

- A. None required.

1.12 QUALITY ASSURANCE

A. Installer Qualifications:

1. Firms qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. A qualified firm is one that is experienced in such work, with minimum of 5 previous projects similar in size and scope to this Project, familiar with precautions required, and in compliance with the requirements of the authority having jurisdiction. The firm shall be in possession of City and County of Denver Fire Protection License Class A or B. Refer to Division 01 Section Reference Standards and Definitions for definition of Installer.
2. The qualified installer shall be licensed for the design and installation for the specific type of system in the City and County of Denver and the State of Colorado and have been in business under the current name for five (5) years.
3. All field personnel must be a current holder of the City & County of Denver Fire Department Fire Protection Installers license.
4. Submit evidence of such qualifications to the DEN Project Manager.

- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."
2. NFPA 20, "Standard for the Installation of Stationary Pumps for Fire Protection."
3. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."
4. NFPA 415, "Standard on Airport Terminal Buildings, Fueling Ramp Drainage and Loading Walkways."

- E. Installation to conform to Denver Fire Department requirements.

- F. Equipment and Components: Bear UL, FM GLOBAL label or marking.

- G. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS B2.1, Specifications for Procedure and Performance Qualifications.
- H. Obtain DEN Life Safety Team review and stamp prior to submittal for permit.
- I. Fire Proofing: Where hangers require removal of fire proofing, remove minimum amount of fire proofing for hanger attachment. Repair fireproofing per requirements specified in Section 078100 "Applied Fireproofing".
- J. Comply with all requirements of Owner's Insurance Underwriter.

1.13 PROJECT CONDITIONS, SEQUENCE AND SCHEDULING

- A. Comply with DEN Maintenance and Engineering system interruption requirements and provide Denver Fire Department approved Fire Watch during entire time of system interruption.
- B. In no case shall the building structure remain without fire protection for more than ten (10) hours.
- C. Prior to system shut down, Contractor shall certify all equipment and materials are on site for removing, capping, valving, tagging, and reconnection of system.
- D. Schedule rough-in installations with installations of other building components.
- E. Conform to NFPA 13 for sprinkler systems.

1.14 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.15 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store pumps in shipping containers with labeling in place under provisions of Division 01.
- B. Provide temporary inlet and outlet caps to be used throughout system construction until systems are in service.
- C. Maintain caps in place until installation.

1.16 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Equipment and components: Bear UL or FM Global label or marking where required.

2.2 STEEL PIPE AND FITTINGS

- A. Threadable lightwall, black and galvanized, for threaded joints is not allowed.
- B. See piping specifications on drawings for requirements.
- C. See threaded fitting specifications on drawings for requirements.
- D. See grooved fitting specifications on drawings for requirements.
- E. Threads for threaded fittings and joints shall conform to ANSI B1.20.1.
- F. Deluge and exterior dry systems connections must have galvanized fittings
- G. Cast Iron Threaded Flanges: ANSI B16.1, Class 125 or 250 as required. Raised face flanges shall be mated with raised face, and flat face flanges shall be mated with flat face only.
- H. Use of Hooker style fittings and/or any similar rubber gasketed, drill to mount, 2" and smaller clamp on tees will NOT be permitted.
- I. Use of threaded thin wall pipe. Pressfit fittings or similar non-threaded connections of any kind will NOT be permitted.
- J. "EZ-T's" are NOT permitted.
- K. Unions: 150 to 300 psi as required malleable iron for threaded ferrous piping.
- L. Welding Materials: Field welding shall not be permitted; perform only shop welding. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded. Welded outlets are permitted as long as the welding is done in compliance with NFPA welding requirements and welding requirements of these specifications.
- M. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: [ASME B16.21, nonmetallic and asbestos free.
1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
 2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Materials: Field welding shall not be permitted. Perform only shop welding. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded. Welded outlets are permitted as long as the welding is done in compliance with NFPA welding requirements and Section 059990 "Welding".
- D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- E. Gasket Materials: Thickness, material, and type suitable for fluid or gas to be handled, and design temperatures and pressures.
- F. Threaded Joint Compound or "Teflon" tape.

2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
1. Valves shall be UL listed or FM approved.
 2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.
 3. Minimum Pressure Rating for High-Pressure Piping: 250 psig.
- B. Ball Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Victaulic Company.
 2. Standard: UL 1091 except with ball instead of disc.
 3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
 4. Valves NPS 2 and NPS 2-1/2 : Bronze body with threaded ends or ductile-iron body with grooved ends.
 5. Valves NPS 3 : Ductile-iron body with grooved ends.
- C. Butterfly and grooved end control valves

1. Per NFPA 13: UL listed and FM Global approved butterfly control valves for use with tamper switches, flanged or grooved connections. Carbon steel body, 150 lb full ANSI rated bi directional, 316 SS electro-deposit nickel plated eccentric rotating disc, dynamic sealed, TFE seal ring, 17 4 PH stainless steel shaft, teflon chevron stem packing, 316 SS graphite impregnated bearings, and gear operator. Provide Supervisory switches.
2. Per NFPA-13 UL-Listed and FM Global approved grooved end control valves for use as zone control and/or sectional valves may be used with appropriate pressure ratings for intended service.
3. Supervisory switches are required on all control valves.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFAC Inc.
 - b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - c. Anvil International, Inc.
 - d. Clow Valve Company; a division of McWane, Inc.
 - e. Crane Co.; Crane Valve Group; Crane Valves.
 - f. Crane Co.; Crane Valve Group; Jenkins Valves.
 - g. Crane Co.; Crane Valve Group; Stockham Division.
 - h. Fire-End & Croker Corporation.
 - i. Fire Protection Products, Inc.
 - j. Fivalco Inc.
 - k. Globe Fire Sprinkler Corporation.
 - l. Groeniger & Company.
 - m. Kennedy Valve; a division of McWane, Inc.
 - n. Matco-Norca.
 - o. Metraflex, Inc.
 - p. Milwaukee Valve Company.
 - q. Mueller Co.; Water Products Division.
 - r. NIBCO INC.
 - s. Potter Roemer.
 - t. Reliable Automatic Sprinkler Co., Inc.
 - u. Shurjoint Piping Products.
 - v. Tyco Fire & Building Products LP.
 - w. United Brass Works, Inc.
 - x. Venus Fire Protection Ltd.
 - y. Victaulic Company.
 - z. Viking Corporation.
 - aa. Watts Water Technologies, Inc.
2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum.
4. Type: Swing check.
5. Body Material: Cast iron, bronze trim, swing disc, renewable disc, and seat.
 - a. Iron body, bronze trim spring loaded, renewable composition disc, where

indicated on drawings.

6. End Connections: Flanged or grooved.

E. Indicating-Type Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Anvil International, Inc.
- b. Fivalco Inc.
- c. Global Safety Products, Inc.
- d. Kennedy Valve; a division of McWane, Inc.
- e. Milwaukee Valve Company.
- f. NIBCO INC.
- g. Shurjoint Piping Products.
- h. Tyco Fire & Building Products LP.
- i. Victaulic Company.

2. Standard: UL 1091.
3. Pressure Rating: 175 psig minimum.
4. Valves NPS 2 and Smaller:

- a. Valve Type: Ball or butterfly.
- b. Body Material: Bronze.
- c. End Connections: Threaded.

5. Valves NPS 2-1/2 and Larger:

- a. Valve Type: Butterfly.
- b. Body Material: Cast or ductile iron.
- c. End Connections: Flanged, grooved, or wafer.

6. Valve Operation: Integral electrical, 115-V ac, prewired, two-circuit, supervisory switchvisual indicating device.

F. OS&Y Gate Valves:

1. Gate Valves, 2- Inch and Smaller: Body and bonnet of cast bronze, 175 pound cold water working pressure, nonshock, threaded ends, solid wedge, outside screw and yoke, rising stem, screw-in bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open. Provide Supervisory switches.
2. Gate Valves, 2-1/2 inch and larger: Iron body, bronze mounted, 175 pound cold water working pressure, nonshock. Valves shall have solid taper wedge, outside screw and yoke, rising stem, flanged bonnet, with body and bonnet conforming to ASTM A 126, Class B; replaceable bronze wedge facing rings, flanged ends, and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing. Valves shall be capable of being repacked under pressure, with valve wide open. Provide Supervisory switches.

3. Iron body, bronze trim, rising stem, OS&Y, solid wedge.
4. Supervisory switches are required.

5. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Stockham Division.
 - e. Kennedy Valve; a division of McWane, Inc.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Tyco Fire & Building Products LP.

G. NRS Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Stockham Division.
 - e. Kennedy Valve; a division of McWane, Inc.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Tyco Fire & Building Products LP.

2. Standard: UL 262.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Cast iron with indicator post flange.
5. Stem: Nonrising.
6. End Connections: Flanged or grooved.

H. Indicator Posts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Stockham Division.
 - e. Kennedy Valve; a division of McWane, Inc.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Tyco Fire & Building Products LP.

2. Standard: UL 789.

3. Type: Horizontal for wall mounting.
4. Body Material: Cast iron with extension rod and locking device.
5. Operation: Hand wheel.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig (1200 kPa) minimum.

B. Angle Valves:

1. Brass body with renewable composition disc.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.

C. Ball Valves:

1. Valves up to 2 Inches: Bronze, two piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, threaded ends.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Affiliated Distributors.
 - b. Anvil International, Inc.
 - c. Barnett.
 - d. Conbraco Industries, Inc.; Apollo Valves.
 - e. Fire-End & Croker Corporation.
 - f. Fire Protection Products, Inc.
 - g. Flowserve.
 - h. FNW.
 - i. Jomar International, Ltd.
 - j. Kennedy Valve; a division of McWane, Inc.
 - k. Kitz Corporation.
 - l. Legend Valve.
 - m. Metso Automation USA Inc.
 - n. Milwaukee Valve Company.
 - o. NIBCO INC.
 - p. Potter Roemer.
 - q. Red-White Valve Corporation.
 - r. Southern Manufacturing Group.
 - s. Stewart, M. A. and Sons Ltd.

- t. Tyco Fire & Building Products LP.
- u. Victaulic Company.
- v. Watts Water Technologies, Inc.

D. Globe Valves:

- 1. Brass body with renewable composition disc.
- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.

E. Plug Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Southern Manufacturing Group.

2.6 SPECIALTY VALVES

A. General Requirements:

- 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
 - b. High-Pressure Piping Specialty Valves: 250 psig minimum.
- 3. Body Material: Cast or ductile iron.
- 4. Size: Same as connected piping.
- 5. End Connections: Flanged or grooved.

B. Automatic (Ball Drip) Drain Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFAC Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
- 2. Standard: UL 1726.
- 3. Pressure Rating: 175 psig minimum.
- 4. Type: Automatic draining, ball check.
- 5. Size: NPS 3/4.
- 6. End Connections: Threaded.

2.7 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Shurjoint Piping Products.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-T and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elkhart Brass Mfg. Company, Inc.
 - b. Fire-End & Croker Corporation.

- c. Potter Roemer.
 - 2. Standard: UL 199.
 - 3. Pressure Rating: 175 psig.
 - 4. Body Material: Brass.
 - 5. Size: Same as connected piping.
 - 6. Inlet: Threaded.
 - 7. Drain Outlet: Threaded and capped.
 - 8. Branch Outlet: Threaded, for sprinkler.

- D. Sprinkler Inspector's Test Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc.
 - b. Triple R Specialty.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.

 - 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 3. Pressure Rating: 175 psig minimum.
 - 4. Body Material: Cast- or ductile-iron housing with sight glass.
 - 5. Size: Same as connected piping.
 - 6. Inlet and Outlet: Threaded.

2.8 SPRINKLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Reliable Automatic Sprinkler Co., Inc.
 - 2. Tyco Fire & Building Products LP.
 - 3. Viking Corporation.

- B. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
 - 3. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig (1725 kPa) minimum.

- C. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Nonresidential Applications: UL 199.

- D. Sprinkler Finishes:

1. Chrome plated.
2. Bronze.
3. Painted.

E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

F. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by the identical manufacturer as the fire sprinkler requiring the guard.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.9 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Potter Electric Signal Company.
 - b. System Sensor; a Honeywell company.
 - c. Viking Corporation.
 - d. Watts Industries (Canada) Inc.
2. Vane type waterflow detector, rated to 250 psig: Designed for vertical or horizontal installation; having two (2), spdt circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125 Vac and 0.25 ampere, 24 Vdc; complete with factory-set, field-adjustable tamperproof cover.
 - a. Retard feature must be of the instantly recycling type so that flows less than retard period will not produce a cumulative effect.
 - b. Flow switch shall not be installed in a fitting or within 12 inches of any fitting that changes the direction of water flow.
 - c. Design detector with a sensitivity setting to signal any flow of water that equals or exceeds the discharge from one sprinkler head.
 - d. Provide weatherproof and dust tight flow detector.
 - e. Provide a 3/4 inch conduit entrance per detector.
 - f. Standard: UL 346.

C. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

D. Indicator-Post Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Potter Electric Signal Company.
 - b. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled indicator-post valve is in other than fully open position.

2.10 PRESSURE GAGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AMETEK; U.S. Gauge Division.
 2. Ashcroft, Inc.
 3. Brecco Corporation.
 4. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gage Range: 0 to 250 psig minimum 0 to 300 psig .
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gage: Include "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends to full inside diameter.
- B. Remove burrs, and bevel plain end ferrous pipe.
- C. Remove scale and foreign material, inside and outside, before assembly.

3.2 WATER-SUPPLY CONNECTIONS

- A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping."
- B. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.3 PIPE APPLICATIONS

- A. See Drawing General Notes for required piping applications not listed in this section.
- B. Use of threaded Hooker fittings and similar rubber gasketed, drill to mount, 2" and smaller clamp on tees will not be permitted.
- C. Use of threaded thin wall pipe: Pressfit fittings or similar non-threaded connections of any kind will NOT be permitted.

3.4 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with DEN Project Manager before deviating from approved working plans.
 - 2. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
 - 3. Install piping to conserve building space, to not interfere with use of space and other work.
 - 4. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Cleaning:

1. Thoroughly pre-clean internal surfaces of piping sections to be installed; install piping in accordance with NFPA 13.
2. Prepare pipe, fittings, supports, and accessories for finish painting.
3. All work in existing areas shall require daily cleaning, including cleaning and removal of any foreign materials. Final cleaning will require all dust to be recovered and removed.

D. Penetrations:

1. Do not penetrate building structural members unless indicated. Penetration of structural members requires structural engineer review and approval.
2. X-ray: Provide X-ray of structural walls and floors prior to attempting drilling or saw cutting to guarantee structural or electrical members are not interrupted by process. Comply with DEN Standard X-ray procedures.

E. Seals and sleeves:

1. Provide sleeves when penetrating footings, floors, partitions, and walls.
2. Seal pipe and sleeve penetration to achieve fire resistance equivalent to fire separation required.
3. Install mechanical sleeve seal at pipe penetrations in basement and foundation walls. Refer to Section 210517 "Sleeves and Sleeve Seals for Fire Suppression Piping".
4. In steel piping, main sized saddle branch connections or direct connection of branch lines to mains is permitted if main is one pipe size larger than the branch for up to 6 inch mains and if main is two pipe sizes larger than branch for 8 inch and larger mains. Do not project branch pipes inside the main pipe.
5. Install sprinkler piping to provide for system drainage in accordance with NFPA 13. Drainage shall be coordinated with locations of floor drains having capacity to receive flow.
6. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
7. Install unions in pipes 2 inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.
8. Install flanges or flange adapters on valves, apparatus, and equipment having a 2-1/2 inch and larger connections.
9. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drainpipes. Victaulic "Test Master" or Engineer approved equal may be used in lieu of test and drainpipe and fittings. Test and drain discharge pipe shall have hose thread connection or discharge as indicated.
10. Install pressure gauge on the riser or feed main at or near each test connection. Provide gauge with a connection not less than 1/4 inch and having a soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and where they will not be subject to freezing.

F. Pipe hangers and supports:

1. Reference Section 210529 "Hangers & Supports for Fire Suppression Piping and Equipment".
 2. Comply with the requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with NFPA 13 and the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Indicate all hangers on shop drawings.
 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 4. Place hangers per NFPA 13.
 5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 6. Modifications or additions to system: Provide new independent supports from existing building structural components or walls suitable for the support of the added or modified sprinkler piping system.
 7. Added sprinkler piping supports shall not be attached to any part of the existing equipment or its support members.
 8. Install new piping, hangers, supports, etc. to avoid interference with existing building systems and operational characteristics of material handling systems.
 9. Supports not addressed by NFPA 13: Submit pipe support shop drawings bearing the wet stamp of a Licensed Colorado Professional Structural engineer for approval. All welding and drilling of existing structural components must be reviewed and approved by the DEN Project Manager prior to proceeding.
 10. Support all horizontal piping within 1'0" of end.
- G. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
- H. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- I. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- J. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- K. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- L. Install sprinkler piping with drains for complete system drainage.
- M. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- N. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- O. Install alarm devices in piping systems.

- P. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- Q. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- R. Fill sprinkler system piping with water.
- S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.5 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Criteria:
 - 1. Up to and including 2-inch diameter: Screw joint and grooved joint steel piping.
 - 2. 2-1/2 inch diameter and larger: Welded joints (only shop welds), screw joints, or grooved joints.
- C. Welded Joints: AWS D10.9, Level AR-3, and Section 050510 "Welding".
- D. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:
 - 1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - 2. Below grade joints: Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other nontoxic joint compound applied to male threads only.
 - 3. Apply appropriate tape or thread compound to the external pipe threads.
 - 4. Assemble joint to appropriate thread depth. When using a wrench on valves, place the wrench on the valve end into which the pipe is being threaded.
 - 5. Damaged Threads: Do not use pipe with threads that are corroded or damaged.

If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

- E. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.
- F. Mechanical Grooved Joints: Mechanical grooved joints may be used instead of threaded or welded joints at accessible aboveground locations. Cut grooves on pipe ends dimensionally compatible with the couplings.
- G. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.
- H. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

3.6 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install valves with stems upright or horizontal, not inverted.
- C. Provide gate valves for shut off or isolating service. Provide double check valve (Back flow preventer) assembly at sprinkler system water source connection.
- D. Gate Valves: Install supervised-open gate valves indicating type so located to control all sources of water supply, except fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating the portion of the system controlled by each valve. Refer to Section 210553 "Identification for Fire Suppression Piping and Equipment" for valve tags and signs.
- E. Where approved and/or indicated, butterfly valves may be used instead of gate valves.
- F. Provide drain valves at main shut off valves, low points of piping and apparatus.
- G. Valves: Bear UL, FM Global label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- H. Install Listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- I. Install Listed fire protection shutoff valves superwired closed that are located to control flow to fire pump test header and flow meter assembly.
- J. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

K. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.
3. Deluge Valves: Install in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

3.7 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

3.8 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Install, fire-department connections in accordance with the installation detail located on drawings.
- B. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.9 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 4. Energize circuits to electrical equipment and devices.
 5. Coordinate with fire-alarm tests. Operate as required.
 6. Coordinate with fire-pump tests. Operate as required.
 7. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.11 CLEANING

- A. Clean dirt and debris from sprinklers and work area.
- B. Remove and replace sprinklers with paint other than factory finish.
- C. Clean exterior of all installation to be painted.

3.12 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves and pressure-maintenance pumps.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. Percent of work complete shall be the method for measuring progress.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. Percent of work complete based on the approved schedule of values.

END OF SECTION 211313

SECTION 260400 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Certain labor, materials, and equipment may be furnished under other Sections of these specifications, by utility Companies or by the Owner. When this is the case, the extent, source and description of these items will be as indicated on the drawings or as described in the specifications.
- B. Where a panel is installed, at least 25% of panel capacity, accounting for serving panel capacity, shall remain as spare capacity after project completion.
- C. Where existing panels are used for additional work, when six (6) or less spaces remain a new panel shall be installed.
- D. All electrical/electronic circuits, including audio, video and fire alarm systems, shall be in an approved raceway system. No "wild circuits" will be accepted.
- E. The Designer of Record shall not design or specify and the Contractor shall not install rigid metal conduit, electrical metallic tubing, flexible steel conduit, liquid-tight flexible steel conduit, non-metallic rigid conduit or innerduct in any horizontal or vertical concrete wall or slab structures or portions thereof, e.g., cast-in-place concrete floor slab on steel decking; cast-in-place concrete slabs integral with concrete structural support systems; prestressed concrete slabs; post-tensioned concrete slabs; precast concrete construction with or without field applied or plant fabricated concrete topping slabs, slabs on grade, foundation walls or in concrete cast-in-place walls, etc.
- F. Related Sections:
 - 1. Basic Electrical Requirements specifically applicable to all Division 26 Sections, in addition to Division 1 General Requirements, and Divisions 14, 21 and, 27.
 - 2. All electrical/electronic circuits and equipment from any other Division shall meet the requirements of Division 26.
 - 3. Description: Work shall consist of furnishing all labor, equipment, supplies, and materials, unless otherwise specified, necessary for the installation of complete electrical systems as required by the specifications and as shown on the drawings, subject to the terms and conditions of the Contract. The Work shall also include the completion of those details of electrical work not mentioned or shown which are necessary for the successful operation of all electrical systems.
 - 4. Temporary Power: See Division 1 for construction power constraints.

G. REFERENCE STANDARDS

H. Comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents.

I. Latest editions of the following:

1. ANSI/NFPA 70 - National Electrical Code (as adopted and amended by the Denver Building Department).
2. International Fire Code (as amended by the Denver Fire Department).
3. International Building Code (as adopted and amended by the Denver Building Department).
4. International Energy Conservation Code (as adopted and amended by the Denver Building Department).
5. ANSI/IEEE C2 - National Electrical Safety Code.
6. OSHA - Occupational Safety and Health Administration, as Amended
7. Underwriter's Laboratory (UL).
8. National Fire Protection Association (NFPA).
9. Other references as listed elsewhere in these specifications.
10. IEEE Standard 519- Recommended Practices and Requirement for Harmonic Control in Electrical Power Systems.

1.3 DEFINITIONS

- A. "Furnish" or "Provide": To supply, install and connect complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
- B. "Install": To erect, mount and connect complete with related accessories.
- C. "Supply": To purchase, procure, acquire and deliver complete with related accessories.
- D. "Work": Labor, materials, equipment, apparatus, controls, accessories, and other items required for proper and complete installation.
- E. "Wiring": Raceway, fittings, wire, boxes and related items.
- F. "Concealed": Embedded in masonry, concrete or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
- G. "Or Equal. Or Approved Equal": Refers to products that, in the opinion of the DEN Project Manager, are similar in all respect to products specified by proprietary brand name. (Refer to Section 01630 for procedures for submittal of proposed substitutions.)
- H. "Exposed": Not installed underground or "concealed" as defined above.
- I. "Indicated," "Shown" or "Noted": As indicated, shown or noted on drawings or specifications.

- J. "Similar" or "Equal": Same in materials, weight, size, design, construction, capacity, performance, and efficiency of specified product.
- K. "Reviewed," "Satisfactory," "Accepted," or "Directed": As reviewed, satisfactory, accepted, or directed by or to DEN Project Manager.
- L. "Related Work" includes all "Work" required for a complete working system.
- M. "Equipment": A general term including material, fittings, devices, appliances, fixtures, apparatus, and the like used as a part of, or in connection with, an electrical installation.
- N. "Busbar": A rigid metallic conductor, lug or bar used to make a common connection between more than one circuit. (Includes all termination assemblies.)
- O. "Shall": Mandatory requirements of this specification are characterized by the use of the word "shall".
- P. Refer to Article 100 of the currently adopted National Electrical Code for other definitions as applicable to this Project.

1.4 WORK SEQUENCE

- A. Construct Work in sequence under provisions of Division 1 where applicable.

1.5 DRAWINGS AND SPECIFICATIONS

- A. The Drawings indicate the general arrangement of circuits, outlets, panelboards and other work. Information shown on the Drawings is schematic; however, re-circuiting will not be permitted without specific acceptance. In cases of conflict between specifications and drawings, the specification shall have precedence. Data presented on the drawings is as accurate as planning can determine, but accuracy is not guaranteed and field verification of all dimensions, locations, levels, etc., to suit field conditions is required. Review all of the Contract Documents and adjust all work to conform to all conditions shown therein.
- B. Prior to submitting a bid, a site visit is required to ascertain all conditions affecting the proposed installation and to adjust all work accordingly. Costs for providing for these adjustments, including response to site constraints, shall be itemized and listed in the bid proposal.
- C. Discrepancies between different plans, between plans and specifications, between specifications, or regulations and codes governing this installation shall be brought to the attention of the DEN Project Manager in writing 72 hours before the date of bid opening. In the event such discrepancies exist, and the DEN Project Manager is not so notified, the adjudication of responsibility shall be solely at the discretion of the DEN Project Manager.

1.6 COORDINATION

- A. Prior to fabrication or installation of any electrical work, participate in detailed coordination planning meetings with all other building utilities system trades, under the direction of the General Contractor, so as to completely establish routings, elevations, space requirements, and coordination of access, layout, and suspension requirements in relationship to the building structure and the work of all other trades.
- B. Any electrical work penetrating concrete walls or floors shall require saw cutting and/or core drilling and shall require approval by the DEN Project Manager. The Contractor shall perform all necessary imaging (x-rays, etc.) as specified, and submit shop drawings of any saw cutting or core drilling to the DEN Project Manager prior to performing the Work. Refer to Section 017330 "Cutting and Patching" for additional requirements.
- C. Any power outages necessary to install or test electrical systems and/or equipment shall be coordinated with Denver International Airport Maintenance/Engineering. A written shutdown request form shall be submitted to and approved by the DEN Project Manager two (2) weeks prior to the shutdown.

1.7 COORDINATION DRAWINGS

- A. Where the Contractor modifies the design, through selection of equipment differing from that shown, coordination drawings shall be provided by the Contractor in accordance with Division 1 to a scale of 1/4"=1'0" or larger for equipment rooms, details, congested areas and sections; other plans at a scale of 1/8"=1'0". These drawings are to detail major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components.
- B. Coordination drawings shall be in accordance with current DEN standards for format, and as outlined in Division 1.
- C. The Contractor shall indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
 - 1. Indicate the proposed locations of raceway systems, equipment, and materials. Include the following:
 - a. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
 - b. Exterior wall and foundation penetrations.
 - c. Fire-rated wall and floor penetrations.
 - d. Equipment connections and support details.
 - e. Sizes and location of required concrete pads and bases.
 - f. Support details.
 - 2. Indicate scheduling, sequencing, movement, and positioning of large equipment

into the building during construction.

3. Floor plans, elevations, and appropriate details are required to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

1.8 SUBMITTALS

- A. Refer to Section 013300 "Submittal Procedures".
- B. Submit shop drawings, coordination drawings and product data in accordance with provisions of Division 1. Submit all required information under a given specification section together. Do not split out submittals under the same specification section.
- C. Prior to submission, shop drawings, material lists and catalog cut sheets or manufacturer's printed data shall be thoroughly checked for compliance with Contract requirements, compatibility with equipment being furnished by the Contractor or Owner, accuracy of dimensions, coordination with work of other trades, and conformance with sound and safe practice as to erection of installation. Each submittal shall bear Contractor's signed statement evidencing such checking.
- D. Clearly mark each shop drawing as follows for purposes of identification:
 1. Shop Drawing.
 2. Equipment Identification Used on Contract Drawings.
 3. Date.
 4. Name of Project.
 5. Branch of Work.
 6. Project Manager's Name.
 7. Contractor's Name.
- E. Clearly mark printed material, catalog cut sheets, pamphlets or specification sheets, and shop drawings with the same designation shown on the Contract document schedules. Contractor agrees that submittals processed by the DEN Project Manager are not change orders; that the purpose of submittals is to demonstrate to the DEN Project Manager that the Contractor understands the design concept; and that the Contractor demonstrates this understanding by indicating which equipment and material the Contractor intends to furnish and install and by detailing the installation methods the Contractor intends to use.
- F. Contractor shall be responsible for dimensions (which the Contractor shall confirm and correlate at the job site), fabrication processes and techniques of construction, and coordination of the Contractor's Work with that of other trades. The Contractor shall check and verify all measurements and review shop drawings before submitting them. If any deviations from the specified requirements for any item of material or equipment exist, such deviation shall be expressly stated in writing and incorporated with the submittal.
- G. Maintain one copy of accepted shop drawings at the Project field office until completion of the Project, and make this copy available, upon request, to

representatives of the DEN Project Manager and Owner.

- H. No equipment or materials shall be installed or stored at the jobsite until submittals for such equipment or materials have been given review action by the DEN Project Manager accepting their use.
- I. Shop drawings and manufacturer's published data shall be submitted for all equipment required for this Project.

1.9 RECORD DOCUMENTS

- A. Maintain a Contract set of electrical drawings and specifications at the site. Neatly mark all changes, discoveries and deviations from the original drawings. Use a reproducible color that contrasts with the prints. This shall be a separate set of drawings, not used for construction purposes, and shall be updated daily as the job progresses and shall be made available for inspection by the DEN Project Manager at all times. Upon completion of the Contract, this set of record drawings shall be delivered to the DEN Project Manager. Follow current DEN BIM standards, to be furnished to the successful bidder as well as the project-specific BIM execution plan. Record documents to be provided by the Contractor shall clearly and accurately show the following:
 - 1. Provide horizontal and vertical dimensions for all raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
 - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - 3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.10 REGULATORY REQUIREMENTS

- A. Obtain all permits, plan review, and inspections from authority having jurisdiction.
- B. The drawings and specifications take precedence when they are more stringent than codes, statutes, or ordinances in effect. Applicable codes, ordinances, standards and statutes take precedence when they are more stringent than the drawings and specifications.

1.11 ENVIRONMENTAL CONDITIONS

- A. The equipment shall be designed and constructed to operate successfully at the rated values under the following environmental conditions:
 - 1. Location: Indoors/Outdoors.
 - 2. Altitude: 5,500 feet above sea level.
 - 3. Temperature range: -30°F to 120°F.

1.12 WARRANTY

- A. The entire electrical system installed under this Contract shall be left in proper working order. Replace, at no additional cost to the Owner, any work, materials, or equipment which evidences defects in design, construction, or workmanship within two (2) years, or any longer period specifically noted elsewhere in these specifications, from date of substantial completion.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and Equipment: Acceptable to the authority having jurisdiction as suitable for the use intended, except where more stringent requirements are indicated by the Contract Documents.
- B. All equipment and materials installed shall be new, unless otherwise specified.
- C. Defective or damaged materials shall be replaced or repaired, prior to final acceptance, in a manner acceptable to the DEN Project Manager or Owner and at no additional cost to the Owner.
- D. All electrical "equipment" and assemblies shall be acceptable for installation only if labeled and listed by a nationally recognized testing laboratory, such as UL or an equivalent.
- E. All major equipment components shall have the manufacturer's name, address, model number, and serial number permanently attached in a conspicuous location.

2.2 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.
- C. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.

2.3 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only:
1. Any product meeting those standards.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions:

1. Submit a request for substitution for any manufacturer not specifically named with supporting documentation for approval by DEN Project Manager.

2.4 PRODUCTS LIST

- A. Within fifteen (15) days after date of Notice to Proceed, submit complete list of major products required for submittal under these specifications, with name of manufacturer, trade name, and model number of each product.

2.5 SUBSTITUTIONS

- A. Refer to Division 1 General Requirements, Section 012510 "Substitutions".

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. Only quality workmanship will be accepted. Poor workmanship, improper layout of work and lack of coordination of Work, as determined by the DEN Project Manager, are not acceptable and shall be corrected at the contractors cost.
- B. Contractor shall include no more than one apprentice per Journeyman Electrician. Apprentices shall be under the direct supervision of a licensed electrician at all times.
- C. Any changes or deviations from the drawings and specifications must be accepted in writing by the DEN Project Manager. All errors in installation shall be corrected at the expense of the Contractor. All specialties shall be installed as detailed on the drawings. Where details or specific installation requirements are not provided, manufacturer's recommendations shall be followed.
- D. Upon completion of Work, all equipment and materials shall be installed complete, thoroughly tested, checked, correctly adjusted, and left ready for intended use or operation. All Work shall be thoroughly cleaned and all residues shall be removed from surfaces. Exterior surfaces of all material and equipment shall be left in a perfect, unblemished condition.
- E. Contractor shall provide a complete installation, including all required labor, material, cartage, testing, insurance, permits, and taxes.

3.2 CHASES, OPENINGS, CUTTING AND PATCHING

- A. Carefully lay out all work in advance so as to eliminate where possible, cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings and roofs. Any

damage to the building, structure, piping, ducts, equipment or any defaced finish shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner and to the satisfaction of the DEN Project Manager. Any necessary cutting, channeling, drilling or welding as required for the proper support, concealment, installation or anchoring of raceways, outlets, or other electrical equipment shall be performed in a careful manner, and shall be pre-approved by the DEN Project Manager.

- B. All openings made in fire-rated walls, floors, or ceilings shall be sealed and made tight in a manner to conform to the fire rating for the barrier penetrated. Reference specification Section 078413 "Penetration Firestopping" for additional information.
- C. All penetrations required through completed concrete construction shall be core drilled at minimum size required. All penetrations in concrete require an x-ray or ground penetrating radar to determine if the location is clear of reinforcing steel and embedded systems. Precautions shall be taken when drilling to prevent damage to structural concrete.

3.3 ELECTRICAL INSTALLATIONS

- A. Coordinate electrical systems, equipment, and material installation with other building components. If the Contractor furnishes equipment of a different size, the Contractor shall furnish and install the proper fuses, circuit breaker, disconnect switch, wire and conduit required for the equipment furnished, at no additional cost to the Owner, and as deemed acceptable by the DEN Project Manager.

3.4 PROGRESS OF WORK

- A. Coordinate the progress of electrical work to conform to the progress of the Work of the other trades. Complete the entire installation as soon as the condition of the sites will permit. Any cost resulting from defective or ill-timed work performed under Division 26 shall be borne by the Contractor.

3.5 ELECTRICAL COMPLETION

- A. Training of Operating and Maintenance Personnel: Furnish the services of a qualified representative of the supplier of each item or system itemized below who shall instruct specific personnel, as designated by the Owner, in the operation and maintenance of that item or system.
- B.
- B. Operating and Maintenance Manuals and Parts Lists: Deliver three (3) complete operating & maintenance manuals and parts lists in three-ring binders to the Owner at the time of the above required training. The information shall be provided on the manufacturer's original data sheets. Fully explain the contents of the manuals as part of required training and instruct the Owner's personnel in the correct procedure in obtaining service, both during and after the guarantee period.

1. The operating and maintenance manuals and parts lists shall give complete information as to whom the Owner shall contact for service and parts. Include address and phone number. Furnish evidence that an authorized service organization regularly carries a complete stock of repair parts for these items (or systems), and that the organization is available for service. Service shall be furnished within 24 hours after requested.
- C. Operating and Acceptance Tests: Provide all labor, instruments, and equipment for the performance of tests as specified below and elsewhere in these specifications for all applicable equipment furnished and installed as part of this Contract. Submit three (3) copies of test reports to the DEN Project Manager for the DEN Project Manager's approval.
- D. Clean Up: Remove all materials, scrap, etc., relative to the electrical installation, and leave the premises and all equipment, lamps, fixtures, etc. in a clean, orderly condition. Clean all electrical equipment, such as switchboards, panel boards, luminaries etc. of construction dirt, dust, etc. and touch-up or repaint all scratches, blemishes, rust spots etc. to its original condition. Any costs to the Owner for cleanup of the site will be charged against the Contractor.
- E. Acceptance Demonstration: Upon completion of the Work, at a time to be designated by the DEN Project Manager, the Contractor shall demonstrate for the Owner the operation of the entire installation, including all systems provided or modified under this Contract.
- F. Final Acceptance by the Owner will not occur until all operating instructions are received and Owner's personnel have been thoroughly indoctrinated in the maintenance and operation of all equipment, as approved by DEN Project Manager.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260400

SECTION 260505 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
- B. Section 024119 "Selective Demolition" for demolition and removal of selected site elements.
- C. Section 260400 "Basic Electrical Requirements."

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Provide construction tools, equipment materials, and supplies of the type and quantities that will facilitate the timely execution of the work.

PART 3 - EXECUTION

3.1 PROCEDURES

- A. Existing electrical systems shall not be abandoned in place.
- B. No area; new, remodeled, or existing shall be without a fully operational electrical system, except for scheduled outages.
- C. The contractor shall remove, relocate or replace any electrical equipment or systems as required for installation of any structural, mechanical or plumbing equipment,
- D. Maintain all existing electrical, control, communication, and signaling systems to the extent required by the owner.
- E. Maintain all existing electrical, control, communication, and signaling systems to the extent required by the owner.

TECHNICAL SPECIFICATIONS
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- F. Where remodel or demolition interferes with circuits outside of the work area, schedule outages to rework the circuits as required.
- G. All items that are removed and not designated by the Project Manager to be used or turned over to the owner shall be removed from the airport.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION **260505**

SECTION 260510 - TESTING, ACCEPTANCES AND CERTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF REQUIREMENTS

- A. The Contractor shall provide the necessary field-testing and startup services for all electrical and mechanical equipment except as noted otherwise. The field-testing and startup services shall be in accordance with each equipment manufacturer's written recommendations for field-testing proving they meet Contract standards.
- B. The Contractor shall be responsible for furnishing all equipment, power source when needed, coordinating and performing electrical/electronic testing required by the Contract Documents. Testing requirements may be located on the Contract Drawings or other sections of the specifications.
- C. The Contractor shall provide all necessary assistance and cooperation with any Independent Testing Organization furnishing by the City. The Contractor shall correct, repair, or replace all equipment found to be defective by the Independent Testing Organization.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all Work specified herein shall conform to or exceed the applicable requirements of the referenced Standards; provided, that wherever the provisions of said publications are in conflict with the requirements specified herein, the more stringent requirements shall apply unless in conflict with the equipment manufacturer's written recommendations:
 - 1. Building Code and DEN Standards.
 - 2. ANSI/IEEE C2 - National Electrical Safety Code.
 - 3. OSHA - Occupational Safety and Health Administration, as Amended
 - 4. NETA - National Electric Testing Association
 - 5. NEMA ICS 1 - General Standards for Industrial Control and Systems.
 - 6. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.
 - 7. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
 - 8. UL 1008 - Standard for Automatic Transfer Switches.
 - 9. NFPA 70 - National Electrical Code, including but not limited to use in emergency and standby systems in accordance with Articles 517, 700, 701 and 702.

10. NFPA 72 - National Fire Alarm Code (as adopted and amended by the Denver Building Code and DEN Standards).
11. NFPA 101 - National Electrical Safety Code (as adopted and amended by the Denver Building Code and DEN Standards).
12. NFPA 110 - Standard for Emergency and Standby Power Systems (as adopted and amended by the Denver Building Code and DEN Standards).
13. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems (Orange Book)
14. NEMA Standard ICS-2-447 - AC Automatic Transfer Switches.
15. IEC - Standard for Automatic Transfer Switches.

1.4 SUBMITTALS

- A. Comply with Division 1 submittal requirements.
- B. Five (5) copies of complete certified test reports shall be submitted to the DEN Project Manager by the contractor. Electronic copy of test reports in pdf format to also be submitted to the DEN Project Manager. The test reports shall include the following as a minimum:
 1. Power cable high potential test reports:
 - a. Insulation resistance tests.
 - b. Continuity tests.
 2. Transformer test reports to include where applicable:
 - a. Transformer turns ratio.
 - b. Winding resistance.
 - c. Insulation power factor.
 - d. K Factor.
 3. All electrical/electronic equipment and systems functional test report.
 4. All other reports required by individual specification sections.
 5. Load balance report for each switch board, panel board and switch gear.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. The electrical and mechanical equipment shall be completely tested in the field in the presence of DEN Inspectors in accordance with good and accepted industry engineering practices to assure that:
 1. The equipment has not been damaged during manufacturing, shipping, or installation.
 2. The equipment has been installed according to the requirements Contract Documents.

3. The equipment meets the requirements of the Contract Documents.

- B. If the Contractor finds during the testing that any piece of equipment failed to satisfactorily pass the required field test, the DEN Project Manager shall be promptly notified and the Contractor shall take the necessary actions for the prompt repair or replacement.
- C. A retest to demonstrate the equipment will meet the requirements of the Contract Documents shall be scheduled with the DEN Project Manager.

2.2 GROUND RESISTANCE TEST

- A. Before connecting a ground rod to the system test the resistance to earth. Where test show resistance to ground over 5 OHMS, an additional ground rod shall be added.
- B. Upon completion of installation of electrical grounding system, test ground resistance to earth in accordance with ANSI/IEEE81. Submit test results to the DEN Project Manager

2.3 CONDUCTOR INSULATION TEST

- A. Prior to energizing, all building service cables feeders to and/or from transformers, switchboards, panel boards are to be tested with a 1000-volt insulation megohm meter to determine insulation resistance levels. Test cables rated for three hundred volt with a 500-volt megohm meter or as recommended by the manufacturer. All field test data is to be recorded, corrected to a baseline temperature and furnished to the DEN Project Manager. A test is to include meggering between conductors and between each conductor and ground. Cables are to be meggered after installation with cables disconnected at both ends. Insulation test values shall meet or exceed the values given below:

| Conductor Size: (AWG or KCMIL) | Resistance: (Megaohms - 1,000 ft.) |
|--|--|
| 12-8 | 200 |
| 6-2/0 | 100 |
| 3/0-750 | 100 |

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. TESTING

1. The Contractor shall allow only certified personnel to perform the testing.
2. The Contractor shall perform the testing using all necessary safety precautions and proper test equipment.
3. The Contractor shall notify the DEN Project Manager three (3) days in advance

- of the proposed testing dates.
4. Witness of testing by DEN Inspector, Electrical Maintenance and Electrical Inspector.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260510

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
- B. Related Sections include the following:
 - 1. Division 26 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.
 - 2. Division 26 Section "Undercarpet Electrical Power Cables" for flat cables for undercarpet installations.
 - 3. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data substantiating that materials comply with requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.8 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Southwire Company.
 - 4. Encore Wire Corp.
 - 5. Cerro Wire and Cable Company.
 - 6. CME Wire.
 - 7. Coleman Cable Inc.
- B. All conductors shall be copper.
- C. AC cable and Modular wiring are not permitted.
- D. MC Cable: Comply with NEMA WC 70. Provide internal equipment grounding conductor throughout.
- E. Copper Conductors: Comply with NEMA WC 70.

- F. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- G. Remote Control and Signal Cable
 - 1. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated at 60 deg C, individual conductors twisted together, shielded, and covered with a PVC jacket.
 - 2. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
 - 6. Ideal.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger, except for connection to vibrating equipment then stranded shall be used.
- C. Prohibited Cable Types: UF, NM, SE, AC.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Minimum wire size shall be based on the over current protection device and as governed by the NEC.
- B. Service Entrance: Type THHN-THWN, single conductors in raceway.

- C. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Feeders below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- F. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- G. Feeders in Cable Tray: Type THHN-THWN, single conductors in raceway.
- H. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- I. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- J. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- K. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- L. Branch Circuits in Cable Tray: Type THHN-THWN, single conductors in raceway.
- M. Class 1 Remote Control and Signal Circuits: Type THHN-THWN, in raceway or cable tray as applicable, or Copper conductor, 600 volt insulation, individual conductors twisted together, shielded, and covered with a PVC jacket.
- N. Class 2 Remote Control and Signal Circuits: Type THHN-THWN, in raceway or cable tray as applicable, or Copper conductor, individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.
- O. All power, control, data, communication and signal wire or cable shall be installed in an approved raceway.
- P. MC Cable allowed for use in 20-Ampere branch circuits, with the following conditions:
 - 1. Cable shall be run concealed in all locations. Where circuiting must be exposed, provide single conductor building wire in approved raceway.
 - 2. Home run from first device to panel board shall be single conductor building wire in approved raceway.
 - 3. MC cable shall be supported using approved methods throughout. Do not run cables unsupported in any area, including above accessible ceilings, in unfinished areas, etc.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. All power, control, data, communication and signal wire or cable shall be installed in an approved raceway (raceway shall be defined as conduit or cable tray as applicable).
- B. Verify raceways are open, continuous and clear of debris before installing cables.
- C. Pull all conductors into a raceway at the same time. Use a listed wire pulling lubricant for pulling No. 4 AWG and larger wires.
- D. Completely and thoroughly swab raceway system before installing conductors for conduit in floors, concrete, or below grade.
- E. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- F. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- G. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- H. Pulling winches and other necessary pulling equipment shall be of adequate capacity to ensure a continuous pull on the cable. Strain gages shall be used to monitor the cable pulling tension.
- I. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- J. Neatly train wiring inside boxes, equipment, and panel boards. Make temporary connections to panel board devices with sufficient slack conductor to facilitate reconnections required for balancing loads between phases.
- K. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- L. Conductors shall not be pulled in concrete encased conduits before concrete is placed.
- M. For connection to vibrating equipment, stranded wire shall be used.
- N. All wiring shall be installed in a new approved raceway system. Existing conduits shall not be used unless approved by the DEN Project Manager.
- O. Where harmonic currents exist on feeders that supply panelboards that serve electronic equipment of 40 percent or more of the panelboards total ampacity, two (2) full size neutral conductors or a neutral conductor rated at 200 percent shall be provided to the panelboard being served. A neutral bus bar rated at 200 percent shall also be provided in the panelboard.

- P. Shared Neutrals: Prohibited. A full-size neutral conductor shall be provided for each single-phase circuit.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Splice only in accessible junction and outlet boxes.
- C. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
1. Field inspection and testing will be performed under provisions of Division 01.
 2. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding

the following critical equipment and services for compliance with requirements.

- a. Prior to energizing, all building service cables, feeders to and/or from transformers, switchboards and panel boards are to be tested with a 500-volt insulation megohm meter to determine insulation resistance levels. All field test data is to be recorded, corrected to a baseline temperature and furnished to the DEN Project Manager. A test is to include meggering for one minute between conductors and between each conductor and ground. Cables are to be meggered after installation with cables disconnected at both ends. Insulation test values shall meet or exceed the values given below.

| Conductor Size (AWG or KCMIL): | Resistance (Megaohms-1,000ft): |
|---------------------------------------|---------------------------------------|
| 12-8 | 200 |
| 6-2/0 | 100 |
| 3/0-750 | 100 |

3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice eleven (11) months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
 4. Inspect wire and cable for physical damage and proper connection.
- B. Test and Inspection Reports: Prepare a written report to record the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Cables will be considered defective if they do not pass tests and inspections.

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CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
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PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.3 SYSTEM DESCRIPTION

- A. An insulated equipment ground conductor shall be installed continuous from the main switchgear or service entrance to all branch panelboards, motor control centers, transformers and all motors. This conductor shall be bonded to the conduit and metal enclosures that it passes through utilizing bonding bushings and terminal devices.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data substantiating that materials comply with requirements.
- B. Shop Drawings:
 - 1. Submit shop drawings, coordination drawings, and product data in accordance with provisions of Division 1. Submit all required information under a given specification section together. Do not split out submittals under the same specification section.
 - a. Clearly mark each shop drawing as follows for purposes of identification:
 - 1) Shop Drawing
 - 2) Equipment Identification Used on Contract Drawings
 - 3) Date
 - 4) Name of Project
 - 5) Branch of Work
 - 6) Project Manager's Name
 - 7) Contractor's Name
 - b. Indicate layout of ground ring, location of system grounding electrode connections, and routing of grounding electrode conductors.

- C. Prior to submission, shop drawings, material lists and catalog cut sheets or manufacturer's printed data shall be thoroughly checked for compliance with contract requirements, compatibility with equipment being furnished by the Contractor or Owner, accuracy of dimensions, coordination with work of other trades, and conformance with sound and safe practice as to erection of installation. Each submittal shall bear Contractor's signed statement evidencing such checking.
- D. Clearly mark printed material, catalog cut sheets, pamphlets or specification sheets, and shop drawings with the same designation shown on the Contract Document schedules.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents

- 1. Maintain a contract set of electrical drawings and specifications at the site. Neatly mark all changes, discoveries, and deviations from the original drawings. Use a reproducible color that contrasts with the prints. This shall be a separate set of drawings, not used for construction purposes, and shall be updated daily as the job progresses and shall be made available for inspection by the DEN Project Manager at all times. Upon completion of the contract, this set of record drawings shall be delivered to the DEN Project Manager. Follow DEN BIM standards, to be furnished to the successful bidder. Record documents to be provided by the Contractor shall clearly and accurately show the following:
 - a. Provide horizontal and vertical dimensions for all raceway systems, size, and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
 - b. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - c. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

1.7 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Codes.
- B. All ground wires shall be copper, sized according to the NEC or as shown on the drawings whichever is larger.
- C. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions. Exothermic welded connections are required where grounding conductors connect to underground grounding conductors and to underground grounding electrodes, and for bonding to steel. All underground connections shall be exothermic welded.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- E. Grounding Connection Accessories:

1. Electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type of service required.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 12 AWG and smaller, and stranded conductors for No. 10 AWG and larger unless otherwise indicated.
- B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 1. Install bus on insulated spacers **2 inches (50 mm)** minimum from wall, **6 inches (150 mm)** above finished floor unless otherwise indicated.
 2. Where indicated on both sides of doorways, route bus up to top of doorframe, across top of doorway, and down to specified height above floor; connect to horizontal bus.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

3.4 LABELING

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" Article for instruction signs.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify DEN Electrical Engineer promptly and include recommendations to reduce ground resistance.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
 - 3. Include data substantiating that materials comply with requirements.

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
1. Trapeze hangers. Include Product Data for components.
 2. Steel slotted channel systems. Include Product Data for components.
 3. Nonmetallic slotted channel systems. Include Product Data for components.
 4. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.8 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.9 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.10 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by

one of the following:

- a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - h. or approved equal.
2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4. For use in dry locations only.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with **9/16-inch (14-mm)** diameter holes at a maximum of **8 inches (200 mm)** o.c., in at least 1 surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.
 - e. or approved equal.
 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 3. Fitting and Accessory Materials: Same as channels and angles.
 4. Rated Strength: Selected to suit applicable load criteria.
- C. Hardware for hangers and supports shall be corrosion-resistant.
- D. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- E. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- F. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

- G. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- H. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 6) or approved equal.
 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 5. Toggle Bolts: All-steel springhead type.
 6. Hanger Rods: Threaded steel.
 7. Pneumatic-Actuated Fasteners: For use in ceilings only and by approval of DEN Project Manager. Powder-actuated tools are prohibited. Threaded-steel stud, for use in pan deck cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - 5)
 - 6) or approved equal.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for

steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as **required by** NFPA 70. Minimum rod size shall be **1/4 inch (6 mm)** in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least **25** percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with **two-bolt conduit clamps**
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for **1-1/2-inch (38-mm)** and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus **200 lb (90 kg)**.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS

- SP-69 or Spring-tension clamps, as appropriate and with sufficient weight rating for the application.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
- F. Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit.
- G. The use of pneumatic-actuated anchors is not allowed except at ceilings. Obtain DEN Project Manager approval prior to ordering materials or performing work.
- H. Do not drill structural steel members.
- I. Install surface-mounted cabinets and panelboards with minimum of four anchors
- J. Suspended conduit or box supports shall not be less than 1/4" diameter steel rod. Rod used as pedestal support is not acceptable. The contractor shall not use tie wire or wire of any type to support conduits, junction boxes or pull boxes.
- K. No more than five (5) 1/2" conduits, three (3) 3/4" conduits or two (2) 1" conduits shall be supported on a single 1/4" diameter steel rod.
- L. All conduits shall be supported by approved hangers. Supports installed and used by other trades such as duct hangers, pipe hangers, ceiling hangers, etc. shall not be used for conduit support.
- M. All light fixtures shall be independently supported at opposite corners from structure, or from trapeze supported from structure by the electrical contractor.
- N. Wall-mounted fixtures shall be supported from building structure with backing support as approved by the DEN Project Manager to prevent any damage to the wall.
- O. Use vibration isolation pads for vibrating equipment such as transformers.
- P. Plastic or fiber anchors are prohibited.
- Q. Anchoring in overhead cast in place, pre-tensioned or post-tensioned concrete is prohibited unless x-ray or ground penetrating radar study are performed and approved by the DEN Project Manager.

TECHNICAL SPECIFICATIONS
26 - ELECTRICAL
260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Innerduct
4. Metal wireways and auxiliary gutters.
5. Nonmetal wireways and auxiliary gutters.
6. Surface raceways.
7. Boxes, enclosures, and cabinets.
8. Handholes and boxes for exterior underground cabling.
9. Buried conduits in concrete encased duct banks.

B. Related Requirements:

1. Division 26 Section 260526 "Grounding and Bonding for Electrical Systems" for additional grounding and bonding requirements.

C. Prohibited Materials

1. Intermediate conduits.
2. Aluminum conduit.
3. Multi-conductor assemblies, unless written authorization is obtained from DEN Project Manager, or specifically allowed within specification.

D. Project Conditions

1. Verify locations of outlets and small pull-boxes prior to rough in.
2. Electrical and pull boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. RMC: Rigid Metallic Conduit.

- C. RNC: Rigid Nonmetallic Conduit.
- D. EMT: Electrical Metallic Conduit.
- E. FMC: Flexible Metallic Conduit.
- F. LFMC: Liquidtight Flexible Metallic Conduit.
- G. HDPE: High Density Polyethelene.
- H. FNC: Flexible Nonmetallic Conduit.
- I. ENT: Electrical non-metallic conduit.
- J. MC: Metal-clad cable.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
 - 1. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
- C. Samples: Per request.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
- D. Source quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.7 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 3. Anamet Electrical, Inc.
 4. Electri-Flex Company.
 5. O-Z/Gedney; a brand of EGS Electrical Group.
 6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
 7. Republic Conduit.
 8. Robroy Industries.
 9. Southwire Company.
 10. Thomas & Betts Corporation.
 11. Western Tube and Conduit Corporation.
 12. Wheatland Tube Company; a division of John Maneely Company.
 13. or approved equal.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- E. EMT: Galvanized tubing. Comply with ANSI C80.3 and UL 797.
- F. FMC: Comply with UL 1; zinc-coated steel.

- G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Set screw or compression.
 - c. Provide throated connectors where entering junction boxes.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- I. Innerduct:
 - 1. Inner duct, meeting or exceeding the following requirements, shall be used to partition conduit.
 - a. Melting point: 260 degrees F., minimum.
 - b. Tensile yield strength: 3600 psi/sq. in., minimum
 - c. Brittleness temperature, maximum: -140 degrees F.
 - d. Heat distortion temperature: 170 degrees F minimum.
- J. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.
 - 3. Arnco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.
 - 6. Condux International, Inc.
 - 7. Electri-Flex Company.
 - 8. Kraloy.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Niedax-Kleinhuis USA, Inc.
 - 11. RACO; a Hubbell company.
 - 12. Thomas & Betts Corporation.

13. or approved equal.

- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. Rigid HDPE: Comply with UL 651A.
- E. Continuous HDPE: Comply with UL 651B.
- F. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- G. RTRC: Comply with UL 1684A and NEMA TC 14.
- H. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- I. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman; a Pentair company.
 - 3. Mono-Systems, Inc.
 - 4. Square D; a brand of Schneider Electric.
 - 5. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 6. or approved equal.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R or Type 4x, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type or screw cover.

- E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allied Moulded Products, Inc.
 2. Hoffman; a Pentair company.
 3. Lamson & Sessions; Carlon Electrical Products.
 4. Niedax-Kleinhuis USA, Inc.
 5. or approved equal.
- B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.
- D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- E. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Prime coated, ready for field painting.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Mono-Systems, Inc.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.
 - d. or approved equal.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by DEN Project Manager from manufacturer's standard colors. Product shall comply with UL 94 V-0

requirements for self-extinguishing characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems Division.
 - b. Mono-Systems, Inc.
 - c. Panduit Corp.
 - d. Wiremold / Legrand.
 - e. or approved equal.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Adalet.
 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 3. EGS/Appleton Electric.
 4. Erickson Electrical Equipment Company.
 5. FSR Inc.
 6. Hoffman; a Pentair company.
 7. Hubbell Incorporated; Killark Division.
 8. Kraloy.
 9. Milbank Manufacturing Co.
 10. Mono-Systems, Inc.
 11. O-Z/Gedney; a brand of EGS Electrical Group.
 12. RACO; a Hubbell Company.
 13. Robroy Industries.
 14. Spring City Electrical Manufacturing Company.
 15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
 16. Thomas & Betts Corporation.
 17. Wiremold / Legrand.
 18. or approved equal.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Galvanized steel. Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, **aluminum**, Type FD, with gasketed cover. Provide threaded hubs.
- E. Nonmetallic Outlet and Device Boxes: Prohibited, unless specifically allowed in writing by the DEN Project Manager.
- F. Metal Floor Boxes:

1. Material: Cast metal.
 2. Type: Fully adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Nonmetallic Floor Boxes: Prohibited, unless specifically allowed by the DEN Project Manager.
1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- I. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- J. Small Sheet Metal Pull and Junction Boxes: Galvanized steel. NEMA OS 1.
- K. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast iron with gasketed cover.
- L. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- M. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep) or as approved by DEN Project Manager.
- N. Gangable boxes are allowed.
- O. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R or Type 4x as appropriate, with continuous-hinge cover with flush latch unless otherwise indicated. Screw cover enclosures: VL50 & NEMA 1.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Plastic or Fiberglass.
 3. Interior Panels: Steel; 14 gage steel, 12 gage if floor mounted, all sides finished with manufacturer's standard enamel, white.
 4. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
 - a. Interior Dry Locations: Use hinged or screw covered enclosure.

b. Interior damp or wet locations: Use nema 3R hinged cover boxes.

P. Cabinets:

1. NEMA 250, **Type 1** galvanized-steel box with removable interior panel and removable **front**, finished inside and out with manufacturer's standard enamel, gray.
2. Cabinet Fronts: Steel, flush or surface type as indicated, with concealed trim clamps, concealed hinge and flush lock keyed to match branch circuit panelboard; finish in gray baked enamel.
3. Provide 3/4-inch thick fire retardant plywood backboard or galvanized steel back plate painted matte white, for mounting terminal blocks.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
7. Fabrication:
 - a. Shop assemble enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.
 - b. Provide knockouts on enclosures.
 - c. Provide protective pocket inside front cover with schematic diagram, connection diagram, and layout drawing of control wiring and components within enclosure.

Q. Terminal blocks and accessories:

1. All terminal Blocks: ANSI/NEMA ICS 4; UL listed.
2. Power Terminals: Unit construction type, closed-back type, with tubular pressure screw terminals, rated 600 volts.
3. Signal and Control Terminals: Modular construction type, channel mounted; tubular pressure screw terminals, rated 300 volts.
4. Power and signal/control wiring will use separate terminal blocks.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Raceways shall not be installed in stairways or on the exterior of any building, unless specifically allowed by DEN Project Manager.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: GRC . Raceway locations include the following:
 - a. Loading dock.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. CONDUIT INSTALLATION SCHEDULE

1. Underground Installations More Than Five Feet from Foundation Wall: Polyvinyl Chloride (PVC) conduit Schedule 40. All bends greater than 45 degrees in non-metallic conduit shall be galvanized rigid steel conduit with a factory coating of polyvinyl chloride (PVC).
2. Installation in Concrete Slab: Not allowed.
 - a. All buried conduits containing cabling shall be installed in concrete encased duct banks.
3. In Slab Above Grade: Not allowed.
4. Wet Interior Locations: Rigid steel.
5. Concealed Dry Interior Locations: Electrical metallic tubing.
6. In Existing Walls of Existing Structure: Electrical metallic tubing or MC Cable.

D. Minimum Raceway Size: 3/4-inch (19-mm)] trade size.

E. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew, or compression, steel fittings. Comply with NEMA FB 2.10.
 - a. Setscrew fittings to be used for indoor applications in dry locations only.
 - b. Compression fittings may be used in indoor or outdoor locations for damp or wet locations.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

- H. Unless otherwise indicated and where not otherwise restricted, use the conduit type indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use Galvanized Rigid Conduit.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Maintain a minimum of 6 inches (150 mm) between conduit and other piping. Maintain twelve inches (12") clearance between conduit and a heat source such as heating pipes, exhaust flues and heating appliances. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 24 inches (610 mm) of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines. Use conduit bodies to make changes in direction around beams or columns.
- H. Support conduit within 24 inches (610 mm) of enclosures to which attached. Support conduit at a maximum of 8 feet on center, within two (2) feet of a box or fitting.
- I. Use only factory cast hubs for fastening conduit to cast boxes, and use steel or malleable iron hubs for fastening conduit to sheet metal boxes or equipment in damp or wet locations.
- J. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- K. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture during construction.
- L. Use PVC-coated rigid steel factory elbows for bends greater than 45 degrees in plastic conduit runs.
- M. Exposed conduits subject to physical damage to be rigid steel to 6'-0" above floor, deck or grating except in electrical, communications and mechanical rooms.

- N. Conduit stubbed up shall be two inches above slab or housekeeping pad and the empty conduits shall be capped. Under freestanding equipment conduits with conductors shall be sealed with duct seal.
- O. Flexible steel conduit runs shall not exceed 6' in length when connecting equipment, 6' in length when connecting light fixtures or when fished in hollow spaces with written approval by DEN Project Manager and shall contain a grounding conductor.
- P. Stub-ups to Above Recessed Ceilings:
1. Use EMT or RMC for raceways.
 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- Q. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- R. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- S. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- T. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to **1-1/4-inch (35mm)** trade size and insulated throat metal bushings on **1-1/2-inch (41-mm)** trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- U. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- V. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- W. Cut conduit perpendicular to the length. For conduits **2-inch (53-mm)** trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- X. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than **160-lb (72-kg)** tensile strength. Leave at least **12 inches (300 mm)** of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- Y. Surface Raceways:
1. Install surface raceway with a minimum **2-inch (50-mm)** radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding **48 inches (1200 mm)** and with no less than two supports per straight

raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

- Z. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- AA. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- BB. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- CC. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed **30 deg F (17 deg C)** and that has straight-run length that exceeds **25 feet (7.6 m)**. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed **100 deg F (55 deg C)** and that has straight-run length that exceeds **100 feet (30 m)**.
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: **125 deg F (70 deg C)** temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: **155 deg F (86 deg C)** temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: **125 deg F (70 deg C)** temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least **0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C)** of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least **0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C)** of temperature change for metal conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
 6. Provide external bonding jumper for all expansion fittings.

- DD. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of **72 inches (1830 mm)** of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors. All vibrating equipment such as motors, transformers, and generators shall be connected with flexible steel conduit, not to exceed six feet in length.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- EE. Size conduit for conductor type installed or for Type THHN conductors, whichever is larger.
- FF. Arrange conduit to maintain headroom and present a neat appearance. Certain existing conditions may allow a waiver to this item.
- GG. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- HH. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- II. Do not support conduit from cable tray or cable tray supports.
- JJ. Flexible conduit shall not be less than one-half (1/2) inch except when supplied with lighting fixtures. MC Cable shall be allowed in lieu of flexible conduit for light fixtures in lengths of 6 feet or less.
- KK. When anchoring to a dual sheet metal pan deck and concrete, anchors of any type when placed from below the deck shall be placed only in the lower pan form. No anchors shall be installed in the upper (high) pan.
- LL. X-ray [or ground penetrating radar] studies shall be made of concrete floors, walls or CMU walls prior to drilling or cutting of concrete and submitted to the DEN Project Manager for review and approval.
- MM. Mount boxes at heights indicated on Drawings. Install boxes with height measured to center of box unless otherwise indicated. Coordinate mounting heights and locations of boxes or outlets so as not to be interfered with by grounding systems, electrical panels, or any other building accessory.
- NN. Coordinate installation of outlet or equipment boxes for systems or products furnished under other sections.
- OO. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

- PP. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel. Provide minimum 8-inch separation.
- QQ. Locate boxes so that cover or plate will not span different building finishes.
- RR. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- SS. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- TT. Set metal floor boxes level and flush with finished floor surface.
- UU. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- VV. Install electrical boxes as shown on Drawings, and as required for equipment, terminal strips, splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- WW. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed light fixture.
- XX. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- YY. Use adjustable steel channel fasteners or all thread for hanging ceiling outlet box, support box from structure.
- ZZ. Support boxes in the ceiling with ¼" threaded rod as a minimum.
- AAA. Use appropriate gang box where more than one device is mounted together.
- BBB. Use 4-inch square box with plaster ring for single device outlets.
- CCC. Use malleable iron outlet box when surface mounted: on exterior of building, in wet location or damp location.
- DDD. Minimum junction and pull box size 4-11/16" x 4-11/16" x 2-1/8".
- EEE. Minimum outlet box size 4" x 4" x 2-1/8" including feed through outlet boxes.
- FFF. Minimum junction box size for fire alarm pull stations, control module, monitor module, 4" x 4" x 2-1/8". Provide plaster ring at all pull station locations.
- GGG. Use flush mounting outlet boxes in finished areas.
- HHH. Install knockout closure in unused box openings.
- III. Install cabinets and enclosures plumb; anchor securely to wall and structural supports at each corner, minimum.

JJJ. All floor-mounted equipment shall be on a 4" nominal concrete housekeeping pad.

KKK. No cabinet shall be supported on slab or grade.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
- 2. Sleeve-seal systems.
- 3. Sleeve-seal fittings.
- 4. Grout.
- 5. Silicone sealants.

- B. Related Requirements:

- 1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include data substantiating that materials comply with requirements.

1.4 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - f. Link-Seal.

g. or approved equal.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: **Carbon steel**.
4. Connecting Bolts and Nuts: **Carbon steel, with corrosion-resistant coating**, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Presealed Systems.
 - b. or approved equal.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
 2. Sealant shall have VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed,

expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors [2 inches (50 mm)] above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

TECHNICAL SPECIFICATIONS
26 - ELECTRICAL
260544
SLEEVES AND SLEEVE SEALS FOR ELECTRICAL
RACEWAYS AND CABLING

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
 - 1. Include data substantiating that materials comply with requirements.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 **and IEEE C2**.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

1.6 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch (75-mm) high letters on 20-inch (500-mm) centers.
- C. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch (100-mm-) wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
- D. Pre-Printed Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Pre-Printed Tags: Polyester tag, **0.010 inch (0.25 mm)** thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than **3 mils (0.08 mm)** thick by **1 to 2 inches (25 to 50 mm)** wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Pre-Printed Tags: Polyester tag, **0.010 inch (0.25 mm)** thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

- A. **2-inch (50-mm)** wide, **5-mil (0.125-mm)** pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
1. Preprinted 20 gauge steel signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 3. Nominal size, 14 by 10 inches (360 mm by 250 mm) unless 7 by 10 inches (180 by 250 mm) is the largest size that can be applied where needed.
- D. Metal-Backed, Butyrate Warning Signs:
1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
- E. Nominal size, 14 by 10 inches (360 mm by 250 mm) unless 7 by 10 inches (180 by 250 mm) is the largest size that can be applied where needed.
- F. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
 3. "XXXX VOLTS"
 4. "KEEP AWAY"
 5. "BURIED CABLE"
 6. "DO NOT TOUCH SWITCH"
- G. Plasticized Tags:
1. Manufacturer's standard preprinted or partially preprinted accident-prevention and operational tags, on plasticized card stock with matte finish suitable for writing, approximately 3-1/4-inch x 5-5/8-inch, with brass grommets and wire fasteners, and with appropriate preprinted wording including large-size primary wording, including but not limited to the following legends: "DANGER", "CAUTION", "DO NOT OPERATE".

2.6 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for

signs up to **20 sq. inches** (129 sq. cm) and **1/8 inch** (3.2 mm) thick for larger sizes.

1. Engraved legend with **black letters on white face**.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch** (10 mm).

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch** (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black letters on white background, by thermal transfer or equivalent process. Minimum letter height shall be **1/4 inch** (7 mm).

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black letters on white background, by thermal transfer or equivalent process. Minimum letter height shall be **1/4 inch** (7 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

C. Self-Adhesive, Engraved, Laminated Acrylic, or Melamine Label: Adhesive backed, with black letters on white background. Minimum letter height shall be **1/4 inch** (7 mm).

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. Black letters on a white background. Minimum letter height shall be **1/4 inch** (7 mm).

E. Stenciled Legend: In nonfading, waterproof, **black** ink or paint. Minimum letter height shall be **1 inch** (25 mm).

F. Emergency Equipment labels shall be white letters on red background..

G. Provide nameplates with a minimum letter height as indicated below. Examples are given below for the size of letters to use for a given application and this not a list of the equipment to be identified. All equipment is required to be identified.

1. For equipment designation: switchboards and motor control centers: 1/2 inch, panel boards: 1/4 inch. For voltage, bus ampacity, feeder source, and circuit number: 1/8 inch.
2. Individual circuit breakers and or motor starters in motor control centers: For equipment designation and section number: 1/4 inch, for load served and location of load: 1/8 inch. Inside the door, a typed label shall provide complete motor data including nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.
3. Individual breakers in switchgears and switchboards: for breaker number

- (address number) and equipment designation; 1/4 inch, for breaker frame size and trip setting; 1/8 inch
4. Individual circuit breaker and spaces in panel boards: for numbers (section number) 1/4 inch.
 5. Individual circuit breakers in distribution panel boards: 1/4 inch for panel being fed and 1/8 inch for its location.
 6. Transformers: 1/4 inch for equipment designation and size; 1/8 inch for primary and secondary voltages, primary source and circuit number, secondary load and its location.
 7. Individual remote indicating lights, meters, instruments, and control switches: 1/8 inch, indicate unit, equipment, or fire detector being monitored and condition indicated by illumination.
 8. Individual switches and pilots: 1/8 inch, identify mechanical unit being served.
 9. Disconnects, relay panels, lighting contactors: 1/4 inch for voltage and source circuit number.

2.8 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 1. Minimum Width: 1/8 inch (3 mm).
 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 1. Minimum Width: 3/16 inch (5 mm).
 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.
 1. Minimum Width: 3/16 inch (5 mm).
 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at **50-foot (15-m)** maximum intervals in straight runs, and at **25-foot (7.6-m)** maximum intervals in congested areas.
- G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
1. In Spaces Handling Environmental Air: Plenum rated.
- H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Wire and Cable Marker:
1. For wire/cables smaller than No. 2/0 use manufacturer's standard cable/conductor markers of wrap-around, pre-numbered plastic coated type are to be used and numbered to show circuit identification.
 2. For cables No. 4 AWG and larger heat shrink sleeving is to be used for phase color-coding.
- B. Cable/Conductor Identification:
1. The application of cable/conductor identification, with circuit number, on each wire / cable in each box/enclosure/cabinet is required. The identification shall match the marking system used in panel boards, shop drawings, and contract documents.

- a. Provide labels on all wires, including in boxes where wires are pulled through but not terminated, such as junction boxes.

C. System Color Coding Schedule:

1. Electrical emergency power conduits, including all feeders and branch circuits serving or connected to emergency systems as defined in NEC 700.2, shall have "RED" stripes on each section every 5 feet of electrical conduit (visible from the floor or above a suspended ceiling) and within 3 feet of all equipment. All associated junction or pull boxes shall have the cover painted red.
2. 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 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 permanent marker.
3. Temperature control conduits shall have "BROWN" bands, 5' on centers for the entire length. All junction or pull boxes shall have the cover painted brown.
4. Fire Alarm conduit shall be a continuous red factory finish.

D. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch (100-mm) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch (75-mm) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

E. Accessible Raceways, More Than 600 V: Self-adhesive vinyl Snap-around labels. Install labels at maximum intervals.

F. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than A, and V to ground: Identify with self-adhesive vinyl label self-adhesive vinyl tape applied in bands. Install labels at maximum intervals.

G. Junction and Pull Box ID: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Work: EM.
2. Power.
3. Uninterruptible Power Supply: UPS.
4. Fiber Optics: FO.
5. Closed Circuit Television: CCTV.
6. Paging System: PA.
7. Radio Frequency: RF.

8. Fire Alarm: FA.
 9. Temperature Control: TC.
- H. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral: White
 - 5) Ground: Green
 - 6) Isolated Ground: Green with a yellow tracer
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral: Gray
 - 5) Ground: Green
 - 6) Isolated Ground: Green with a yellow tracer
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- I. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- J. Install instructional sign including the color-code for conductors using adhesive-film-type labels.
- K. Conductors to Be Extended in the Future: Attach write-on tags marker tape to conductors and list source.
- L. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions and terminals. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- M. Locations of Underground Lines: Identify with underground-line detectable warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Install underground-line detectable line marker for encased duct bank, direct-buried cables, and cables in raceway.
- N. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- O. Danger Signs:
1. Critical Switches/Controls: Danger signs shall be provided on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation could result in danger to persons, or damage to equipment, or damage to or loss of property.
- P. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels Baked-enamel warning signs Metal-backed, butyrate warning signs.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- Q. Caution Signs:
1. The following red caution sign is to be provided for all circuit breakers and switchboards where turning off a circuit will automatically start an emergency operation:
 - a. "Caution Turning Off this Circuit will Automatically Start Emergency Operation"
 2. The following red caution sign is to be provided for all automatic transfer switches, switches, circuit breakers, equipment, and emergency panels that are energized by the emergency power system:

- a. "Caution Automatically Energized by Emergency Power Supply System".
- R. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.
- S. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum **3/8-inch (10-mm)** high letters for emergency instructions at equipment used for emergency operations.
- T. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

- a. Indoor Equipment: Mechanically fastened, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with **1/2-inch (13-mm)** high letters on **1-1/2-inch (38-mm)** high label; where two lines of text are required, use labels **2 inches (50 mm)** high. Use black lettering on white field for normal and white letters on a red field for emergency. Provide text matching terminology and numbering of the contract documents and shop drawings. The sign shall include unit designation, source circuit number, circuit voltage, and other data specifically indicated. Also, the sign shall indicate normal source circuit number ("Fed from . . .") and emergency source circuit number when the equipment is a transfer switch or fed directly from a transfer switch.
- b. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend **4 inches (100 mm)** high.
- c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
- d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

- a. Panelboards: include main bus ampacity on sign. Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Switchgear.
- e. Switchboards.
- f. Disconnect switch.

- g. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - h. Substations.
 - i. Emergency system boxes and enclosures.
 - j. Motor-control centers.
 - k. Enclosed switches.
 - l. Selector switches, indicating lights. (Circuit number and voltage not required on sign).
 - m. Enclosed circuit breakers.
 - n. Enclosed controllers.
 - o. Variable-speed controllers.
 - p. Push-button stations.
 - q. Power transfer equipment.
 - r. Contactors.
 - s. Remote-controlled switches, dimmer modules, and control devices.
 - t. Battery-inverter units.
 - u. Battery racks.
 - v. Power-generating units.
 - w. Monitoring and control equipment.
 - x. UPS equipment.
 - y. Telephone cabinets and switching equipment. (Circuit number and voltage not required on sign.)
 - z. Fire alarm panels.
 - aa. Security monitoring master station.
 - bb. Relays
 - cc. Lighting contactors
 - dd. Individual distribution circuit breakers
3. All panel boards shall have a typed panel schedule indicating the date, contractor, type of equipment served, and its location.

3.3 EQUIPMENT NAMING

- A. Electrical Panels shall be named according to the panel names indicated on the drawings.
- B. Naming Disconnects and Transformers
 - 1. Disconnects shall have the same as the equipment they serve.
 - 2. Transformers shall have the same name as the low-voltage panel they supply power to with the extension of -X

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

TECHNICAL SPECIFICATIONS
26 - ELECTRICAL
260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260553

SECTION 260583 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Electrical connections to equipment specified under other Sections or furnished by the Owner.
- B. Applications of electrical power, control and monitoring connections specified in this section include the following:
1. From electrical source to motor starters.
 2. From motor starters to motors.
 3. To lighting fixtures and wiring devices.
 4. To converters, rectifiers, transformers, inverters, switchgear, switchboards, panel boards, generators, and similar equipment.
 5. To grounds including ground electrode connections.
 6. Equipment furnished in other Divisions (unless indicated otherwise).
 7. Electrical connections for equipment, that are not furnished as integral part of equipment, are specified in Division 14 Division 27 and other Division 26 sections and are criteria of this Section.
 8. **Refer to** Division 14 sections for motor starters and controllers furnished integrally with equipment; not criteria of this Section.
 9. Refer to Division 14 Division 27 sections for control system wiring, not criteria of this section.
 10. Junction boxes and disconnect switches required for connecting motors and other electrical units of equipment are specified in applicable Division 26 sections and are criteria of this Section.

- C. Related requirements:

1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables".

1.3 ACTION SUBMITTALS

- A. The following data shall be submitted in accordance with Sections 013300 "Submittal Procedures" required prior to starting installation:
1. Product Data: Manufacturer's data on electrical connections for equipment

products and materials.

- a. Include data substantiating that materials comply with requirements.
2. Complete wiring diagrams and/or shop drawings for installation purposes shall be furnished under the Mechanical or other Divisions, as required by DEN Project Manager, prior to installation.

1.4 CLOSEOUT SUBMITTALS

- A. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.5 QUALITY ASSURANCE

- A. Products, materials, equipment, and systems shall comply with the following Codes and Standards:
 1. NFPA Compliance: NFPA 70, "National Electrical Code (NEC)" as adopted and amended by the Denver Building Code and as applicable to products used and the installation of electrical power connections (terminals and splices), junction boxes, motor starters and disconnect switches.
 2. IEEE Compliance: Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to connections and terminations.
 3. ANSI Compliance: Applicable requirements of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical connections for equipment.
 4. UL Compliance: UL Std. 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors" including, but not limited to, tightening of electrical connectors to torque values indicated. Electrical connection products and materials are to be UL-listed and labeled.

1.6 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Products shall be as specified in other Sections of this Division.
- B. General: Each electrical connection shall be a complete assembly of materials,

including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, stress cones, splice kits, termination kits, solder less wire nuts, and other items and accessories as needed to complete splices and terminations as required.

1. Connectors and Terminals: Electrical connectors and terminals shall mate and match, including sizes and ratings, with equipment terminals that are recommended by equipment manufacturer for intended applications.
2. Electrical Connection Accessories: Electrical insulating tape, heat-shrinkable insulating tubing and boots, stress cones, splice kits, termination kits, wirenuts, and cable ties as recommended for use by accessories manufacturers for type of services required.

2.2 MECHANICAL AND ELECTRICAL COORDINATION

- A. Verify location, size, and characteristics of all mechanical equipment before installation of electric service. In all cases of the installation of heating, ventilating, air conditioning, plumbing, and other mechanical equipment, the Contractor is responsible for all revisions, changes, and modifications necessary to properly supply electric services to the equipment.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 PREPARATION

- A. Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of connections. Coordinate details of equipment connections with supplier and installer.

3.3 INSTALLATION

- A. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.
- B. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations. Length shall be six feet (6') maximum.
- C. Install pre-finished cord set where connection with attachment plug is indicated or specified, use attachment plug with suitable strain-relief clamps.
- D. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

- E. Make wiring connections in control panel or in wiring compartment of pre-wired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring as required for a complete operating system.
- F. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as required for a complete operating system. Connect with conduit and wiring as required for a complete operating system.

3.4 EQUIPMENT CONNECTION SCHEDULE

- A. Furnish, set in place, and wire, except as may be otherwise indicated, all heating, ventilating, air conditioning, plumbing, fire protection, and other motors and controls in accordance with the electrical/mechanical coordination schedule. The contractor shall carefully coordinate with work performed under the Mechanical and other Divisions if these specifications.
- B. All line and low voltage wiring shall be installed utilizing materials and methods as specified in the Division 26 of the technical specifications.
- C. Provide NEMA-rated motors and equipment suitable for operation on the voltage systems as designated below, with tolerances for the allowable voltage variations above and below the nominal:

1. Rated Motor Voltage:

| Service Voltage and Phase: | 1/3 HP and Smaller 1-Phase: | 1/2 HP and Larger 3-Phase: |
|-----------------------------------|------------------------------------|--|
| 120/208V, 3-Phase | 115V | 208V (Only when 480V is not available) |
| 277/480V, 3-Phase | | 460V |

3.5 INSTALLATION OF ELECTRICAL CONNECTIONS

- A. Electrical connections shall be installed in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.
 1. As a minimum: Each feeder circuit to panelboards, switchboards, motor control centers, transformers, and 480-volt (and higher) motor circuits shall have an insulated equipment ground conductor.
 2. All medium voltage splices and terminations are to be made by a certified cable splicer/terminator.
 3. Electrical service and feeders are to be maintained to occupied areas and operational facilities when temporary service is required during interruptions to existing facilities. Momentary outages for replacing existing wiring systems with new wiring systems shall be scheduled. When the "cutting-over" has been successfully accomplished, temporary wiring is to be removed.

4. Splices shall be covered with electrical insulating material equivalent to, or of greater insulation rating, than electrical insulation rating of those conductors being spliced.
5. Cables and wires shall be trimmed as long as practicable and routing shall be arranged to facilitate inspection, testing, and maintenance.
6. Connectors and terminals, including screws and bolts, shall be tightened in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings shall be used to comply with torquing values contained in UL 496A or the manufacturer's literature.
7. Identification markers are to be fastened to each electrical power supply wire/cable conductor in accordance with Section 260553 "Identification for Electrical Systems".
 - a. Markers are to be affixed on each terminal conductor, as close as possible to the point of connection.

3.6 FIELD QUALITY CONTROL

- A. The correct direction of rotation of each motor is to be verified.
- B. Provide measured torquing value checklist with witness signature to DEN Project Manager.
- C. Perform infrared scanning of all splices and terminations as required in Section 260519 "Low-Voltage Electric Power Conductors and Cables".

PART 4 - MEASUREMENT

4.1 MEASUREMENT

- A. No separate measurement will be made for the work specified in this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 260583

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Receptacles with integral surge-suppression units.
4. Isolated-ground receptacles.
5. Tamper-resistant receptacles.
6. Weather-resistant receptacles.
7. Snap switches and wall-box dimmers.
8. Solid-state fan speed controls.
9. Wall-switch and exterior occupancy sensors.
10. Pendant cord-connector devices.
11. Cord and plug sets.
12. Floor service outlets, poke-through assemblies, and multioutlet assemblies.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. SPD: Surge Protective Device.
- F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.8 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 3. Leviton Mfg. Company Inc. (Leviton).
 4. Pass & Seymour/Legrand (Pass & Seymour).
 5. or approved equal.
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Unless noted otherwise, all general-use straight blade devices shall be gray.
- B. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5351 (single), CR5362 (duplex).
 - b. Hubbell; HBL5351 (single), HBL5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362 (duplex).
 - e. or approved equal.
- C. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; IG5362RN.
 - b. Hubbell; IG5362.
 - c. Leviton; 5362-IG.
 - d. Pass & Seymour; IG5362.
 - e. or approved equal.
 - 2. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
- D. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. Cooper; TR8300.
- b. Hubbell; HBL8300SGA.
- c. Leviton; 8300-SGG.
- d. Pass & Seymour; TR63H.
- e. or approved equal.

2.4 GFCI RECEPTACLES

- A. Unless noted otherwise, all GFI receptacles shall be gray.
- B. General Description:
 1. Straight blade, feed through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- C. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Pass & Seymour; 2095.
 - d. Leviton; 7599.
 - e. or approved equal.
- D. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; GFTR20.
 - b. Pass & Seymour; 2095TR.
 - c. or approved equal.

2.5 PENDANT CORD-CONNECTOR DEVICES

- A. Description:
 1. Matching, locking-type plug and receptacle body connector.
 2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
 3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
 4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.6 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.7 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Unless noted otherwise, toggle switches shall be gray.

C. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Single Pole:
 - 1) Cooper; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - 4) Pass & Seymour; CSB20AC1.
 - 5) or approved equal.
 - b. Two Pole:
 - 1) Cooper; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - 4) Pass & Seymour; CSB20AC2.
 - 5) **<Insert manufacturer's name; catalog number(s)>**.
 - 6) or approved equal.

2.8 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Type 302/304 stainless steel 0.04 inch (1mm) thick.
3. Material for Unfinished Spaces: Type 302/304 stainless steel 0.04 inch (1mm) thick.
4. Material for Damp Locations: Type 302/304 stainless steel 0.04 inch (1mm) thick.

5. Plastic covers will not be accepted.

- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, Type 302/304 satin stainless steel with lockable cover.

2.9 FINISHES

- A. Device Color:

1. Wiring Devices Connected to Normal Power System: Gray
2. Wiring Devices Connected to Emergency Power System: Red
3. SPD Devices: Blue.
4. Isolated-Ground Receptacles: Orange

- B. Wall Plate Finish: 302/304 satin stainless steel. Plastic covers will not be accepted.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

- B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

- C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

- a. Cut back and pigtail, or replace all damaged conductors.

- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than **6 inches (152 mm)** in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
10. Mounting heights shall be as shown on drawings. If no heights noted, standard device heights above finished floor are as follows:
 - a. Wall switches: 48"
 - b. Convenience receptacles: 18"

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles install ground pin to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

- I. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

TECHNICAL SPECIFICATIONS
26 - ELECTRICAL
262726
WIRING DEVICES

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in enclosed switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in PDF format.
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.
7. Include data substantiating that materials comply with requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017825 "Operation and Maintenance Data," include the following:
1. Ambient temperature adjustment information.
 2. Current-limitation curves for fuses with current-limiting characteristics.
 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in PDF format.
 4. Coordination charts and tables and related data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses: Equal to ten (10) percent of quantity installed for each size and type, but no fewer than three (3) of each size and type.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

1.7 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (5 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.8 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.9 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
1. [Cooper Bussmann.](#)
 2. [Edison; a brand of Cooper Bussmann.](#)
 3. Ferraz Shawmut, Inc.
 4. [Littelfuse, Inc.](#)
 5. General Electric.
 6. Gould.
 7. Reliance.
 8. or approved equal.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class L, fast acting Class L, time delay Class RK1, fast acting Class RK1, time delay Class J, fast acting Class J, time delay Class T, fast acting.
2. Feeders: Class L, fast acting Class L, time delay Class RK1, fast acting Class RK1, time delay Class RK5, fast acting Class RK5, time delay Class J, fast acting.
3. Motor Branch Circuits: Class RK1 Class RK5, time delay.
4. Other Branch Circuits: Class RK1, time delay Class RK5, time delay Class J, fast acting Class J, time delay.
5. Control Circuits: Class CC, fast acting time delay.

B. Plug Fuses:

1. Motor Branch Circuits: Edison-base type, dual Edison-base type, single Type S, dual Type S, single-element time delay.
2. Other Branch Circuits: Edison-base type, single-element fast acting Edison-base type, dual-element time delay Edison-base type, single-element time delay Type S, dual-element time delay Type S, single-element time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.
- C. Install spare-fuse cabinet(s).

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

TECHNICAL SPECIFICATIONS
26 - ELECTRICAL
262813
FUSES

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.

3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
7. Include data substantiating that materials comply with requirements.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Manufacturer's field service report.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017825 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. As-Built Plans: Submit complete as-built plans of all Work, including interface with other Work, in accordance with requirements as specified in Section 013300 "Submittal Procedures".

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to ten (10) percent of quantity installed for each size and type, but no fewer than three (3) of each size and type.
2. Fuse Pullers: Two (2) for each size and type.

1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 1. Ambient Temperature: Not less than **minus 30 deg F** (minus 35 deg C) and not exceeding **120 deg F** (49 deg C).
 2. Altitude: **5500 feet** (1677 m).
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 1. Any power outages necessary to install or test electrical systems and/or equipment shall be coordinated with Denver International Airport Maintenance/Engineering. A written shutdown request form shall be submitted to and approved by the DEN Project Manager two (2) weeks prior to the shutdown.
 2. Indicate method of providing temporary electric service.
 3. Do not proceed with interruption of electric service without DEN Project Manager's written permission.
 4. Comply with NFPA 70E.

1.11 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.12 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
- Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - Siemens Energy & Automation, Inc.
 - Square D; a brand of Schneider Electric.
 - or approved equal.
- B. Type HD, Heavy Duty, Single Throw, **240, 600-V** ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
- Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - Auxiliary Contact Kit: Two (2) NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 - Hookstick Handle: Allows use of a hookstick to operate the handle.
 - Lugs: Mechanical type, suitable for number, size, and conductor material.
 - Service-Rated Switches: Labeled for use as service equipment.
 - Accessory Control Power Voltage: Remote mounted and powered; 120-V ac.

2.2 NONFUSIBLE SWITCHES

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
3. [Siemens Energy & Automation, Inc.](#)
4. [Square D; a brand of Schneider Electric.](#)
5. or approved equal.

B. Type HD, Heavy Duty, Single Throw, 240, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
4. Auxiliary Contact Kit: Two (2) NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material.
7. Accessory Control Power Voltage: Remote mounted and powered; 120-V ac.

2.3 RECEPTACLE SWITCHES

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
3. [Siemens Energy & Automation, Inc.](#)
4. [Square D; a brand of Schneider Electric.](#)
5. **<Insert manufacturer's name>.**
6. or approved equal.

B. Type HD, Heavy-Duty, Single-Throw Fusible Switch: **[240] [600]**-V ac, **[30] [60] [100]** A; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate **[specified] [indicated]** fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

C. Type HD, Heavy-Duty, Single-Throw Nonfusible Switch: **[240] [600]**-V ac, **[30] [60] [100]** A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

- D. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.
- E. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).
 - 1. Receptacle Manufacturer and Catalog Number: **<Insert manufacturer and catalog number>**.

2.4 SHUNT TRIP SWITCHES

- A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
 - 1. [Cooper Bussmann, Inc.](#)
 - 2. [Ferraz Shawmut, Inc.](#)
 - 3. [Littelfuse, Inc.](#)
 - 4. **<Insert manufacturer's name>**.
 - 5. or approved equal.
- B. General Requirements: Comply with[**ASME A17.1,**] UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.
- C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- D. Control Circuit: 120-V ac; obtained from [**integral control power transformer, with primary and secondary fuses,**] **<Insert source of control power>** with a control power [**transformer**] [**source**] of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.
- E. Accessories:
 - 1. Oiltight key switch for key-to-test function.
 - 2. Oiltight [**red**] [**green**] [**white**] [**yellow**] ON pilot light.
 - 3. Isolated neutral lug; [**100**] [**200**] percent rating.
 - 4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
 - 5. Form C alarm contacts that change state when switch is tripped.
 - 6. Three-pole, double-throw, fire-safety and alarm relay; [**120-V ac**] [**24-V dc**] coil voltage.
 - 7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.5 MOLDED-CASE CIRCUIT BREAKERS

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
3. [Siemens Energy & Automation, Inc.](#)
4. [Square D; a brand of Schneider Electric.](#)
5. or approved equal.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

F. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

G. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

H. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

I. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

J. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

2.6 MOLDED-CASE SWITCHES

- A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
 1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 3. [Siemens Energy & Automation, Inc.](#)
 4. [Square D; a brand of Schneider Electric.](#)
 5. or approved equal.
- B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Features and Accessories:
 1. Standard frame sizes and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

2.7 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R.
 3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 5. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- 3.5 ADJUSTING
- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 METHOD OF PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

TECHNICAL SPECIFICATIONS
26 - ELECTRICAL
262816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 20256518

END OF SECTION 262816

SECTION 275123 - EMERGENCY COMMUNICATIONS SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Microprocessor-switched intercommunications and program systems with the following components:
 - 1. Announcement Control System.
 - 2. Software.
 - 3. Server.
 - 4. Workstation.
 - 5. Visual Display Devices.
 - 6. Monitoring and Testing Systems.
 - 7. Ambient Noise Sensing System.
 - 8. Flight Announcement System.
 - 9. Master Emergency Communication Microphone stations.
 - 10. Microphone stations.
 - 11. Amplifiers.
 - 12. Loudspeakers.
 - 13. Conductors and cables.
 - 14. Raceways.
- B. Related Sections:
 - 1. Sections of Division 01 "General Requirements"
 - 2. Sections of Division 26 "Electrical"
 - 3. Sections of Division 27 "Communications"
- C. System Overview:
 - 1. This section covers the emergency communication system, and associated equipment for use in all projects. As such, loudspeakers shall be provided to achieve intelligible audio in all spaces.

1.3 REFERENCE STANDARDS

- A. Comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents.

- B. A listing of the applicable reference standards is contained in Section 014225 "Reference Standards".
- C. In addition to all applicable local and state codes, the work shall be in accordance with the latest revisions of all applicable standards and specifications, including the following:
1. Currently adopted City and County of Denver Building and Fire Codes as amended.
 2. National Fire Protection Association (NFPA):
 - a. NFPA 70, National Electrical Code.
 - b. NFPA 72, National Fire Alarm and Signaling Code.
 3. National Association of Broadcasters (NAB).
 4. International Building Code (IBC).
 5. International Fire Code (IFC).
 6. EIA: Electrical Industries Association.
 7. Underwriters Laboratories (UL):
 - a. UL6, Electrical Rigid Metal Conduit – Steel.
 - b. UL 464, Standard for Audible Signal Appliances.
 - c. UL 797, Electrical Metal Tubing – Steel.
 - d. UL 1242, Standard for Electrical Intermediate Metal Conduit – Steel.
 - e. UL 1480, Standard for loudspeakers for Fire Alarm, Emergency, and Commercial, and Professional Use.
 - f. UL 2572, Standard for Mass Notification Systems.
 - g. Other UL Standards shall be applied to ensure that all materials are listed for their intended purpose.
 8. United States Access Board (USAB) – Americans with Disabilities Act (ADA) and the 2010 ADA Standards for Accessible Design.

1.4 PERMITS

- A. DEN Life Safety Approved drawings and DFD Permit is required for all work affecting audio and /or video ECS equipment.

1.5 ACTION SUBMITTALS

- A. Provide Submittals in accordance with requirements of Division 01.
- B. Product Data: For each type of product indicated.
1. Technical data on each component.
 2. Materials list and backbox schedule (including unique backboxes).
 3. Include data substantiating that materials comply with requirements.
- C. ECS Drawings: For emergency communications system. Include plans, elevations,

sections, details, spreadsheets, and attachments to other work.

1. Drawings shall be stamped by a Professional Engineer licensed in the state of Colorado as part of the submittal.
2. Drawing submittals shall be done on the existing DEN as-builts and clouded to show the scope of work. Drawings in Auto CADD shall have project specific layer(s) showing new work or modifications on its own layer(s) with the project name.
3. Drawings shall be of scale suitable for use for fabrication. They shall show materials, finishes and panel/control markings. Contractor shall make the following submittals:
 - a. Shop drawings shall be submitted with information as required by currently adopted NFPA72 and any applicable codes designated per AHJ.
 - b. Amplifier load calculations
 - c. Level of ambient SPL anticipated for design basis per 2016 NFPA 72 section 18.4.1.4.3.
 - d. Estimated intelligibility score expected by design.
 - e. A complete list of equipment for the systems, including that required for items that are to be fabricated by the Contractor.
 - f. A complete set of detailed technical descriptions describing and illustrating all components and materials.
 - g. A complete set of shop drawings of items that are to be fabricated by the Contractor and/or which the Contractor intends to fabricate or has fabricated, including but not limited to, the custom panels and receptacle plates.
 - h. System block diagrams.
 - i. Equipment rack and console layouts.
 - j. Details of cable management and termination in terminal boxes junction boxes and equipment racks.
 - k. Wiring diagrams showing the exact manner in which the Contractor proposes to install the system. Show all switches, modifications to equipment, control circuits, and equipment rack layouts. Show all equipment/apparatus items that are required for performance of the required functions. Include the following:
 - 1) Single-line diagram showing interconnection of components.
 - 2) Cabling diagram showing cable routing.
 - l. Drawings identifying all terminals, wiring color-coding and control functions.
4. Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection. They shall show materials, finishes and panel/control markings.
5. Microphone Station Schedule including the following information:
 - a. Station number.
 - b. Location.
 - c. Station model number.
 - d. Station mounting.

- e. Handset type.
 - f. IP address.
 - g. Identity of associated parent station, if applicable.
 - h. Fiber optic transceivers if necessary.
- 6. Equipment design considerations for future expansion, when indicated.
 - 7. Description of system operation.
 - 8. A complete list of equipment for the systems, including that required for items that are to be fabricated by the Contractor.
 - 9. Equipment rack and console layouts.
 - 10. Zone programming table with microphone station programming for each location.
 - 11. Details of cable management and termination in terminal boxes, junction boxes, and equipment racks.
- D. The data submitted by the Contractor shall be sufficiently detailed to enable the Owner's Representative to determine whether the equipment, materials, and installation that the Contractor proposes to furnish comply with the requirements of this specification, and whether or not the Contractor's organization is qualified by experience, and by capability of personnel, to execute the work described herein.

1.6 INFORMATIONAL SUBMITTALS

- A. Spreadsheet of all IP devices, their functionality, model number, and location with placeholders for Owner to provide IP address, Masking, port assignment, switch name and default gateway assignments. Templates are available upon request. Also, include POE power requirements and the equipment room that the supporting network switch is located.
- B. Qualification Data:
 - 1. Qualifications shall be provided for installer as required in Quality Assurance, 1.9 A.
- C. Field Quality-Control Reports. Submit quality reports throughout project as decided in Pre-Construction Meeting. Include communication room conditions, loudspeaker testing information, test and inspection reports as detailed in section 3.12 A, infrastructure connectivity quality and power outage coordination to prevent power issues from damaging installed equipment.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. A record of Owner's equipment-programming option decisions.
 - 2. Factory-prepared operation and service manual for each system.
 - 3. Contractor shall provide technical information for all electronic apparatus, including but not limited to schematic diagrams and parts lists, manufacturer's

- installation instructions, operating instructions and technical specifications.
4. All system spreadsheets, shop drawings prepared and used by the Contractor, as-built drawings, and any other documents which were used in construction or programming, even if not required to be submitted for approval. This shall include, but not be limited to, wiring diagrams, schedules for identification of building wiring and installation details useful to a maintenance technician.
 5. Instruction Manuals:
 - a. Provide one (1) hard copy and one (1) electronic copy of an Instruction Manual containing the following:
 - 1) Table of Contents.
 - 2) Instructions for operating the system in all modes of operation and for fulfilling all functional requirements.
 - 3) List of settings and adjustments for semi-fixed controls.
 - 4) Manufacturer's sheets of specifications, operating instructions and service information arranged alphabetically by manufacturer and then by model number.
 - 5) Complete detailed wiring diagrams and one-line diagrams for the "as-built" system in reproducible format.
 - 6) Recommended preventive and remedial maintenance.
 - 7) Complete parts list.
 6. Tenant User Manuals:
 - a. Provide ten (10) hard copies and one (1) electronic copy of Tenant User Manual. They shall include the following information:
 - 1) Basic description of equipment and its functions.
 7. As-Built Documents: Two (2) weeks prior to final acceptance testing, the Contractor shall provide two (2) sets of "as-built" prints, and one (1) electronic copy of the following:
 - a. System block diagrams.
 - b. Equipment rack and console layouts.
 - c. All termination cabinet locations and layouts.
 - d. System wiring diagrams.
 - e. Test reports, as specified herein.
 - f. Written warranty, as specified herein.
 - g. As-Built drawings in AutoCAD shall have project specific layer(s) showing new work or modifications on its own layer(s) with the project name. New work shall be shown in a dark lineweight, with existing conditions shown in a light lineweight.
 8. Project Record:
 - a. Provide As-Built drawings in accordance with NFPA 72, "Record Drawings".
 - b. Provide Record of Completion in accordance with NFPA 72, "Record of Completion".

- c. Provide project information on USB flash drive, or format as requested by DEN Project Manager.
 - d. Provide two (2) ANSI C sized printed copies and (2) electronic copies on USB flash drives, or format as requested by DEN Project Manager with electronic files to DEN Life Safety.
9. Field Documentation:
- a. Provide laminated information sheets of new zone or message information for new operating positions at the gates. Include simple microphone station use directions.

1.8 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers' Qualifications: Paging control system, microphone stations, amplifiers, ambient noise system equipment, monitoring hardware shall be manufactured by:
 - a. AtlasIED (formerly known as Innovative Electronic Designs, Inc.) (IED).
2. Contractor's Qualifications:
 - a. Installers for ECS system components shall have a current DFD mass notification system Installer's License and a manufacturer certification. Installers for ECS field devices shall have a current DFD mass notification system installer's license.
 - 1) Installers working on both ECS and Fire Alarm systems shall also have a Fire Alarm Installer's License from the City and County of DFD, in addition to the licensing requirements stated above.
 - b. The ECS shall be installed by a Contractor who has been regularly engaged in the installation of electronic equipment for at least five (5) years and certified to install IED Voice Paging Systems.
 - c. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size.
3. A resume of qualifications shall be submitted with the Contractor's bid indicating the following:
 - a. A list of recently completed projects of similar type and size with contact names and telephone numbers for each.
 - b. A technical resume of experience for the Contractor's Engineer and on-site installation foreman who will be assigned to this project.
 - c. Similar documentation will be required of any subcontractor who will assist the Contractor in performance of this work. All proposed subcontractors must demonstrate equal or superior experience or technical qualifications to

the Contractor to contract for any part of the installation or testing of the system.

4. Contractor shall be an authorized installer and dealer of the specified equipment with a service facility within 100 miles of the project site.
5. Contractor shall submit proof that the primary system programmer has attended a programming school hosted by the manufacturer of the computerized systems to be provided under this section and is proficient in the current version of the system.

B. Warranty:

1. Provide a written two (2) year warranty, signed by the Contractor, beginning on the date of Substantial Completion.
2. Include the following provisions:
 - a. Contractor shall provide initial response within 2 hours by phone and 4 hours on site.
 - b. Warranty issues shall be addressed until resolved.
 - c. Warrant all equipment and the installation to be free of faulty workmanship.
 - d. Warrant all components, including solid state devices, to be free of defects for a period of two (2) years from the date of final acceptance.
 - e. Paint and exterior finishes, fuses and lamps are excluded from the above warranty, except when damage or failure results from defective materials or workmanship covered by the warranty.

1.9 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted loudspeaker and ambient noise sensor microphones with other construction that penetrates ceilings or is supported by them, including light fixtures, fire-suppression system, and partition assemblies.
- B. Coordinate installation with existing DEN systems (i.e., telecommunications, security, fire alarm, etc.). Notify DEN Project Manager promptly of any conflicts that are identified.

1.10 CONSTRUCTION WASTE MANAGEMENT

- A. Construction waste shall be managed in accordance with provisions of Section 017419 "Construction Waste Management and Disposal". Documentation shall be submitted to satisfy the requirements of that Section.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials, equipment, and apparatus provided shall be new and of the latest design

or model offered for sale by the approved manufacturer.

- B. Acceptability for use in the systems shall be determined by DEN Life Safety. Such items shall be installed only after receipt of written approval of the DEN Project Manager.
- C. All products shall be compatible with the existing system.
- D. All products shall be rated for continuous (24-hour, 365-day) use.

2.2 ENVIRONMENTAL CONDITIONS

- A. The equipment shall be designed and constructed to operate successfully at the rated values under the following environmental conditions:
 - 1. Location: Indoors and Outdoors.
 - 2. Altitude: 5,500 feet (1677 m) above sea level.
 - 3. Ambient Temperature Range: Minus 30 deg F (minus 35 deg C) to 120 deg F (49 deg C).

2.3 ANNOUNCEMENT CONTROL SYSTEM (ACS)

- A. The ACS shall provide system setup, control, and messaging for the PA system and integrate with the existing systems at DEN in order to provide a fully functioning and monitored system.
- B. ACS shall be capable of managing 240 microphone stations and 65,536 zone outputs per unit.
- C. ACS shall provide 8 x 8 message system expandable to 64 x 64 of pre-recorded messages via the use of additional message controller(s).
- D. ACS shall provide up to 180 simultaneous announcements and messages over a single LAN or VLAN.
- E. ACS shall provide the following:
 - 1. Fully redundant architecture over standard LAN.
 - 2. System backup and restoration configuration files.
 - 3. Built-in wizards for initial setup.
 - 4. Integrated visual paging support.
 - 5. Event messaging allowing multiple actions or events to be triggered.
 - 6. Multi-Language support for different language packages or second language requirements as defined in the specification.
- F. Manufacturer:
 - 1. IED IP 100 Series Software. Include hot standby backup for each primary controller.

2. or approved equal.

2.4 AMBIENT NOISE SENSING SYSTEM

- A. Ambient Noise Sensor Collector shall be provided for noise sensor termination from the field devices. Collector shall be used with Titan 9160 amplifier system exclusively. Collector shall:

1. Be PoE device or connect to local 48Vdc power supply.
2. Connect 32 ambient noise sensors on each frame.
3. One (1) RU and rack mountable.

- B. Manufacturer:

1. IED T9032NS with IED 540S-2 Sensor on 2-Gang Plate.
2. or approved equal.

2.5 AUTOMATIC TEST AND MONITOR SYSTEM

- A. The Automatic Test and Monitor System shall provide for self-diagnostics that operate in real time under software control. This self-testing shall include testing of logic, audio operation, power supplies, and power amplifiers. This test shall be automatic and utilize only one system as the interface for the test. Results shall be logged on the PC and a fault list generated that can be printed for the Owner Maintenance staff.

- B. System shall report results of actual audio signals being routed through the entire system as well as loudspeaker impedance load changes, loudspeaker ground faults and End of Line loudspeaker faults.

- C. System faults shall be reported through software with clearly labeled information and through external interfaces to other systems, via RSS feeds, contact closures, or network messages.

- D. System shall collect information from internal IED test and monitoring devices in hardware and report faults or settings.

- E. System shall allow circuit testing and reset of corrected fault.

- F. Manufacturer:

1. 610 Monitor/Test Software for the system server.
2. 596SGFI Dual Channel sensors for loudspeaker lines.
3. 596EOL loudspeaker end-of-line sensor as required by Designer.
4. or approved equal.

2.6 MICROPHONE PAGING STATIONS

- A. General:

1. Microphone stations shall originate announcements into zone groups as determined by the DEN Project Manager.
 2. Any microphone page station shall be capable of being programmed into any zone group.
 - a. Microphone stations shall be capable, when so programmed, of making emergency zone group announcements, terminal zone group announcements, local zone group announcements, and multi-local group announcements.
 - b. When so programmed, they shall also be capable of performing any or all of the control functions for pre-recorded and assembled messages.
 - 1) These control functions shall include initiating a playback sequence, interrupting a playback sequence, recording a message, monitoring a message, or playing back a message to its own multi local group, or to a terminal zone group instead of to the zone map assigned to that message.
 3. The microphone stations shall include a microphone; either handheld, handset or gooseneck-mounted type.
 4. Each microphone station shall have buttons for zone group selection to activate that microphone station for announcements into pre-programmed zones.
 - a. Green and Red LED's shall indicate ready or busy respectively. Any 5-second pause after the green LED has illuminated shall terminate the announcement.
 5. Each station shall include its own microphone preamplifier, test oscillator, compressor, and balanced output line amplifier for driving long lines without appreciable high frequency loss.
 - a. The ACS microprocessor, under software control shall continuously interrogate all active microphone and telephone page stations for requests.
 6. Specifications – Total System, Direct Microphone Station input to Zone Output:
 - a. Frequency Response: 0.5dB 20Hz - 20kHz.
 - b. Total Harmonic Distortion (THD): < .05% @ +24dBm 20Hz - 20kHz.
 - c. Noise Referred to Input: -125dBv 20Hz - 20kHz.
 - d. Signal-to-Noise (limited by input amp): > 80dB.
 - e. Gain, Adjustable at each paging station: 65dB Maximum.
 - f. Maximum Output Level: +24.0dBm.
 - g. Normal Output Level: +2.0dBm.
 - h. High-pass filter in mic station defeated.
- B. Full function Communication Stations:
1. Stations shall have a 12-button keypad for data entry, (8) soft function keys and a color graphical LCD.
 2. The station shall be a network appliance with control and CobraNet audio

- communicating on the audio network.
3. Connection to the system shall be 100BaseT with power provided by a PoE switch port or PoE mid span power.
 4. Microphones shall be provided as handheld or gooseneck as required.
 - a. Each microphone shall utilize a magnetic mount and include a line amplifier in the microphone shell to eliminate microphone signal levels beyond the microphones.
 5. Each station shall support the connection of up to three 528SK Sidekick expansion stations.
 6. Stations shall be provided in vertical, horizontal, surface, flush, or desktop as noted on the drawings and based on the mounting situation required.
 7. Acceptable Products:
 - a. Horizontal Communications Station:
 - 1) IED 528HFM-H.
 - 2) or approved equal.
 - b. Vertical Communications Station:
 - 1) IED 528VFM-H.
 - 2) or approved equal.
- C. Microphone Communication Station Enclosures:
1. For station mounting locations requiring desktop, angled vertical, or angled horizontal, provide factory enclosures to match the finish of the station. Enclosures shall be non-metallic and include rubber feet.
 2. Acceptable Products:
 - a. IED 528VBB or 528HBB.
 - b. or approved equal.
- D. Master Emergency Communications Systems Microphone Station (MECSMS):
1. Microphone station shall be complete with integral 17- inch touchscreen monitor computer workstation and graphics user interface per DEN Standards. MECSMS shall provide:
 - a. Standard Microphone station as required.
 - b. Graphical User Interface (GUI) developed for project.
 - c. GUI software application for microphone zone selection and message playback.
 - d. Message selection and de-selection.
 - e. Live page capabilities.
 - f. Acceptable Products:
 - 1) IED 528 series with touchscreen workstation IED 591D.
 - 2) or approved equal.

E. Expansion Microphone Communication Station:

1. Expansion stations shall act as an intelligent slave station to a full function station.
 - a. Expansion stations shall include (4) soft function keys that can be programmed for operations independent of the master station to which it is connected. This shall allow flight announcements and other cued messages to be controlled from the expansion location.
 - b. Microphones shall be provided as handheld and include a line amplifier in the microphone shell to eliminate microphone signal levels beyond the microphone.
 - c. The station shall mount in a standard 2-gang wall box and connect to the full function station with Cat5e cable and RJ45 modular connectors.
2. Acceptable Products:
 - a. Expansion Communications Station IED 528SK.
 - b. or approved equal.

F. Rack Communications Station:

1. Rack Communication Stations shall have a 12-button keypad for data entry, eight (8) soft function keys and a color graphical LCD.
2. The station shall be a network appliance with control and CobraNet audio communicating on the audio network.
3. Connection to the system shall be 100BaseT with power provided by a PoE switch port or PoE mid span power.
4. Microphones shall be handheld and utilize a magnetic mount. It shall include a line amplifier in the microphone shell to eliminate microphone signal levels beyond the microphones.
5. The station shall include a flush loudspeaker for monitoring selected audio.
6. The loudspeaker shall be powered by an 8-watt power amplifier and include a panel volume control.
7. The station shall use no more than four (4) standard rack units.
8. Acceptable Products:
 - a. IED 528SRM-H Rack Communications Station.
 - b. or approved equal.

2.7 EXTERNAL SYSTEM INTERFACE

- A. An external interface shall be provided to allow interfacing contact inputs or outputs into the ACS system from the Fire Alarm System, Video displays, or other systems. Each interface shall provide 64 input closures and output closures or voltage ports in groups of 8.
- B. Acceptable Products:

1. IED T9032LVIO, T9064LVIO, PoE required.
2. or IED T9040NLR.
3. or approved equal (model and quantity as required).

2.8 POWER AMPLIFIERS

- A. Integrated Digital Power Amplifier System (IDPAS): The IDPAS shall provide DSP processing and power amplification for up to (16) zones in a single modular mainframe.
1. Digital Audio Network Interface:
 - a. The network interface shall receive (32) dynamic assigned audio channels from the ACS via the Ethernet Network. Control for the IDPAS and monitoring shall be included on the network. The NIC shall provide dual outputs to support a redundant network.
 2. Zone Manager:
 - a. The IDPAS shall provide zone management for (16) channels as directed by the ACS. Channel management shall be structured to utilize the minimum channels necessary on the network to support paging, messaging, and background music activity for any combination of zones.
 3. DSP Processing:
 - a. The IDPAS shall include digital signal processing for (16) channels of audio. Each channel shall include (9) bands of parametric equalization, time delay, ambient analysis control, (7) monitoring points, and (7) testing points. Complete setup and control software shall be integrated within the Enterprise Software and available on the network for configuring, controlling, monitoring, and testing the DSP for each channel.
 4. Ambient Analysis and Control:
 - a. The Ambient Analysis System shall adjust signal levels in response to either ambient noise levels or computer commands. The system shall operate in real time and shall not be a "sample and hold" system. The system shall include an automatic calibration sequence. All setup, configuration, and monitoring controls shall be software based with the ability for multiple sensors averaged to control a single channel(s) or for a single sensor to control multiple channels. The sensors shall utilize control signaling and levels that allow co-locating with the loudspeaker cable for cable routing efficiency. Three (3) modes of operation shall be possible:
 - 1) Automatic: Changes attenuation levels in response to noise levels reported by remote sensors.
 - 2) Slaved: Changes attenuation levels based on remote sensors of an automatic channel.

- 3) Fixed: Fixed attenuation as set by the computer and user.
5. Power Amplifier Cards:
- a. Each IDPAS mainframe shall be designed to accept (9) amplifier cards.
 - b. Each card shall be removable and replaceable without disabling or interfering with the operation of the DSP or other power amplifier cards.
 - c. The amplifier cards shall be available as dual 300-watt cards or dual 600-watt cards and shall be of a high efficiency design to maintain a minimum of 78% efficiency at 100% output.
 - d. The mainframe shall support simultaneous use of (8) amplifier cards (16 channels) plus the hot spare card.
 - e. Provide appropriate card models as required.
6. Automatic Backup Amplifier Switching:
- a. The 9th power amplifier slot shall be reserved for automatic backup amplifier switching.
 - b. A matching amplifier card shall be installed as a hot spare amplifier in the event of failure of one of the primary amplifiers.
 - c. Backup amplifier shall be sized to substitute for the largest amplifier installed in the mainframe.
 - d. The system shall detect a failure of an amplifier card and shall electronically replace that amplifier without loss of service.
 - e. Switching shall result in no loss or change of source or destination routing. Detection and switching shall take place in less than 2 seconds.
 - f. A failure shall be reported immediately to the fault logging system.
7. Internal Monitoring:
- a. Each IDPAS shall include an internal audio monitoring buss with software selected switching.
 - b. This monitor shall allow selection of a monitor point from the control software to allow visual and audio monitoring of the channel network input, channel direct input, ambient channel output, EQ output, amplifier input, amplifier output, and loudspeaker load monitor for each of the (16) channels.
 - c. This feature shall operate simultaneously and independent of the automatic testing.
8. Automatic Testing:
- a. The automatic testing system shall locally test and process audio test signals through the IDPAS.
 - b. These tests may be done manually on demand for any single test point as well as globally in the mainframe on a completely automated basis during the day.
 - c. The test points duplicate those of the monitoring points above with a testing resolution of 0.5 dB.

9. Local Inputs:

- a. The IDPAS shall include (16) analog inputs for local zone program sources or BGM. One channel shall be configurable as a backup emergency input usable in the event of a network failure.
- b. Acceptable Products:
 - 1) Integrated Amplifier Mainframe: IED T9160L or approved equal.
 - 2) Dual 300 Watt 70-Volt Amplifier Card: IED T6302L or approved equal.
 - 3) 600 Watt 70-Volt Amplifier Card: IED T6301L or approved equal.
 - 4) or approved equal.

2.9 END OF CIRCUIT SUPERVISION

- A. The end of circuit supervision module shall enhance the loudspeaker line supervision functions of the system. Module shall include:
 1. Supervision of 70 and 100-volt loudspeaker lines without the need for a return wire.
 2. Unique ID number for identification in the system monitoring software.
 3. Proof that cable is intact to the end of the circuit.
- B. Manufacturer:
 1. IED T597EOB, IED T596EOL (for end of Line).
 2. Or approved equal.

2.10 UNINTERRUPTABLE POWER SUPPLY (UPS)

- A. Provide UPS in accordance with Section 263353 "Static Uninterruptible Power Supply".
- B. A UPS shall be supplied for critical components of the ECS including the ACS, microphone stations in Fire Command Centers and Communication Centers, ECS network switches, and amplifier frames to insure uninterrupted service and control of the system.
- C. UPS shall be rack-mounted device with 24 hours standby and 15 minutes of operation at full load. Monitor LAN connection for supervision of unit.
 1. Manufacturer:
 - a. See Section 263353 "Static Uninterruptible Power Supply" for latest standard.

2.11 LOUDSPEAKERS

- A. General: Loudspeaker design shall be provided to meet the requirements of the currently adopted edition of NFPA72 – “Notification Appliances”. Match Existing loudspeakers in areas if Project includes additions or remodels.
1. All network capable loudspeakers shall be permanently connected to the ECS network for monitoring and configuration.
- B. Type S1, Full-Range Paging Loudspeaker, Flush Mount with grille:
1. Loudspeaker Type S1 shall be a 6.5- inch diameter coaxial device, UL 1480 & 2043 with a minimum input sensitivity of 90 dB measured at 1 meter with 1 watt input from 800 Hz to 4 kHz, frequency response shall be ± 7 dB, 80 Hz to 20 kHz and the coverage angle shall be a nominal 90 degrees conical.
 - a. The loudspeakers shall be rated for up to 32 W minimum and shall include a 70 V line matching transformer, with 0.5 dB maximum insertion loss over the frequency range of 100 Hz to 15 kHz and selectable level taps at 4, 8, 16 and 32 watts, which shall be wired in parallel with the voice coil.
 - b. Type S1 loudspeakers shall use the safety First Mounting System and be suitable for mounting in suspended tile or drywall and shall be an integrated flush mounted loudspeaker enclosure, 8.9- inches minimum depth x 10.5- inches wide.
 2. These loudspeakers shall be utilized in public areas with suspended tile or drywall ceiling height of 15 ft. or less.
 3. Manufacturer:
 - a. Atlas FAP63T-W with integrated back can, grill and suspension system.
 - b.
 - c. or approved equal.
- C. Type S2, Full-range Paging Loudspeaker, Flush Mount behind perforated metal ceiling:
1. Loudspeaker Type S2 shall be a 4.5- inch diameter coaxial device, UL 1480 & 2043 with a minimum input sensitivity of 90 dB measured at 1 meter with 1 watt input from 800 Hz to 4 kHz, frequency response shall be ± 7 dB, 90 Hz to 20 kHz and the coverage angle shall be a nominal 90 degrees conical.
 - a. The loudspeakers shall be rated for 32 W minimum and shall include a 70 V line matching transformer, with 0.5 dB maximum insertion loss over the frequency range of 100 Hz to 15 kHz and selectable level taps at 4, 8, 16 and 32 watts, which shall be wired in parallel with the voice coil.
 - b. Type 2 loudspeaker shall use the Safety First Mounting System where applicable. Where required, a separate a mounting ring shall be provided to secure the loudspeaker to the enclosure. Standard grilles will not be used behind perforated metal.
 - c. All other specified requirements apply as stated.
 2. Perforated metal ceiling materials must have at least 80% opening to avoid

- affecting loudspeaker performance or intelligibility.
3. These loudspeakers shall be utilized in public areas with perforated metal ceiling at a height of 15 ft. or less.
 4. Manufacturer:
 - a. Atlas FAP43T-W and support.
 - b. or approved equal.

D. Type S3, Two-way Curbside Paging Horn:

1. Loudspeaker Type S3 shall be a two-way device with a compression driver and folded high frequency horn, coupled through a crossover network to a horn-loaded woofer.
 - a. The frequency response shall be ± 5 dB, 190 Hz to 18 kHz with low frequency cut-off at 200 Hz.
 - b. The input sensitivity shall be 111 dB at 1 meter with 1 watt pink noise input from 400 Hz to 5 kHz.
 - c. The loudspeaker shall be rated for 30 W with 250 Hz to 5 kHz pink noise signal with a 6 dB crest factor for a period of eight hours.
 - d. The low-frequency horn shall be constructed of reinforced fiberglass and the high frequency horn of die-cast aluminum finished in white.
 - e. The horn shall produce a 63 degree horizontal by 85 degree vertical coverage pattern at 2 kHz.
 - f. The loudspeaker shall be provided with a 70 Volt line matching transformer with 3.75, 7.5, 15 and 30 watt taps and bracket to allow aiming.
 - g. The loudspeaker shall be suitable for mounting to a 4- inch octagonal electrical box.
2. These loudspeakers shall be utilized on Terminal levels 4, 5 and 6 curbsides.
3. Manufacturer:
 - a. Penton MSH30T.
 - b. or approved equal.

E. Type S4, 12- inch Coaxial Loudspeaker:

1. Loudspeaker Type S4 shall be a high quality two-way loudspeaker system, consisting of a constant directivity horn, coaxially mounted in front of a cone transducer.
 - a. The overall frequency response shall be ± 3 dB, 100 Hz to 15 kHz and the loudspeaker shall be rated for 150 W continuous pink noise.
 - b. The low frequency transducer shall be 12- inches in diameter with an input sensitivity of 99 dB at 1 meter with 1 watt averaged from 500 Hz to 2.5 kHz.
 - c. The high frequency driver/horn shall have a symmetrical coverage pattern of 90 degrees between 1 kHz and 10 kHz and a sensitivity of 110 dB at 1 meter with 1 watt input averaged from 2 kHz to 10 kHz.
 - d. Type S4 assemblies shall be provided with a passive crossover with a crossover frequency of 1.5 kHz.

- e. A 70 Volt line matching transformer, with 0.5 dB maximum insertion loss over the frequency range of 100 Hz to 15 kHz and 7.5, 15, 30 and 60 watt taps, shall be wired in parallel with the voice coil.
 - f. The assembly shall be suitable for mounting in a (3) cubic foot square enclosure provided under another contract.
 - g. A square 22 gauge steel grille shall be provided which can be mounted to enclosures in the Terminal airline ticketing areas or in the Concourse ceilings.
2. These loudspeakers shall be flush mounted above the airline ticket counters in the Terminal and flush mounted in the Mezzanine level ceiling structure down the center of the Concourses at a height of approximately 32 ft.
 3. Manufacturer:
 - a. Atlas 12CX with Q4812 Back box and mounting hardware.
 - b. or approved equal.
- F. Type S5, Ceiling Loudspeaker
1. Loudspeaker Type S5 shall be a two-way coaxial loudspeaker with a constant directivity horn mounted in a backcan with supports and grill assembly.
 - a. Unit shall be flush mounted in ceiling and supported with a safety cable to structure above besides normal means and methods.
 - b. Loudspeaker shall be 92dB 1W/1M with a frequency response of 60Hz 0-15kHz +/- 5 dB. loudspeaker shall have an internal 70/100 volt transformer with taps of 7.5, 15, 30 and 60 watts including an 8 ohm setting.
 2. These loudspeakers shall be installed in new high ceiling areas in lieu of the 12-inch loudspeakers in the center of the concourses.
 3. Manufacturer:
 - a. Atlas FAP8CXT with mounting hardware.
 - b. or approved equal.
- G. Type S6, Paging Horn:
1. Loudspeaker Type S6 shall be a high power paging horn consisting of a compression driver and an aluminum re-entrant horn flare with a symmetrical dispersion angle of 100 degrees.
 - a. The frequency response shall be ± 10 dB, 300 Hz to 6,500 Hz at the minimum, with a sensitivity of 107 dB at 1 meter with 1 watt 1 kHz input.
 - b. Type S6 units shall have a power rating of 30 W and shall be supplied with a transformer with 4, 7.7, 15, and 30 watt taps.
 - c. An adjustable mounting bracket shall be provided which is suitable for mounting to a 4- inch octagonal electrical box and allows aiming of the device.
 2. These loudspeakers shall be used in the Terminal Parking Garage, the AGTS

3. Tunnel, Central Plant, mechanical rooms and other high noise environments.
3. Manufacturer:
- Atlas AP30T with APXB-N Base.
 - or approved equal.
- H. Type S7, Paging Horn with Dual Horn Flares:
- Loudspeaker Type S7 shall be a high power paging horn consisting of a single compression driver, coupler and two aluminum re-entrant horn flares with a symmetrical dispersion angle of 100 degrees.
 - The frequency response shall be ± 10 dB, 250 Hz to 12,500 Hz with a sensitivity of 101 dB at 1 meter with 1 watt input swept from 500 Hz to 2.5 kHz.
 - The loudspeakers shall have a minimum power rating of 30 W and shall be provided with a 70 Volt line matching transformer wired in parallel with the voice coil with 4, 7.5, 15 and 30 watt taps.
 - An adjustable mounting bracket shall be provided that is suitable for mounting to a 4-inch octagonal electrical box and allows aiming of the device.
 - These loudspeakers shall be used in the AGTS Tunnel and in the Central Plant.
 - Manufacturer:
 - Atlas APT-34AT with APXB-N Base.
 - or approved equal.
- I. Type S8, 4-inch Paging Loudspeaker, Flush Mount:
- Loudspeaker Type S8 shall be a 4- inch general paging loudspeaker with a frequency response of ± 1.5 dB, 100 Hz to 10 kHz, an input sensitivity of 94 dB at 1 meter with 1 watt input swept from 500 Hz to 2.5 kHz.
 - The loudspeaker shall be rated for 15 W minimum and shall be supplied with a 70 Volt line matching transformer with 0.5, 1, 2 and 4 watt taps.
 - The insertion loss of the 70 Volt transformer shall be 1 dB maximum over the frequency range of 100 Hz to 12 kHz.
 - The loudspeakers shall be suitable for recess mounting in a standard 4-inch recessed mounted loudspeaker round enclosures provided under another contract. A white, 22 gauge steel loudspeaker grille shall be provided.
 - These loudspeakers shall be flush mounted in suspended tile and drywall ceilings in non-public areas of the Airport buildings.
 - Manufacturer:
 - Atlas FAP43 or FAP42TC and support.
 - or approved equal.
- J. Type S9, 4-inch Paging Loudspeaker, Surface Mount:

1. Loudspeaker Type S9 shall be a 4-inch general paging loudspeaker with a frequency response of ± 1.5 dB, 100 Hz to 10 kHz, an input sensitivity of 94 dB at 1 meter with 1 watt input swept from 500 Hz to 2.5 kHz.
 - a. The loudspeaker shall be rated for 15 W minimum and shall be supplied with a 70 Volt line matching transformer with 0.5, 1, 2 and 4 watt taps.
 - b. The insertion loss of the 70 Volt transformer shall be 1 dB maximum over the frequency range of 100 Hz to 12 kHz.
 - c. The loudspeakers shall be suitable for recess mounting in a standard 4-inch recessed mounted loudspeaker round enclosures provided under another contract.
 - d. A white, 22 gauge steel loudspeaker grille shall be provided.
 2. These loudspeakers shall be surface mounted in non-public areas of the Airport buildings which do not have ceilings.
 3. Manufacturer:
 - a. Atlas FC104T72 with Aluminum Housing 410-4 and support mounting hardware.
 - b. or approved equal.
- K. Type S10, Full-range Paging Loudspeaker, Surface Mount:
1. Loudspeaker Type S10 shall be a full-range device with a frequency response of ± 3 dB, 80 Hz to 20 kHz and input sensitivity of 90 db at 1 meter with 1 watt input at 500 Hz to 2500 Hz.
 - a. The coverage shall be nominal 100 degrees horizontal from 500 Hz to 2.5 kHz.
 - b. The power rating shall be 100 W minimum, and a 70 volt line matching transformer with 7.5, 15 and 30 watt taps and a maximum insertion loss of 0.5 dB from 100 Hz to 15 kHz shall be provided.
 - c. The loudspeaker shall be surface mounted and enclosed in a UL 94V-0 rated injection molded or metal enclosure with integral metal grille and mounting bracket to allow aiming.
 - d. A cover plate for a 4- inch square electrical box shall be provided with grommets wire access hole.
 2. These loudspeakers shall be utilized in the public areas of the Concourses and shall be surface mounted on the sides of crossover bridges and walkways.
 3. Manufacturer:
 - a. Atlas SM52TB.
 - b. or approved equal.
- L. Type S11, Full-range Paging Loudspeaker, Pendant Hung:
1. Loudspeaker Type S11 shall be a white 8- inch diameter coaxial device with a minimum input sensitivity of 90 dB minimum measured at 1 meter with 1 watt input from 500 Hz to 2.5 kHz, frequency response shall be ± 5 dB, 60 Hz to 20

kHz and the coverage angle shall be a nominal 100 degrees conical from 500 Hz to 2.5 kHz.

- a. The loudspeakers shall be rated for 60 W minimum, and a 70 Volt line matching transformer with 0.5 dB maximum insertion loss over the frequency range of 100 Hz to 15 kHz and selectable level taps at 1.9, 3.8, 7.5, 15, 30 and 60 watts shall be wired in parallel with the voice coil.
 - b. Type S11 loudspeakers shall be suitable for mounting in an 8- inch suspended round pendant enclosure.
 - c. Suspension hangers shall be provided to lower loudspeaker within 15 ft. of the floor.
2. These loudspeakers shall be mounted to down pipe suspended from structure above with safety cable concealed in the down pipe in the ceiling of public areas of the Concourses where ceiling heights exceed 20 ft.
 3. Manufacturer:
 - a. Atlas PM8FA-W.
 - b. or approved equal.

M. Type S18 Full-range Paging Loudspeaker, Flush Mount:

1. Loudspeaker Type S12 shall be a 3- inch diameter coaxial device, UL 1480 & 2043 with a minimum input sensitivity of 90 dB measured at 1 meter with 1 watt input from 800 Hz to 4 kHz, frequency response shall be ± 5 dB, 110 Hz to 12 kHz and the coverage angle shall be a nominal 130 degrees conical.
 - a. The loudspeakers shall be rated for 16 W minimum and shall include a 70 V line matching transformer, with 0.5 dB maximum insertion loss over the frequency range of 100 Hz to 15 kHz and selectable level taps at 2, 4, 8, and 16 watts, which shall be wired in parallel with the voice coil.
 - b. Type 12 loudspeaker shall use the Safety First Mounting System where applicable. Where required, a separate a mounting ring shall be provided to secure the loudspeaker to the enclosure. Standard grilles will not be used behind perforated metal.
 - c. All other specified requirements apply as stated.
2. Perforated metal ceiling materials must have at least 80% opening to avoid affecting loudspeaker performance or intelligibility.
3. These loudspeakers shall be utilized in public areas with ceiling height of 15 ft. or less.
4. Manufacturer:
 - a. Atlas FAP33T-W and support.
 - b. or approved equal

2.12 OTHER DEVICES

A. Equipment Racks:

1. Vertical floor equipment racks shall be located in P.A. Rooms and shall be constructed of heavy gauge steel frame with removable sides and rear door.
 - a. Racks shall be equipped with 11 gage CRS adjustable mounting rails plated, drilled, and tapped 10-32 thread on E.I.A. standard hole spacing, and shall accept standard 19" rack-mountable equipment.
 - b. Cabinet depth shall be 25-1/2" and provide 77-1/8" rack space mounting.
 - c. Racks shall allow opening on sides and bottom to facilitate wiring of components, shall have a rear door equipped with a cylinder lock and shall have louvered top and side panels.
 - d. Base shall be tapped to accept leg levelers, and the frame shall be finished in textured black.
 - e. The top and side panels, rear door, and all trim shall be finished as directed by the DEN Project Manager.

 2. Except as otherwise specified or shown, ECS equipment shall be installed in equipment racks. Include racks for facilities for which racks are not shown on the drawings, and provide an adequate number of sections, at all locations, for installation of the equipment, which the Contractor will provide.
- B. Sound System Terminal Cabinets:
1. Wall mounted terminal cabinets shall be provided in each P.A. Room and ECS Control Room to allow breakout of wiring from conduit to the equipment racks.
 - a. The terminal cabinets shall be 36"H by 24"W by 9"D and constructed of 14 gauge CRS throughout.
 - b. Rear section shall be of one-piece construction with all welded seams.
 - c. Cabinet finish shall be as selected by DEN Project Manager from standards available.
 - d. Cabinet shall include AMP Flexiblocks with track and end stops for cable termination and connection points.

 2. Manufacturer:
 - a. Hoffman T series cabinet.
 - b. or approved equal.

 3. Tenant ECS terminal boxes shall provide loudspeaker connection points and be a minimum 12"x12"x6".
 - a. Provide Amp flex terminal strips or other approved method of connection that is field serviceable for testing and troubleshooting in the terminal box for loudspeaker connections.
- C. Wiring and Conductors:
1. Microphone and Line Level Cable:
 - a. Microphone, line level, and ambient sensor cable, when installed in conduit,

shall be NEC Type CM cable consisting of ASTM stranded tinned copper, 22 AWG, 100% aluminum polyester foil shielded twisted pair with tinned copper drain wire and 75 degree Centigrade rated polypropylene insulation.

- 1) The cable shall have a nominal O.D. of 0.135" with a green outer jacket, nominal capacitance of 34 pF/ft. between conductors and nominal capacitance of 67 pF/ft. between one conductor and other conductors connected to shield.
 - b. Where cable is installed in cable trays, it shall be NEC Type PLTC stranded tinned copper, 22 AWG, 100% aluminum polyester foil shielded twisted pair with tinned copper drain wire.
 - 1) The insulation shall be PVC with nylon and rated for 105 degrees Centigrade.
 - 2) The cable shall have a nominal O.D. of 0.201" with a green outer jacket, a nominal capacitance of 50 pF/ft. conductor to conductor and a nominal capacitance of 90 pF/ft. between one conductor and the others connected to the shield.
 - c. Manufacturer:
 - 1) West Penn Wire – 25291BGN1000
 - 2) or approved equal.
2. Homerun loudspeaker cable:
- a. Manufacturer: Southwire P70031-1 or Equal.
 - b. Size: #12 AWG, stranded.
 - c. Type: Unshielded twisted pair.
 - d. Insulation Color: Red (positive), black (negative).
 - e. Jacket Color: Dark green.
 - f. Cable shall be plenum rated.
 - g. All cable shall be installed in conduit.
 - h. Loudspeaker circuits shall not contain T-Tap or star configurations.
3. Circuit loudspeaker cable:
- a. Manufacturer: Belden 6100UE or Equal.
 - b. Size: #14 AWG, stranded.
 - c. Type: Unshielded twisted pair.
 - d. Insulation Color: Red (positive), black (negative).
 - e. Jacket Color: Dark green.
 - f. Cable shall be plenum rated.
 - g. All cable shall be installed in conduit.
 - h. Loudspeaker circuits shall not contain T-Tap or star configurations.
4. Whip to speaker cable:
- D. Manufacturer: Smartwire, #MC-007960-11BR-GB or Equal.

- E. Size: #14 AWG, stranded.
- F. Type: Unshielded twisted pair.
- G. Insulation Color: Red (positive), black (negative).
- H. Metal Cladding Color: Dark green or White with Dark green stripe.
- I. Cable shall be plenum rated.
- J. Loudspeaker circuits shall not contain T-Tap or star configurations.
- K. Whip not to exceed 6' in length.
 - 1. Control cable shall be installed in conduit and shall be low capacitance 22 AWG stranded four twisted pair with 100% aluminum polyester overall shield and drain wire.
 - a. The nominal O.D. shall be 0.325" with a green outer jacket, nominal conductor D.C.R. shall be 24 ohm/1000 ft., the nominal capacitance shall be 15.5 pF/ft. between conductors and the nominal capacitance shall be 27.5 pF/ft. between one conductor and other conductors connected to shield.
 - 2. The installation may involve localized conditions in which metallic-conductor cable systems will transition from conduit to tray installation, for limited lengths of run.
 - a. If a cable is transitioning from a room via tray into conduit for the remaining distance of the run, the wiring should be the type rated for use in conduit.
 - b. If the majority of the cable run is in conduit, use cable rated for such use.
 - c. If the majority of the cable run is in cable tray, use cable rated for use in tray.

2.13 RACEWAYS

- A. Intercommunication and Program System Raceways and Boxes: Comply with requirements in Section 260533 "Raceway and Boxes for Electrical Systems."
- B. All cabling shall be housed in factory-painted green conduit, minimum 3/4" diameter.
- C. Where existing conduit is permitted to be reused based on other sections, conduits shall be brought into compliance with current NEC requirements and shall be banded green and labeled "ECS" every 5 feet where accessible.
- D. Provide a complete raceway system for the ECS. Emergency signal infrastructure from Master Microphone stations or network connections for amplifier frames shall not be allowed in cable trays. They must be provided in conduit. Raceways shall be installed utilizing the most efficient route.

1. Speaker circuits shall be zoned by floor except in stairwells.
- E. No one speaker circuit shall serve more than one fire or smoke zone.
- F. Outlet boxes shall be not less than 2- inches (50 mm) wide, 3- inches (75 mm) high, and 2-1/2- inches (64 mm) deep.
- G. Flexible metal conduit is allowed where other conduit will not suffice.

2.14 MISCELLANEOUS

A. Cable Labels:

1. Self-adhesive, pre-printed labels with black text on white background, as produced by Brady BMP21 or equal.

B. Loudspeaker Labels:

1. Self-adhesive, pre-printed 1" x 0.5" labels with red text on white background, printed with the following text: "FIRE ALARM DO NOT DISCONNECT"



Figure 1 - Sample Loudspeaker Label

PART 3 - EXECUTION

3.1 GENERAL

- A. All work shall be provided complete, and the ECS shall be fully operational as shown and described herein.
- B. Modifications and additions to the existing ECS:
 1. Work Meeting:
 - a. The Contractor shall coordinate and arrange a pre-work meeting with the DEN Project Manager and DEN Life Safety one week in advance of the beginning of any work.
 - b. The Contractor shall assure attendance of trades installing the ECS including any electrical, telecommunications, and audio-related trades involved.

- c. The Contractor shall present the contractor's construction, demolition, phasing, implementation, and testing plans and schedule.
 - d. Meeting notes shall be accurately recorded by the DEN Project Manager and distributed within three (3) working days.
 2. All Work shall be provided complete, and the voice paging systems shall be fully operational as shown and described herein. DEN Life Safety shall witness all final connections to existing circuits.
 3. Modifications and additions to the existing ECS:
 - a. Contractors must give DEN AIM five (5) working days' notice before making any connections, deletions, or modifications to the existing sound system.
 - b. DEN System Shutdown Request form must be used for this purpose.
- C. Electrical Related Work:
 1. Furnish and install all electrical conduit, wiring, and outlets for electrical power to paging and announcement control equipment.
 2. Furnish and install raceway, conduit, junction boxes and for audio signal and control wiring.
 3. Furnish and install loudspeaker junction boxes and enclosures.
 4. Furnish and install ground conductor from building earth ground to each group of equipment racks in accordance with requirements of Section 260526 "Grounding and Bonding for Electrical Systems". The insulated ground conductor shall be installed in conduit and sized for a DC resistance of 0.1 ohm or less to ground. For example, a 15 ft. run would be 8 AWG or larger.
- D. Power or ECS System Outages:
 1. Any power or ECS System outages necessary to demolish, install or test systems and/or equipment shall be coordinated with Denver International Airport Project Manager.
 2. A written shutdown request form shall be submitted to and approved by the DEN Project Manager five (5) working days prior to the shutdown.

3.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site and store and protect under provisions of Division 01.
- B. Store products in secure locations as approved and directed by DEN Project Manager.

3.3 FABRICATION

- A. Designation/Engraving:
 1. All equipment controls, receptacles, and all indicators shall have, unless otherwise noted, permanently engraved or silk-screened, fully descriptive identification labels. The resolution of silk-screened labels shall not be less than 90,000 dots/sq. in.

B. Terminals and Terminations:

1. Cables shall not be spliced or otherwise interrupted from termination to termination.
 - a. All cables shall have visible heat-shrink identifying markers on each end in compliance with DEN labeling standards.
2. Location of termination cabinets must be approved by DEN Life Safety prior to installation.
3. Wiring in terminal cabinets shall be tied and clamped neatly to backboards or cable forms.
4. Terminal blocks shall be fully insulated, rated for the wire size to be terminated, suitable for mounting inside an electrical enclosure and, unless otherwise specified, be one of the following types:
 - a. Terminal strips with interposing barriers between screw terminals.
 - b. Terminal strips with gas-tight screw type clamp connectors.
5. Each terminal strip shall have a legibly marked permanent identification strip.

C. Structural Assemblies:

1. Loudspeaker mounting frames and brackets shall be fabricated and assembled in shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.
2. Provide high-strength threaded fasteners for bolted connections and comply with AWS code for procedures, appearance, and quality of welds and for methods used in correcting welding work.
3. Provide holes required for securing other components or assemblies to structural steel framing and for passage of other components through steel framing members as shown on final shop drawings. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.
4. In fabricating mounting brackets and other steel components requiring bends, the radii of the bends shall not be less than three times the thickness of the steel being bent.

3.4 REDUNDANCY

A. The PA System shall be a fully redundant system with the minimum basic requirements of the following:

1. Redundant Globalcom equipment shall be implemented into the system for full redundancy.
 - a. Locate redundant Lifeline Globalcom as shown on contract documents.

B. System shall be connected via a physically separated fiber optic premise wiring

system designed for the Fire Alarm System.

1. Redundancy shall include redundant core and intermediate switches with redundant connections to the edge switch as shown on contract drawings.
- C. IP Microphone stations shall connect to each regional Announcement Control System (ACS) over Owner provided network.
1. The remainder of the ECS equipment Ethernet connectivity shall be provided by a stand-alone Ethernet network consisting of access layer switches, pairs of regional distribution switches and core switches.
 2. Connectivity of access layer to distribution switches shall be done using diversely routed fire alarm system single mode fiber provided by Owner.
 3. Inter-Building connectivity shall use DEN Premise Wiring and Distribution System Fiber Strands.
- D. Cabling required for network infrastructure shall be provided by the Owners Premise Wiring Contractor Services (PWCS).
1. PWCS shall be provided with the drawings and shall then provide pricing to be included in the Project for the network cabling and connectivity.

3.5 INTERFACES

- A. Several interfaces to other system shall be required for both physical hardware and software. These systems include, but are not limited to Fire Alarm System, AIDX Database, Tenant PA systems, and DEN Networks. Specific requirements for each shall be as follows:
1. Fire Alarm System Interfaces shall be connected to ACS and Globalcom locations throughout the airport.
 - a. Provide interfaces through dry contacts to allow required functionality to occur including tenant areas.
 - b. System sequence of operation shall be defined by Section 283100 "Intelligent Life Safety Fire Management System" and Section 283112 and the fire alarm documentation.
 - c. Critical faults from the ECS shall be faulted to the fire alarm system through the interface.
 2. Airport Information Data Exchange (AIDX) Database shall provide information for the Flight Announcement System. System shall be interfaced at IED Server locations.
 3. DEN Networks:
 - a. DEN networks work and interfaces shall be coordinated at the Pre-construction meeting.
 - b. DEN network representatives shall be available during any scheduled work with regard to interfaces or LAN, VLAN modifications of the PA system.

3.6 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters, and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
1. Install plenum cable in environmental air spaces, including plenum ceilings.
 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- B. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.7 INSTALLATION OF RACEWAYS

- A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for installation of conduits and wireways.
- B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.8 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements:
1. Speaker circuits shall be zoned by floor except in stairwells.
- C. No one speaker circuit shall serve more than one fire or smoke zone.
1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
 2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
 3. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
 5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 6. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.

D. Separation of Wires:

1. Separate microphone, line-level, loudspeaker-level, and power wiring runs.
2. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least **12 inches (300 mm)** apart for loudspeaker microphones and adjacent parallel power and telephone wiring.
3. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

3.9 INSTALLATION

A. Identification of Conductors and Cables:

1. Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
2. Clearly, logically, and permanently mark switches, connectors, jacks, relays, and receptacles.

B. Weatherproof Equipment:

1. For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.

C. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings. Any unused speaker tap wiring shall be isolated individually and protected to prevent shorts and grounds.

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

E. Mount equipment firmly in place, including loudspeakers, amplifiers, and cables in accordance with manufacturer's instructions. Make fastenings and supports adequate to support their loads with a safety factor of three. Appliances shall be mounted independently of their attachments to the circuit conductors.

F. Appliances subject to mechanical damage shall be suitably protected. If guards, covers, or lenses are employed, they shall be listed for use with the appliance.

G. Secure equipment firmly in place, including loudspeakers, amplifiers, and cables. Make fastenings and supports adequate to support their loads with a safety factor of three

H. Clearly, logically, and permanently mark switches, connectors, jacks, relays, receptacles, junction boxes, loudspeakers, cables, and cable terminations.

I. The Contractor shall take precautions to prevent electromagnetic and electrostatic hum. Install the equipment to provide safe operation. Provide ventilation as required to maintain equipment within the manufacturer's specified temperature limits.

J. Provide all cables necessary for interconnection of permanently mounted equipment.

Use terminations required to achieve full function of equipment as specified herein.

- K. Exercise care in wiring, to avoid damage to the cables and to the equipment. Make all joints and connections with rosin-core solder or with mechanical connectors approved for Class I wiring. Execute all wiring in strict adherence to standard broadcast procedures.
- L. Run lines in separate metallic conduits or install cable tray dividers for microphone level circuits (up to -20 dBm), line level circuits (up to +30 dBm), loudspeaker circuits (above +30 dBm) and power circuits. Ground power conduits with heavy wire to the power system ground. Use only cables which are insulated from the conduit and from each other for the entire conduit length. Connect conduits mechanically and electrically to the sound system ground point. Do not splice lines in conduit.
- M. The Installer shall coordinate all sound equipment panel and control locations with the DEN Project Manager prior to installation.
- N. Speaker circuits shall be run in continuous line to provide circuit supervision utilizing End of Line Module.
- O. Speaker circuits, loudspeakers, and control equipment shall be installed to meet the pathway survivability requirements of NFPA 72, Chapter 24. Specifically, Level 1 Pathway Survivability shall be provided.

3.10 GROUNDING

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Section 260526 "Grounding and Bonding for Electrical Systems."

3.11 SYSTEM PROGRAMMING

- A. Programming:
 - 1. Fully brief Owner on available programming options.
 - 2. Record Owner's decisions and set up initial system program.
 - 3. Provide all programming required for a fully functioning system and associated interfaces.
 - 4. Prepare a written record of decisions, implementation methodology, and final results.

3.12 TESTING AND CERTIFICATION

- A. Electrical/Electronic Tests and Inspections: At the job site, the Contractor shall perform tests not conducted and certified by the manufacturer and, be prepared to repeat any or all tests as may be directed by the DEN Project Manager during the period of final inspection and checkout. Furthermore, the Contractor shall be prepared to perform work required to modify the performance of the system in accordance with this specification. Test all electrical circuits before plugging ECS equipment into the circuit.
1. Schedule tests with DEN Project Manager with at least seven (7) days' advance notice of test performance. Do not proceed with testing without written approval from DEN Project Manager.
 2. General Inspection and Adjustment: Make all measurements, and subsequently deliver documentation, to demonstrate that all individual components, not previously measured and certified by the manufacturer, are performing in accordance with each manufacturer's published specifications. Specifically, examine frequency response, total harmonic distortion, and signal-to-noise ratio. Replace any components found to be defective.
 3. Operational Test: Test microphone stations at each area that the microphone station is installed. Verify proper routing and volume levels and that system is free of noise and distortion. Test each available message path from each station on system.
 4. Redundancy Test: Test redundancy and back up amplifier switching for all redundant components including a power loss scenario. Determine that system components are configured for automatic boot up recovery as part of redundancy and that the appropriate files are correctly backed up for system configurations.
 5. Distortion Test: If distorted signal is present, measure distortion at normal gain settings and rated power. Feed signals at frequencies of 150, 200, 400, 1000, and 2500 Hz into selected amplifiers. For each frequency, measure distortion in the system outputs. Maximum acceptable distortion at any frequency is 5 percent total harmonics. Replace defective equipment
 6. Acoustic Coverage Test: Feed pink noise into system. Use sound-level RTA meter with octave-band filters to measure level at three locations in each paging zone. Equalize and delay loudspeakers with Pink Noise and sufficient analyzer to maximize audio quality and intelligibility in every instance. Consultant shall spot check these loudspeaker systems with the Contractor in the field during test out. Maximum permissible variation in level is plus or minus 3 dB; in levels between adjacent zones, plus or minus 5 dB. Set equalization for maximum flat response of loudspeaker system. Use filters to cut, if possible, rather than boost frequencies. If 6dB of boost or cut is required, verify position of test microphone, loudspeaker polarity issues, or reflections that may be skewing the test. Slight repositioning of the test Microphone may be required
 7. Power Output Test: If loudspeaker performance is not producing the required and calculated level in a zone, measure electrical power output of each paging amplifier at normal gain settings of 150, 1000, and 2500 Hz. Maximum variation in power output at these frequencies is plus or minus 3 dB. Replace defective equipment or verify loudspeakers are tapped and performing correctly.
 8. Signal Ground Test: Measure and report ground resistance at system signal ground. Comply with testing requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
 9. Loudspeaker Line Impedance: Measure the impedance and the resistance of each loudspeaker line leaving the sound equipment racks with the line

- disconnected from its normal driving source. Maintain values within $\pm 10\%$ of the value calculated for that circuit based upon the parallel impedances of the loudspeakers connected plus the resistance of the loudspeakers. Measure loudspeaker impedance at multiple frequencies according to the loudspeaker type. Measure for ground faults on each leg of the loudspeaker system. Correct any faults found for both impedance and ground faults. Loudspeaker circuits shall not be loaded greater than 80% of listed amplifier capacity.
10. Hum and Noise Level: If hum or noise is present, measure the hum and noise levels of the overall system. Adjust gain controls for optimum signal-to-noise ratio. The adjustment shall also be such that full amplifier output would be achieved with 0 dBm input. Terminate inputs with shielded resistors of 600 ohms, and disconnect the loudspeaker lines, terminating the power amplifier outputs with power resistors for these measurements. The load resistors shall match the rated load impedance and output power of the amplifiers.
 11. Power Output and Signal Level Adjustments: Adjust gain controls as for the hum and noise level test. Set variable equalizers for flat response. Apply 1,000 Hz sinewave signal at the input tested, at a level required to produce a full amplifier output. Use a distortion analyzer to measure the output level and total harmonic distortion of the amplification equipment. Make all measurements with loads actually incurred in system operation. Power amplifier loads shall be resistors equal to the nominal impedance of the output terminals used in the system.
 12. Gain Control Settings: Establish tentative normal settings for all gain controls. All gain controls on rack-mounted equipment shall be adjusted for optimum signal-to-noise ratio and signal balance. Settings may require further adjustment by the Contractor as a result of testing by the DEN Life Safety. Programmed settings shall be recorded in hardcopy format.
 13. Provide System Set with no faults. System shall run fault free from the Contractors work for a minimum of 30 days with no issues for final closeout of work.
 14. Freedom from Switching Transient Noise: Operate all control switches and relays, while listening for clicks and pops in the system outputs. Eliminate any found.
 15. Listening Tests: These tests shall include speech intelligibility surveys and subjective aural evaluations by observers at various positions under various operating conditions, using live speech and/or recorded music material.
 16. Equipment Tests: Any measurements of frequency response, distortion, noise, or other characteristics and any operational tests deemed necessary may be performed on any item or group of items to determine conformity with these requirements. Measurements of system performance shall be made using a calibrated ANSI S1.4, Type 1 sound level meter set for "slow" meter damping and flat response. The microphone shall be positioned 5 feet above the floor within the area served by the system. All interior finishes and furnishings shall be in place, and the system gain shall be set to provide octave band levels at least 10 dB above background noise levels in any octave band at the measuring locations.
 17. Identification: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging loudspeaker-line matching transformers.

B. Demonstration Test: Upon completion of installation, and at a time established by DEN

Life Safety, demonstrate the operation of each major component of the system and the completed installation. Assist as required in the following acceptance tests:

1. Reference Appendix A for checklist items required for the Demonstration Test.
2. Prior to connection to the ECS, DEN Life Safety will test the loudspeaker system for impedance, shorts, and grounds. The contractor shall perform a basic short and ground test of the completed wiring system in advance of this test. Any anomalies noted in either test shall be corrected by the contractor before the loudspeaker(s) will be connected to the ECS.
3. Upon completion of the ECS installation, the contractor shall arrange with DEN Life Safety to review programming and conduct a test of the emergency paging within the tenant or concession area. This test may be scheduled during a period of low airport activity at night at the discretion of DEN Life Safety.
4. This work requires a mandatory shutdown request.
5. Listening Tests: These tests shall include speech intelligibility survey and subjective aural evaluations by observers at various positions under various operating conditions, using live speech and/or recorded speech.
6. If the need for adjustment or modification becomes evident during demonstration and testing, accomplish adjustments or alterations until the installation operates fully in accordance with the requirements of this specification.

C. DFD Acceptance Test:

1. Reference Appendix A for checklist items required for the DFD Acceptance Test.
2. Upon satisfactory completion of the demonstration test, DEN Life Safety will schedule DFD Acceptance Test. This notification shall occur a minimum of 5 days prior to the desired time of the test. This test may be scheduled during a period of low airport activity at night at the discretion of DEN Life Safety.
3. This work requires a mandatory shutdown request.

D. The ECS shall be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

F. Report:

1. Upon completion of the above tests and any necessary adjustments, submit two (2) copies of a written report presenting test results, including numerical values where necessary, for review by the DEN Project Manager prior to acceptance testing, final tuning, and demonstration.
2. With this report, submit written certification that the installation conforms to the requirements stated herein, is complete in all respects, and is ready for inspection, testing and final tuning.

3.13 STARTUP SERVICE

A. Engage an IED factory-authorized service representative to assist Contractor and perform startup service and initial system programming and final commissioning.

1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
2. Complete installation and startup checks according to manufacturer's written instructions.

3.14 ADJUSTING

- A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.
- B. Occupancy Adjustments: When requested within twelve (12) months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two (2) visits to Project during other-than-normal occupancy hours for this purpose.

3.15 MAINTENANCE SERVICE

- A. Replace defective materials and repair faulty workmanship within 48 hours of discovery during the period of the warranty. Contractor shall not rely upon Owner's stock for warranty replacements.

3.16 DEMONSTRATION

- A. Engage a factory-authorized service representative to assist Contractor and train Owner's maintenance personnel to adjust, operate, and maintain the intercommunications and program systems.
 1. Train Owner's maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining the system and equipment.
 2. Schedule training with Owner, through DEN Project Manager, with at least seven (7) days advance notice.
- B. Upon approval of the test report by the DEN Project Manager, and at a time established by the DEN Project Manager, demonstrate the operation of each major component of the system and the completed installation. After demonstration, assist as required in the following acceptance tests:
 1. Listening Tests: These tests shall include speech intelligibility survey and subjective aural evaluations by observers at various positions under various operating conditions, using live speech and/or recorded music material.
 2. Equipment Tests: Any measurements of frequency response, distortion, noise or other characteristics and any operational tests deemed necessary may be performed on any item or group of items to determine conformity with these requirements.
 3. If the need for adjustment or modification becomes evident during demonstration and testing, accomplish adjustments or alterations until the installation operates

fully in accordance with the requirement of this specification.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

- A. No separate measurement shall be made for work under this Section.

PART 5 - PAYMENT

5.1 PAYMENT

- A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be included in the Lump Sum Contract price.

END OF SECTION 275123

TECHNICAL SPECIFICATIONS
27 - COMMUNICATIONS
275123
EMERGENCY COMMUNICATIONS SYSTEM

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518

APPENDIX A: ECS Pre-Inspection Checklist

| # | Yes | No | TO BE COMPLETED PRIOR TO DEMONSTRATION TEST | Initials |
|-----|-----|----|--|----------|
| 1. | | | A shutdown request is in place and approved prior to working on any part of the Fire Alarm/ECS. | |
| 2. | | | The Approved construction drawings, shop drawings, and permit card are on site prior to inspection. | |
| 3. | | | The "Tie-in" points for the ECS speaker circuits are clearly shown on the shop drawings. | |
| 4. | | | All new ECS conduits are green per specifications. Approved existing conduit is identified per specification. | |
| 5. | | | All ECS conductors match the Wire Schedule provided on ECS shop drawings. | |
| 6. | | | Speaker cables are labeled with speaker circuit ID at all terminations and junction boxes. | |
| 7. | | | Where an end of line branch monitor is used, the devices and their enclosures must be marked ECS EOL. | |
| 8. | | | Audio Contractor and Installing Contractor both have licensed representatives present during Demonstration Test. | |
| 9. | | | Wiring and connections are direct to speaker, no T-Taps or star configurations are present | |
| # | Yes | No | TO BE COMPLETED PRIOR TO FIRE ALARM TIE-IN | Initials |
| 10. | | | A ground fault test has been completed in the presence of a DEN Life Safety representative. | |
| 11. | | | An impedance test has been completed in the presence of a DEN Life Safety representative. | |
| 12. | | | All deficiencies identified in the Demonstration Test have been corrected and system was successfully tested in the presence of DEN Life Safety. | |
| 13. | | | Audio Contractor and Installing Contractor both have representatives present during fire alarm tie-in. Representatives must possess a current CCD Mass Notification license. | |
| # | Yes | No | AT FIRE ALARM INSPECTION | Initials |
| 14. | | | Stamped & Signed set of ECS plans, Permit card on hand at the time of the final test. | |
| 15. | | | All required testing materials are available for the test, including but not limited to: Ladders, extension cords, impedance meter, multimeter, sound pressure level meter. | |
| 16. | | | All appropriate parties are present & access to the area being inspected has been arranged. These include Owner Rep; Licensed contractor holding a current CCD Mass Notification Installers license. | |
| 17. | | | All required Spare Parts delivered to DEN Life Safety. | |
| 18. | | | ECS Supplementary Record of Completion is on-site, completed and signed. This form may be obtained from DEN Life Safety. | |

Project Name:

Revised Nov 2017

End of Appendix A

TECHNICAL SPECIFICATIONS
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EMERGENCY COMMUNICATIONS SYSTEM

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Appendix B - Emergency Communications System Supplementary Record of Completion

This form is a supplement to the System Record of Completion. It includes systems and components specific to emergency communications system. This form is to be completed by the system installation contractor at the time of system acceptance and approval. (Insert N/A in all unused lines.)

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

PROPERTY INFORMATION

Name of property & Name of Project: DEN XXXXXX _____

Address: _____

Permit Number: _____

Description of Scope of Work: _____

Installation, Service, And Testing Contractor Information

Installation contractor for this equipment: Ford Audio Video _____

Address: _____

License or certification number: _____

Phone: _____ Fax: _____ E-mail: _____

Service organization for this equipment: _____

Address: _____

License or certification number: _____

Phone: _____ Fax: _____ E-mail: _____

A contract for test and inspection in accordance with NFPA standards is in effect as of: _____

Contracted testing company: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Contract expires: _____ Contract number: _____ Frequency of routine inspections: _____

DESCRIPTION OF SYSTEM OR SERVICE

Fire alarm with in-building fire emergency voice alarm communication system (EVAC)

Mass Notification System

Combination system, with the following components:

Fire Alarm

EVACS

MNS

Two-way, in-building, emergency communications system

Other (specify) _____

NFPA 72 edition: _____ Additional description of systems: _____

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Fire Alarm System

Manufacturer: SimplexGrinnell Model number: 4100ES
Number of single voice alarm channels: 1 Number of multiple voice alarm channels: n/a
Number of speakers: n/a Number of speaker circuits: n/a
Location of amplification and sound processing equipment: _____

Mass Notification System

System Type

In-building MNS-combination
 In-building MNS Wide-area MNS Distributed Recipient MNS
 Other (specify): _____
Manufacturer: _____ Model Number: _____

System Features:

Combo fire alarm/MNS MNS autonomous control unit Wide-area MNS to regional national alerting interface
 Local operating console (LOC) Distributed-recipient MNS (DRMNS) Wide-area MNS to DRMNS interface
 Wide-area MNS to high power speaker array (HPSA) interface In-building MNS to wide-area MNS interface
 Other (specify): _____

MNS Local Operating Consoles

Location 1: _____
Location 2: _____
Location 3: _____

Mass Notification Devices

Number of Speakers (new or reconfigured): _____ Number of Speaker Circuits (new or reconfigured): _____
Combination fire alarm/MNS visual devices: _____ MNS-only visual devices: _____
Textual signs: _____ Other (describe): _____
Pathway and Survivability Classification: _____

SYSTEM POWER

Control Unit

Input voltage of control unit: _____ Control unit amps: _____
Overcurrent protection type: Circuit Breaker Amps: _____
Location of primary supply panel board: _____
Disconnecting means location: _____
Describe secondary (backup): Emergency Power fed from dual-ended switchgear

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 CONTRACT NO. 202056518

EMERGENCY COMMUNICATIONS SYSTEM INTERFACE

Interface (capture) with Flight Information Displays (MUFIDS, FIDs, BIDs, GIDs)

Number of displays: _____ Location of displays: _____

Description of interface: _____

Location / type of interface equipment: _____

Other Information: _____

Interface (capture) with Video Displays (Advertising or Other)

Number of displays: _____ Location of displays: _____

Description of interface: _____

Location / type of interface equipment: _____

Other Information: _____

Media Shunt (Audio or Video Shunt)

Describe Location and Method: _____

CONTROL FUNCTIONS

This system activates the following control functions specific to emergency communications systems:

| Type | Quantity |
|---|----------|
| Mass Notification Override of Alarm Signaling Systems or Appliances | |
| | |
| | |
| | |
| | |

RECORD OF SYSTEM INSTALLATION

Fill out after all installation is complete and wiring has been checked for opens, shorts, ground faults, and improper branching, but before conducting operational acceptance tests.

This is a: New System Modification to an existing system Permit Number: _____

The system has been installed in accordance with the following requirements: (Note any or all that apply.)

✓ NFPA 72, Edition: _____

✓ NFPA 70, National Electric Code, Edition: _____

✓ Manufacturer's published instructions

Other (specify): _____

System deviations from referenced NFPA standards: _____

Signed: _____ Printed Name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

TECHNICAL SPECIFICATIONS
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275123
EMERGENCY COMMUNICATIONS SYSTEM

DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
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RECORD OF SYSTEM OPERATIONAL PRE-TEST

New system

All operational features and functions of this system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements for the following:

Modifications to an existing system

All newly modified operational features and functions of the system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements of the following:

✓ *NFPA 72*, Edition: _____

✓ *NFPA 70, National Electric Code*, Edition: _____

✓ Manufacturer's published instructions

Other (specify): _____

Individual device testing documentation [Inspections and Testing Form is attached]

Signed: _____ Printed Name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

End of Appendix B

TECHNICAL SPECIFICATIONS
27 - COMMUNICATIONS
275114
EMERGENCY COMMUNICATIONS SYSTEM, PUBLIC
ADDRESS SYSTEM, AND VIDEO INTERFACE-LIMITED SCOPE

DENVER INTERNATIONAL AIRPORT
DEN STANDARD SPECIFICATIONS - 2017
CONTRACT NO. 00000

EXHIBIT J

CONTRACT DRAWINGS

CONCOURSE A ESCALATOR REPLACEMENT

Design Contract No. 201630091
Construction Contract No. 202056518

8700 PENA BLVD
DENVER, CO 80249

Volume No. 01

NORTH CENTER CORE ESCALATOR ISSUED FOR CONSTRUCTION

12/09/2020



| SHEET # | SHEET NAME |
|---|---|
| GENERAL-NORTH | |
| G-001-N | COVER SHEET |
| G-002-N | ABBREVIATIONS, PARTITIONS, AND SYMBOLS |
| G-003-N | DISCREPANCY |
| G-004-N | CONSTRUCTION LOGISTICS |
| STRUCTURAL-NORTH | |
| S-001-N | GENERAL NOTES |
| S-010-N | APRON LEVEL NORTH DEMO PLAN |
| S-010-N | APRON LEVEL NORTH DEMO PLAN |
| S-010-N | CONCOURSE LEVEL NORTH DEMO PLAN |
| S-001-N | ESCALATOR PIT DEMO SECTIONS |
| S-001-N | STRUCTURAL DEMO OF TIE |
| S-100-N | APRIL LEVEL NORTH FOUNDATION PLAN |
| S-101-N | APRIL LEVEL NORTH FRAMING PLAN |
| S-102-N | CONCOURSE LEVEL NORTH FRAMING PLAN |
| S-001-N | ESCALATOR PIT SECTIONS |
| S-001-N | STRUCTURAL DE TIE |
| ARCHITECTURAL-NORTH | |
| A-100-N | NORTH OVERALL DEMO PLANS |
| A-100-N | NORTH ENLARGED DEMO PLAN |
| A-100-N | NORTH OVERALL PLANS |
| A-100-N | NORTH ENLARGED PLANS |
| A-100-N | NORTH ENLARGED FLOORS |
| A-101-N | NORTH ESCALATORS ELEVATIONS AND SECTIONS |
| A-001-N | DETAILS |
| A-001-N | ASSETS |
| A-001-N | NORTH ENLARGED PLANS WAYFINDING |
| ELECTRICAL-NORTH | |
| E-001-N | ELECTRICAL GENERAL NOTES & LEGEND |
| E-100-N | NORTH ENLARGED ELECTRICAL DEMO PLANS |
| E-100-N | NORTH ENLARGED ELECTRICAL DEMO REFLECTED CEILING PLANS |
| E-100-N | NORTH ENLARGED ELECTRICAL PLANS |
| E-100-N | NORTH ENLARGED ELECTRICAL REFLECTED CEILING PLANS |
| E-101-N | NORTH ONE LINE DIAGRAM |
| E-101-N | NORTH ELECTRICAL SCHEDULES |
| E-101-N | NORTH ASSETS |
| FIRE ALARM AND SUPPRESSION-NORTH | |
| F-001-N | GENERAL NOTES |
| F-001-N | LEVEL 00 - AGTS STATION - EXISTING NORTH OSD PLAN |
| F-001-N | GENERAL NOTES |
| F-001-N | LEVEL 00 - AGTS STATION - NORTH DEMOLITION PLAN |
| F-001-N | LEVEL 01 - APRON - NORTH DEMOLITION PLAN |
| F-001-N | NORTH ESCALATOR DEMOLITION SECTIONS - WEST AND EAST VIEWS |
| F-001-N | ENLARGED NORTH DEMOLITION PLANS |
| F-001-N | LEVEL 00 - AGTS STATION - NORTH CONSTRUCTION PLANS |
| F-001-N | LEVEL 01 - APRON - NORTH CONSTRUCTION PLAN |
| F-001-N | NORTH ESCALATOR CONSTRUCTION SECTIONS - WEST AND EAST VIEWS |
| F-001-N | ENLARGED NORTH CONSTRUCTION PLANS |
| F-001-N | FIRE SUPPRESSION CALCULATIONS |
| F-001-N | LEVEL 00 - AGTS STATION - NORTH FIRE SUPPRESSION CALCULATIONS REFERENCE |
| F-001-N | LEVEL 01 - APRON - NORTH FIRE SUPPRESSION CALCULATIONS REFERENCE |
| F-001-N | LEVEL 01 - APRON - SOUTH FIRE SUPPRESSION CALCULATIONS REFERENCE |

ARCHITECTURAL

JACOBS
717 17TH STREET
SUITE 2750
DENVER, COLORADO 80202

SCOPE OF WORK NARRATIVE
THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 8 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. STRUCTURAL TRAVEL FROM THE AGTS LEVEL TRAVEL PLATFORM TO APRON LEVEL. THEY THEN SWITCH BACK AND TRAVEL THE REMAINING WAY TO CONCOURSE. ALL THE NEW ESCALATORS ARE 37' CLEAR WIDTH.

STRUCTURAL

JACOBS
717 17TH STREET
SUITE 2750
DENVER, COLORADO 80202

SCOPE OF WORK NARRATIVE
THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 8 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. STRUCTURAL SCOPE IS TO VERIFY LANDING ON EXISTING STRUCTURE AND DESIGN SUSPENDED PITS.

ELECTRICAL

PK ELECTRICAL, INC.
5108 DTC PKWY
SUITE 420
GREENWOOD VILLAGE, COLORADO 80111

SCOPE OF WORK NARRATIVE
THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 8 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. ELECTRICAL SCOPE IS TO ADD TO EXISTING PANELS WITH THE NEW ESCALATORS AND VERIFY CAPACITY FOR POWER.

FIRE ALARM

KILBREW | KILBREW, INC.
5511 FARMMOUNT DRIVE
WINDSOR, COLORADO 80550

SCOPE OF WORK NARRATIVE
THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 8 NEW ESCALATORS. VERIFY THAT EXISTING FIRE ALARM LEVELS CODE BY AREA OF WORK.

FIRE SUPPRESSION

KILBREW | KILBREW, INC.
5511 FARMMOUNT DRIVE
WINDSOR, COLORADO 80550

SCOPE OF WORK NARRATIVE
THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 8 NEW ESCALATORS. RELOCATE EXISTING FIRE SUPPRESSION WITH THE NEW ESCALATORS AND VERIFY EXISTING SYSTEM CAPACITY WITHIN THE AREA OF WORK.

DEFERRED SUBMITTALS

05700 - DECORATIVE METAL RAILINGS
05700 - DECORATIVE FORMED METAL (ESCALATOR ENCLLOSURE)
14300 - ESCALATORS
21131 - FIRE SUPPRESSION SYSTEM



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD
DENVER, CO 80249



717 17TH STREET SUITE 2750
DENVER, CO 80202
ISSUE RECORD
NO. DATE PURPOSE DATE CND
0 0 JA IFC 12/09/20 01
1 1 JA Contract Del 12/09/20 01

SCALE: As indicated
DATE: 12/09/2020
DRAWN BY: CLM
CHECKED BY: CVH
FAA #P NO:
DESIGN CONTRACT NO: 201630091
CONSTR. CONTRACT NO: 202056518
VOLUME NO: 01
SHEET TITLE: COVER SHEET
SHEET NO: G-001-N



DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD DENVER, CO 80249



717 17th STREET SUITE 2750 DENVER, CO 80202

ISSUE RECORD: NO. / PURPOSE DATE CND

SCALE: As indicated

DATE: 12/09/2020

DRAWN BY: CM

CHECKED BY: CH

FAAP NO. 01

DESIGN CONTRACT NO. 20183001

CONST. CONTRACT NO. 202005018

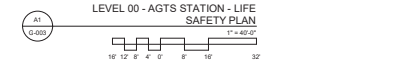
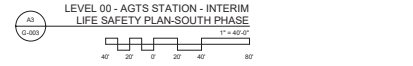
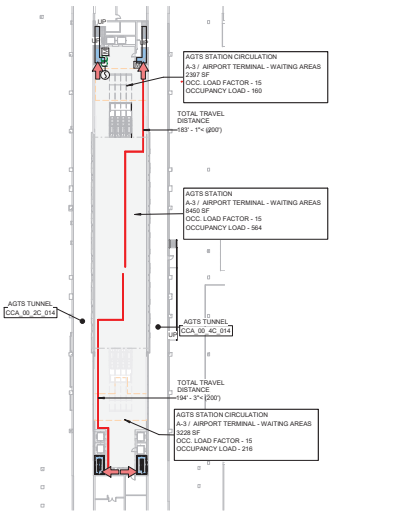
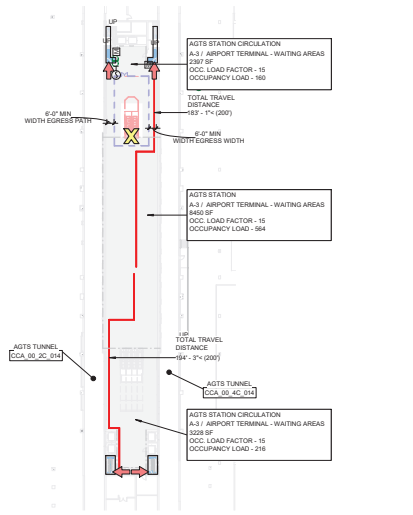
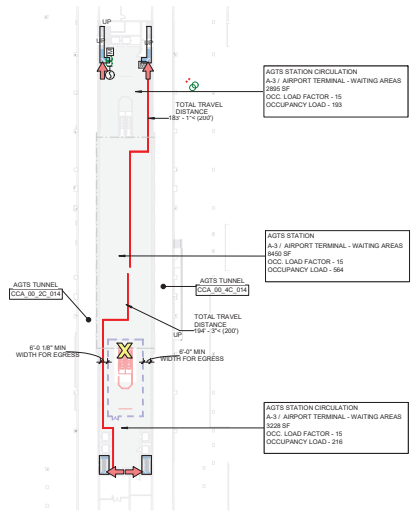
VOLUME NO. 01

SHEET TITLE: LIFE SAFETY

SHEET NO. G-003

APPLICABLE CODES

- BUILDING:
 - INTERNATIONAL BUILDING CODE (IBC) 2018 EDITION
 - INTERNATIONAL EXISTING BUILDING CODE (IEBC) 2018 EDITION
 - CITY AND COUNTY OF DENVER BUILDING AND FIRE CODE AMENDMENTS, 2019 EDITION
 - INTERNATIONAL CODE COUNCIL (ICC) 1171 (ANSI ACCESSIBLE AND USABLE BUILDINGS), 2017 EDITION
 - ASIA M1: SAFETY CODE FOR ELEVATORS AND ESCALATORS, 2019 EDITION
 - NFPA 135, STANDARD FOR FIXED GUIDEWAY TRANSIT AND PASSENGER RAIL SYSTEMS, 2019 EDITION
- PLUMBING:
 - INTERNATIONAL PLUMBING CODE (IPC) 2018 EDITION
 - INTERNATIONAL ENERGY CONSERVATION CODE (IECC) 2018 EDITION
- ELECTRICAL:
 - NFPA 70 NATIONAL ELECTRICAL CODE (NEC) 2008 EDITION
 - NFPA 110 STANDARD FOR EMERGENCY AND STANDBY POWER SYSTEMS, 2016 EDITION
 - INTERNATIONAL ENERGY CONSERVATION CODE (IECC) 2018 EDITION
- FIRE:
 - INTERNATIONAL FIRE CODE (IFC) 2018 EDITION
 - INTERNATIONAL BUILDING CODE (IBC) 2018 EDITION
 - NFPA 13, STANDARD FOR INSTALLATION OF SPRINKLER SYSTEM 2019 EDITION
 - NFPA 114, NATIONAL FIRE ALARM AND SOUNDING CODE, 2019 EDITION
 - NFPA 415, STANDARD ON AIRPORT TERMINAL BUILDINGS, FUELING TAMP PHRANGE, AND LOADING WALKWAYS
 - 2018 EDITION
 - CITY AND COUNTY OF DENVER BUILDING AND FIRE CODE AMENDMENTS, 2019 EDITION



APPLICABLE IBC, IEBC AND NFPA SECTIONS

IBC 2018
SECTION 302 OCCUPANCY CLASSIFICATION AND USE
 THE OCCUPANCY FOR THE AGTS TRAIN PLATFORM, AIRPORT LEVEL LANDING, AND THE CONCOURSE CIRCULATION AREA FALL UNDER GROUP A-3 ASSEMBLY - PASSENGER TERMINAL WITH OPEN AREAS.
601 CONSTRUCTION CLASSIFICATION
 THE 2018 DENVER AMENDMENTS TO THE 2018 INTERNATIONAL BUILDING CODE, SECTION 4.1, REQUIRE AIRPORT TERMINAL BUILDINGS TO BE OF TYPE II CONSTRUCTION AS DEFINED IN IBC CHAPTER 6.
TYPE I-A
TABLE 601.1 RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS

| MEMBER | RESISTANCE RATING | SEPARATION | SEPARATION |
|---------------------------|-------------------|------------|------------|
| PRIMARY STRUCTURAL FRAME | 3 HR | 3 HR | 3 HR |
| BEARING WALL EXTERIOR | 3 HR | 3 HR | 3 HR |
| BEARING WALL INTERIOR | 2 HR | 2 HR | 2 HR |
| NON-BEARING WALL EXTERIOR | 0 HR | 0 HR | 0 HR |
| FLOOR CONSTRUCTION | 1.5 HR | 1.5 HR | 1.5 HR |
| ROOF CONSTRUCTION | 1.5 HR | 1.5 HR | 1.5 HR |

SECTION 1004 OCCUPANT LOAD
 THE IBC PROVIDES FOUR OCCUPANT LOAD FACTORS IN SQUARE FEET PER OCCUPANT. FOR AIRPORT TERMINALS [IBC TABLE 1004.1 (4) FOOTINGS].
 1004.1.4 AIRPORT WAITING AREAS, THE OCCUPANCY FACTOR IS 15 SF/GROSS PER OCCUPANT.
 1004.1.4 AIRPORT CONCOURSE, THE OCCUPANCY FACTOR IS 100 SF/GROSS PER OCCUPANT.
 1004.1.4 AIRPORT BAGGAGE CLAIM, THE OCCUPANCY FACTOR IS 200 SF/GROSS PER OCCUPANT.
 1004.1.4 AIRPORT BAGGAGE HANDLING, THE OCCUPANCY FACTOR IS 200 SF/GROSS PER OCCUPANT.
 BAGGAGE HANDLING AND BAGGAGE CLAIM ARE NOT APPLICABLE TO THE STATION PLATFORMS SINCE THIS AREA IS ONLY FOR PASSENGER MOVEMENT. THE CONCOURSE OCCUPANT LOAD FACTOR DOES NOT PROVIDE A REALISTIC OCCUPANT LOAD AS THE STATION PLATFORM DOES NOT HAVE THE OPENNESS AND UNUSUAL SPACE COMMON TO CONCOURSE AREAS. THEREFORE, THE OCCUPANT LOAD FACTOR UTILIZED IN THIS ANALYSIS IS 15 SF/PER OCCUPANT FOR WAITING AREAS.
 TOTAL IN SCHEDULE
SECTION 711.1.1.1 OPENING SIZE
 IN LIEU OF PROVIDING DRAFT CURTAINS AND/OR AUTOMATIC SHUTTERS AT THE EXISTING AIRLIFT OPENING, EXISTING SMOKE BEAM DETECTORS SERVE THE LENGTH OF THE AGTS PLATFORM. REFERS TO FA SHEETS.
SECTION 1003.1.1 MEANS OF EGRESS BURNS
 SECTION 1003.1.1 USES 20 MINUTES PER EGRESS STAR DOOR (800 OCCUPANTS)
 REQUIRED EGRESS STAR WIDTH IS 22" x 18" OF MINIMUM.
 EXISTING EGRESS STAR WIDTH AT BETWEEN 4" TO 2" WIDTH EACH + EXISTING TOTAL 18" EGRESS ESCALATOR WIDTH.
 *NEW ESCALATORS EGRESS WIDTHS AT 2'-8" WIDTHS EACH + 21'-4" EGRESS ESCALATOR WIDTH.
 SECTION 1003.3.2 FOR DOORS, GATES, CORRIDORS, AISLES, AND RAMP USES 15 INCHES PER OCCUPANT (800 OCCUPANTS)
 REQUIRED EGRESS AISLE CORRIDOR WIDTH 15" x 10' x 15' MINIMUM.
 EXISTING 4 EGRESS STAR DOORS IS 36" WIDTHS EACH + EXISTING TOTAL 18" EGRESS STAR DOOR WIDTH.
SECTION 1008 NUMBER OF EXITS & COMMON PATH LIMITS
 SECTION 1008.2.1 OCCUPANCY A-3 = 150 OCCUPANTS OR GREATER, REQUIRES 3 EXITS. EXISTING 4 STAR EXITS.
IEBC 2018
SECTION 711.1.1 CONFORMANCE
 AN EXISTING BUILDING OR PORTION THEREOF SHALL NOT BE ALTERED SUCH THAT THE BUILDING BECOMES LESS SAFE THAN ITS EXISTING CONDITION. THIS APPLIES TO THE NUMBER OF EXITS AND COMMON PATH LIMITS THAT ARE EXISTING AT THE AGTS TRAIN PLATFORM. THE EXISTING COMMON PATH TRAVEL EXCEEDS THE 2018 IBC MAXIMUM DISTANCE ALLOWED UNDER THE PRESENT CODE, HOWEVER IT IS NOT BEING ALTERED SUCH THAT IT BECOMES LESS SAFE THAN ITS EXISTING CONDITION.
SECTION 703.1.1.1.1 FEATURES
 SHALL BE DONE IN A MANNER THAT MAINTAINS THE LEVEL OF PROTECTION PROVIDED FOR THE MEANS OF EGRESS. FOR EGRESS AND OCCUPANCY CALCULATIONS NONE OF THE AREAS ARE BEING IMPROVED IN SIZE. THE AREAS ARE ONLY IMPROVED AT AGTS AND CONCOURSE LEVELS BY THE ADDITION OF ESCALATORS PER NORTH AND SOUTH ENDS OF THE TRAIN PLATFORM. THE EXISTING EGRESS STAIRS AND DOOR WIDTHS ARE NOT CHANGED BY THE MODIFICATION OF THE ESCALATORS.
2019 DENVER AMENDMENTS
SECTION 1003.1.1.1.1 ESCALATORS AND MOVING WALKS
 ELEVATORS, ESCALATORS AND MOVING WALKS SHALL NOT BE USED AS A COMPONENT OF A REQUIRED MEANS OF EGRESS FROM ANY OTHER PART OF THE BUILDING.
EXCEPTIONS:
 1. ESCALATORS USED AS AN ACCESSIBLE MEANS OF EGRESS IN ACCORDANCE WITH SECTION 1009.4
 2. ESCALATORS BEING FIXED GUIDEWAY TRANSIT SYSTEMS IN ACCORDANCE WITH NFPA 135.
APPENDIX B SECTION 7.3
 SECTION 7.3 TRANSIT SYSTEM CONSTRUCTION GUIDE. FIXED GUIDEWAY TRANSIT SYSTEMS NFPA 135 SHALL BE USED AS A CONSTRUCTION GUIDE UNLESS SPECIFICALLY COVERED BY THIS CODE.

NFPA 130
SECTION 5.3.1.2
 NFPA 130 DETERMINE OCCUPANT LOAD BASED ON ANTICIPATED USE OF THE TRAINS. SPECIFICALLY NFPA 130 SECTION 5.3.1.2 REQUIRES THE OCCUPANT LOAD FOR A STATION TO BE BASED ON FULL TRAINS BEING TANGENTIAL ENTERING THE STATION ON ALL TRACKS IN NORMAL TRAVEL DIRECTION PLUS THE ENTRING LOAD OF PASSENGERS ON THE PLATFORM AS THE TRAINS ARE IN STATION. THE TRAVEL DISTANCE FOR EACH TRACK SHALL BE BASED ON THE TRAIN LENGTH PER TRAIN HEADWAY FACTORS TO ACCOUNT FOR SERVICE DISRUPTIONS AND SYSTEM REACTION TIME.
 THE CONCOURSE A PLATFORM IS SERVED BY TWO TRACKS UNDER NORMAL TRAFFIC. ONE TRACK IS MOVING PASSENGERS FROM THE CONCOURSE TOWARDS THE TERMINAL, AND THE OTHER IS MOVING PASSENGERS FROM THE TERMINAL TOWARDS THE CONCOURSE. IN BOTH CASES, PEOPLE WILL BE BOTH ENTRING AND DETRAINING ON BOTH TRAINS AT THE CONCOURSE A STATION PLATFORM.
 THE EGRESS OCCUPANT LOAD FOR THIS ANALYSIS IS BASED ON BOTH TRAINS BEING AT MAXIMUM CAPACITY PLUS A MAXIMUM CAPACITY GROWTH WAITING ON THE STATION PLATFORM. IN OTHER WORDS, THE EGRESS OCCUPANT LOAD FOR THIS ANALYSIS IS EQUAL TO THREE TIMES THE MAXIMUM CAPACITY OF A SINGLE TRAIN. THIS APPROACH IS CONSERVATIVE AS THE MAJORITY OF TRAINS ARE NOT LOADED TO CAPACITY. LET ALONG TWO IN OPPOSITE DIRECTION AT THE SAME TIME. THE HEADWAY OF TRAINS IN THE ORDER OF 5 MINUTES SO AGAIN, IT IS EXTREMELY UNUSUAL TO HAVE A CAPACITY GROWTH ON THE STATION PLATFORM.
 EACH TRAIN HAS FOUR CARS AND EACH CAR IS RATED FOR 90 PASSENGERS BY THE MANUFACTURER. HOWEVER, THIS IS NOT A REALISTIC NUMBER FOR AIRPORT OPERATIONS AS MOST PASSENGERS ARE CARRYING BAGGAGE. USUAL WHO OVERSEES AGTS OPERATIONS AT DEN, STATES THE MAXIMUM TRAIN CAR CAPACITY IS REALISTICALLY 75 OCCUPANTS. I.E. PERSONS WANTING TO ENTER WILL NOT FEEL ABLE TO DO SO IF THE CAR IS ALREADY AT 75 PEOPLE. AS A RESULT, THE AGTS TRAINS ARE OPERATED BASED ON AN OCCUPANT LOAD OF 60 PERSONS PER CAR.
 SEE OCCUPANT TOTAL IN SCHEDULE
SECTION 5.3.1.2.1 PLATFORM EVACUATION TIME THERE SHALL BE SUFFICIENT EGRESS CAPACITY TO EVACUATE THE PLATFORM OCCUPANT LOAD AS DEFINED IN 5.3.1.2 FROM THE STATION PLATFORM IN 4 MINUTES OR LESS. THIS EVALUATION FOCUSES ON THE CAPACITY OF THE EGRESS COMPONENT MORE THAN TOTAL EXIT LENGTH.
SECTION 5.3.1.2.2 PLATFORM EVACUATION TIME TO A POINT OF SAFETY THIS EVALUATION FOCUSES ON THE CAPACITY OF THE EGRESS COMPONENT MORE THAN TOTAL EXIT LENGTH.
 NFPA 130 SECTION 5.3.1.2.2 EVALUATION TIME TO A POINT OF SAFETY. THE STATION SHALL BE DESIGNED TO PERMIT EVACUATION FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN 4 MINUTES OR LESS. NFPA 130 SECTION 5.3.1.2.2.2 POINT OF SAFETY. AN ENCLOSED EXIT THAT LEADS TO A PUBLIC WAY OR SAFETY LOCATION OUTSIDE THE STRUCTURE. AN AN-GRATE POINT BEYOND AN ENCLOSED STRUCTURE, OR OTHER AREA THAT PROVIDES ADEQUATE PROTECTION FOR EVACUATING PASSENGERS. IN THIS CASE, THE POINT OF SAFETY IS OUTSIDE THE STARWELL EXIT ON THE AIRPORT LEVEL. THE 4 MINUTE TEST COMBINES THE CAPACITY OF THE EGRESS COMPONENTS WITH TOTAL TRAVEL DISTANCE FOR OCCUPANTS. IT ALSO ACCOUNTS FOR QUEUING AT THE MOST RESTRICTIVE EGRESS COMPONENT, WHICH IS THE STARWELL.
 THE CAPACITY OF THE MEANS OF EGRESS SHALL BE CALCULATED IN PERSONS PER INCH PER MINUTE (PPM) AND PASSENGER TRAVEL SPEEDS IN FEET PER MINUTE (FPM). THE TRAVEL DISTANCE FROM THE PLATFORM TO THE STAIRS IS SHOWN IN ATTACHMENT A. THE CALCULATIONS ARE BASED ON APPENDIX B OF NFPA 130, WHICH DETAILS HOW THESE CALCULATIONS ARE TO BE PERFORMED.
NFPA 130 EGRESS ANALYSIS - WIDTH OF ESCALATORS
 NFPA 130 PROVIDES FOR A MORE PERFORMANCE BASED APPROACH TO EGRESS. NFPA 130 SECTION 5.3.1.1 "PLATFORM EVACUATION TIME" THERE SHALL BE SUFFICIENT EGRESS CAPACITY TO EVACUATE THE PLATFORM OCCUPANT LOAD AS DEFINED IN 5.3.1.2 FROM THE STATION PLATFORM IN 4 MINUTES OR LESS. THIS EVALUATION FOCUSES ON THE CAPACITY OF THE EGRESS COMPONENT MORE THAN TOTAL EXIT LENGTH.

NFPA 130 SECTION 5.3.1.2.2 EVALUATION TIME TO A POINT OF SAFETY
 THE STATION SHALL BE DESIGNED TO PERMIT EVACUATION FROM THE MOST REMOTE POINT ON THE PLATFORM TO A POINT OF SAFETY IN 4 MINUTES OR LESS. NFPA 130 SECTION 5.3.1.2.2 POINT OF SAFETY. AN ENCLOSED EXIT THAT LEADS TO A PUBLIC WAY OR SAFETY LOCATION OUTSIDE THE STRUCTURE. AN AN-GRATE POINT BEYOND AN ENCLOSED STRUCTURE, OR OTHER AREA THAT PROVIDES ADEQUATE PROTECTION FOR EVACUATING PASSENGERS. IN THIS CASE, THE POINT OF SAFETY IS OUTSIDE THE STARWELL EXIT ON THE AIRPORT LEVEL. THE 4 MINUTE TEST COMBINES THE CAPACITY OF THE EGRESS COMPONENTS WITH TOTAL TRAVEL DISTANCE FOR OCCUPANTS. IT ALSO ACCOUNTS FOR QUEUING AT THE MOST RESTRICTIVE EGRESS COMPONENT, WHICH IS THE STARWELL.
 THE CAPACITY OF THE MEANS OF EGRESS SHALL BE CALCULATED IN PERSONS PER INCH PER MINUTE (PPM) AND PASSENGER TRAVEL SPEEDS IN FEET PER MINUTE (FPM). THE TRAVEL DISTANCE FROM THE PLATFORM TO THE STAIRS IS SHOWN IN ATTACHMENT A. THE CALCULATIONS ARE BASED ON APPENDIX B OF NFPA 130, WHICH DETAILS HOW THESE CALCULATIONS ARE TO BE PERFORMED.
TEST NO. 1: EVALUATE PLATFORM OCCUPANT LOAD FROM PLATFORM IN 4 MINUTES OR LESS
 EGRESS ELEMENT (WIDTH IN INCHES) FLOW RATE (PERSONS/MINUTE) PERSONS/MINUTE
 STAIR EXITS 150 141 0 270
 ESCALATORS 0 0 0 0
 Exit Capacity 141 270
 PLATFORM OCCUPANT LOAD 200
 P₁ MINUTE TIME AT STARWELL + PLATFORM EXIT CAPACITY 270 + 3.33 MINUTES
IN TEST NO. 1, THE TIME TO CLEAR THE PLATFORM IS FOUND TO BE 3.33 MINUTES BASED ON THE OCCUPANT LOAD OF 300 PERSONS. THIS MEETS THE REQUIREMENT OF NFPA 130 SECTION 5.3.1.2.1.
TEST NO. 2: EVALUATE PLATFORM OCCUPANT LOAD FROM MOST REMOTE POINT ON PLATFORM TO A POINT OF SAFETY IN 4 MINUTES OR LESS
 EGRESS ROUTE COMPONENT DISTANCE (FEET) FLOW RATE (PERSONS/MINUTE) TRAVEL TIME (MINUTES)
 TRAVEL ALONG PLATFORM (F₁) 25 50 48 0.24
 TRAVEL UP STAIRS (F₂) 150 124 1.24
 TRAVEL TO SAFETY (F₃) 50 104 0.52
 TOTAL TRAVEL TIME (T₁) 0.76
 TOTAL WALKING TIME (T₂) 0.53
 NOTE: DISTANCE USED IS FROM THE CENTER OF THE AGTS PLATFORM UP THE STAIRS TO THE AIRPORT LEVEL AND THROUGH THE EXIT DOORS TO THE EXTERIOR OF THE BUILDING.
 W₁ WAITING TIME ON PLATFORM = F₁ * T₁ + 5.23 * 1.21 = 2.02 MIN
 TOTAL EXIT TIME = T₁ + W₁ + T₂ + 2.02 + 4.53 MIN
IN TEST NO. 2, THE MAXIMUM TIME TO REACH A POINT OF SAFETY (I.E. EXIT DISCHARGE PER IBC) IS FOUND TO BE 4.15 MINUTES. THIS MEETS THE REQUIREMENT OF NFPA 130 SECTION 5.3.1.2.2 OF 4 MINUTES OR LESS TO REACH A POINT OF SAFETY.
CONCLUSION
USE OF ESCALATORS
 THE IBC DOES NOT RECOGNIZE THE USE OF ESCALATORS AS EGRESS COMPONENTS. HOWEVER, NFPA 130 SECTION 5.3.2 DOES ALLOW ESCALATORS TO BE UTILIZED FOR EGRESS. THEREFORE, BASED ON THE EXISTING CONDITIONS AND ASSUMED ORIGINAL APPROVAL FOR THIS AREA, THE ESCALATORS ARE NOT CONSIDERED AS PART OF THE EGRESS FOR THIS PROJECT.
SEQUENCING OF ESCALATOR REPLACEMENT
 THE EXISTING ESCALATOR FOR THE CONCOURSE A PLATFORM ALTHOUGH NOT COMPLIANT WITH THE IBC IS COMPLIANT WITH NFPA 130.
 THE PROPOSED CONSTRUCTION SEQUENCE FOR THE ESCALATOR UPGRADE WILL TAKE ONLY ONE SET NORTH OR SOUTH OF ESCALATORS OUT OF SERVICE AT A TIME. IN THIS WAY, ONE SET OF ESCALATORS WILL ALWAYS BE AVAILABLE FOR EGRESS. DEN REQUESTS THAT THE PROPOSED CONSTRUCTION SEQUENCE BE ASSESSED AS BEING ADEQUATE WITH NFPA 130.
 THE PROPOSED CONSTRUCTION SEQUENCE FOR THE ESCALATOR UPGRADE FOR USING NFPA 130:

OCCUPANT LOAD - AGTS LEVEL - METHOD BASED ON NFPA 130:

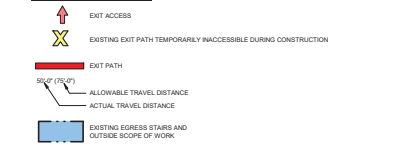
| | |
|---|--------------------|
| • MAXIMUM DETRAINING 4 CARS AT 75 PERSONS PER CAR | 300 PERSONS |
| • MAXIMUM ENTRING 4 CARS AT 75 PERSONS PER CAR | 300 PERSONS |
| • DOUBLING OF ENTRING PERSONS TO ACCOUNT FOR DELAYS | 300 PERSONS |
| TOTAL OCCUPANT LOAD | 900 PERSONS |

OCCUPANT LOAD - AGTS LEVEL - METHOD BASED ON IBC 2018

| COLOR LEGEND | FUNCTION OF SPACE | OCCUPANCY TYPE | AREA | OCCUPANT LOAD FACTOR | OCCUPANT LOAD |
|--------------|----------------------------------|----------------|----------|----------------------|---------------|
| A-3 | AIRPORT TERMINAL - WAITING AREAS | A-3 | 14075 SF | 15 | 940 |
| | | | | | 14075 SF |
| | | | | | 940 |

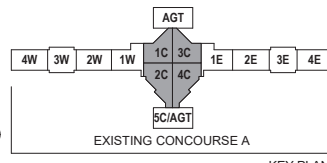
- NOTE:
- IBC OCCUPANT LOAD IS BASED UPON NUMBER AND SIZE OF ROOMS. SQUARE FOOTAGE SHOWN IS A TOTAL OF EACH FUNCTION OF SPACE.
 - IBC OCCUPANT LOAD IS BASED UPON BURST FACTOR OF TRAIN CARS LOADING AND UNLOADING ONTO TRAIN PLATFORM.
 - FOR EGRESS USE THE GREATER OCCUPANT LOAD OF THE 2 METHODS. (900 OCCUPANTS)
 - EXISTING AGTS OCCUPANT LOAD IS BASED UPON NFPA 130 SECTION 5.3.1.2.

LIFE SAFETY SYMBOLS



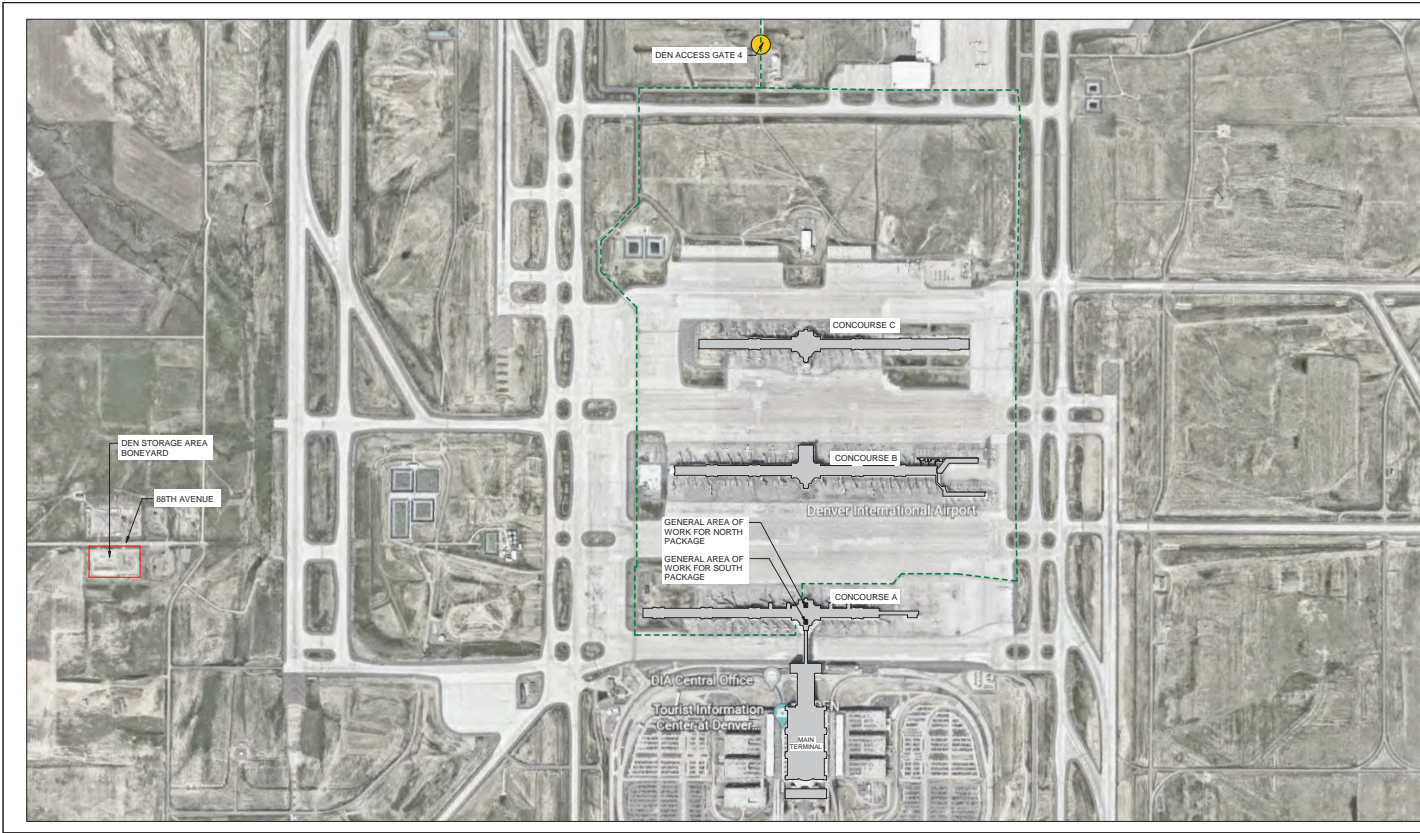
NOTE:

LIFE SAFETY SHEETS ARE TO BE PRINTED IN COLOR. COLOR VERSION IS REQUIRED.



EXISTING CONCOURSE A KEY PLAN

4/9/2021 12:24



- GENERAL NOTES**
- REFER TO DIVISION 1 SPECIFICATIONS FOR REQUIREMENTS TO MOVE ESCALATORS IN AND OUT OF THE SITE.
 - EXISTING UNITS ARE TO BE REMOVED FROM THE CONCOURSE AND TAKEN TO THE DEN BONEYARD AND UNLOADED. CONTRACTOR TO CUT THE APPEL AREA THROUGH ACCESS GATE 4 NORTH OF THE CONCOURSES. THE BONEYARD IS LOCATED ON 88TH AVENUE. THE ROUTE TO THE BONEYARD FROM CONCOURSE A IS APPROXIMATELY 1/2 MILE.
 - DEN WILL PROVIDE THE TRASH BINS FOR EACH STAGE OF THE CONSTRUCTION. SEE PLAN FOR GENERAL AREA. ALL EXISTING FINISHES AND AREAS WILL BE PROTECTED BY THE CONTRACTOR MOVING INTO AND OUT OF THE AREA OF WORK.
 - DEN WILL PROVIDE THE TRASH BINS FOR EACH STAGE OF THE CONSTRUCTION. SEE PLAN FOR GENERAL AREA. ALL EXISTING FINISHES AND AREAS WILL BE PROTECTED BY THE CONTRACTOR MOVING INTO AND OUT OF THE AREA OF WORK.
 - ACCESS TO THE INTERIOR CONSTRUCTION HAUL ROUTE IS CONCOURSE LEVEL AT GATE A38 AND THROUGH A DOORWAY WITHIN THE CURTAIN WALL.

CITY & COUNTY of DENVER
DENVER INTERNATIONAL AIRPORT

DESIGNER OF RECORD

LEGENDS

CONSTRUCTION LEGEND

- TRASH BIN AREA
- ACCESS POINT
- INTERIOR HAUL ROUTES
- VEHICLE HAUL ROUTES
- DEN BONEYARD

**DENVER INTERNATIONAL AIRPORT
 CONCOURSE A ESCALATOR REPLACEMENT**

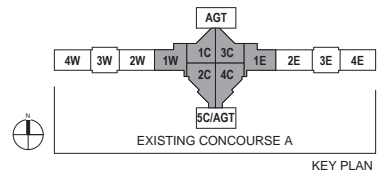
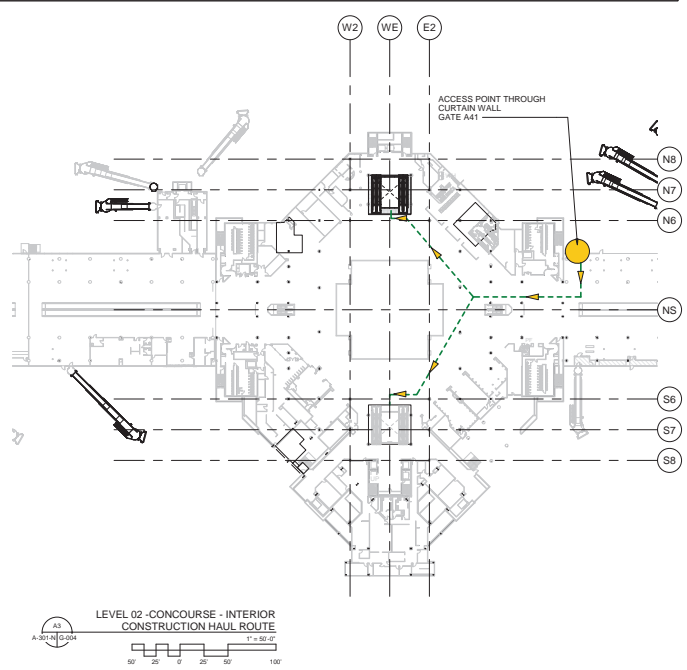
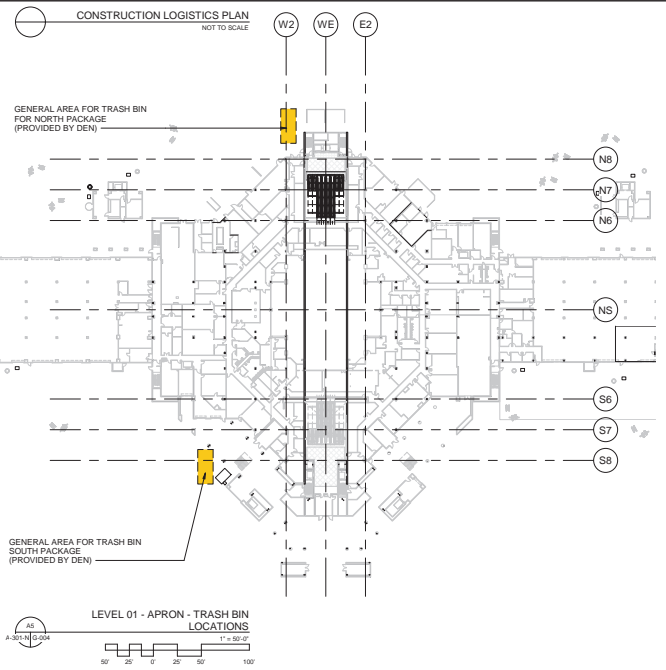
8700 PENA BLVD
 DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
 DENVER, CO 80202

| ISSUE RECORD | NO. | DATE | BY | PURPOSE |
|--------------|-----|----------|----|------------------------|
| 1 | JA | 04/09/21 | JC | ISSUE FOR CONSTRUCTION |

| | |
|----------------------|------------------------|
| SCALE: | As indicated |
| DATE: | 12/09/2020 |
| DRAWN BY: | CV |
| CHECKED BY: | DR |
| FAA AIP NO.: | |
| DESIGN CONTRACT NO.: | 20183001 |
| CONST. CONTRACT NO.: | 202005514 |
| VOLUME NO.: | 01 |
| SHEET TITLE: | CONSTRUCTION LOGISTICS |
| SHEET NO.: | G-004 |



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DESIGNER OF RECORD



4-05-21

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

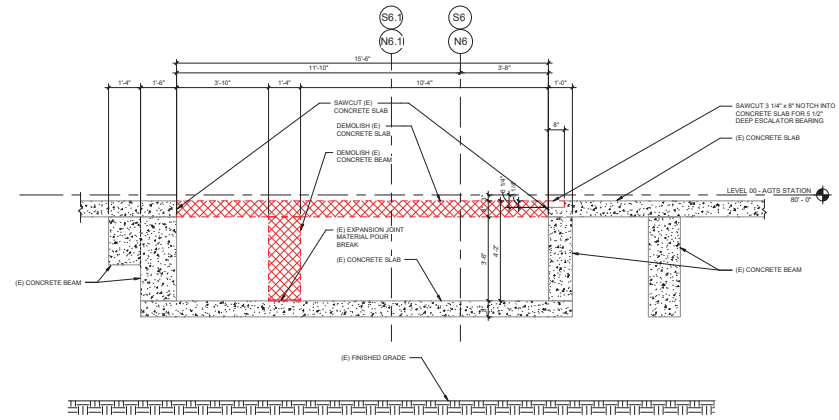
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DENVER, CO 80249

Jacobs

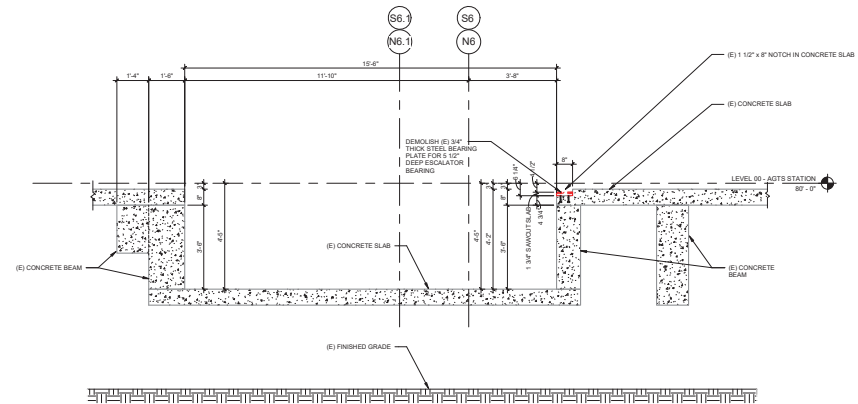
717 17TH STREET SUITE 2750
DENVER, CO 80202

| ISSUE RECORD | DATE | CHD |
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| 1 | JA | Contracted |

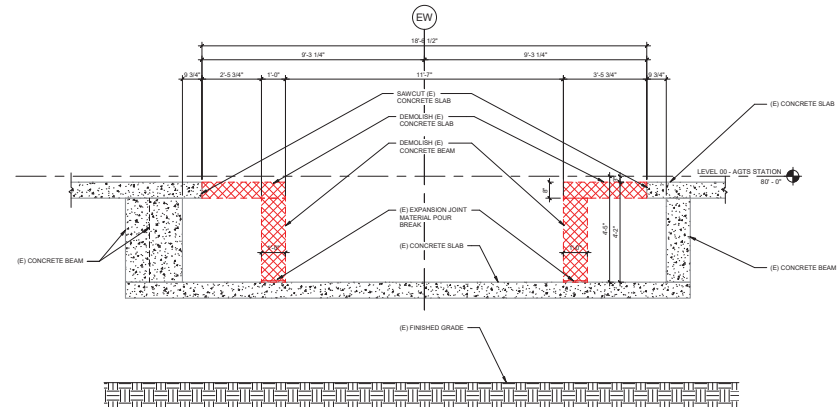
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| CHECKED BY: | SM |
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| DESIGN CONTRACT NO: | 201833001 |
| CONST. CONTRACT NO: | 202026518 |
| VOLUME NO: | 01 |
| SHEET TITLE: | ESCALATOR PIT DEMO SECTIONS |
| SHEET NO: | SD301 |



3 AGTS LEVEL NORTH-SOUTH SECTION - ESCALATOR PIT DEMO
SD104-SD301 1/2" = 1'-0"



2 AGTS LEVEL NORTH-SOUTH SECTION - ESCALATOR PIT DEMO
SD104-SD301 1/2" = 1'-0"



1 AGTS LEVEL EAST-WEST SECTION - ESCALATOR PIT DEMO
SD104-SD301 1/2" = 1'-0"



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8500 PENA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202
ISSUE RECORD
NO. 1 PURPOSE DATE CND
1 JA JPC 12/09/20 AS
1 JA Contractor 04/02/21 JA

SCALE: 1/2" = 1'-0"

DATE: 12/09/20

DRAWN BY: AS

CHECKED BY: SM

FAA AP NO:

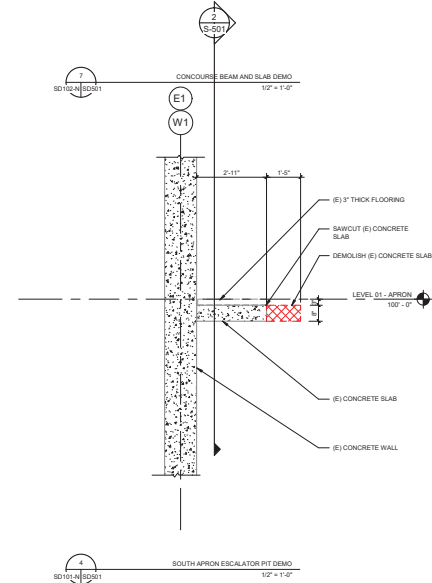
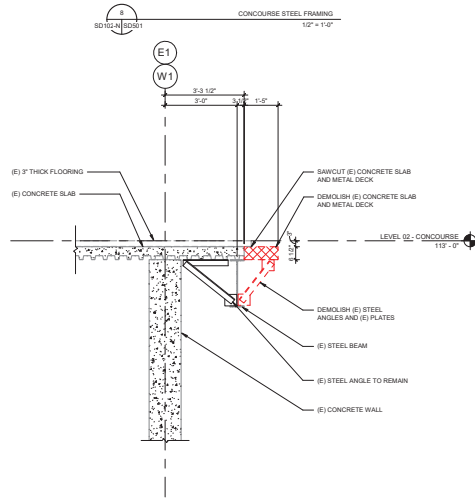
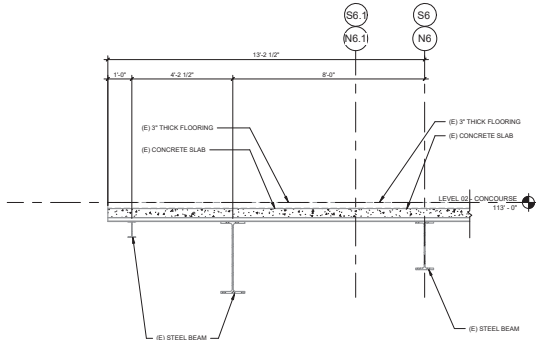
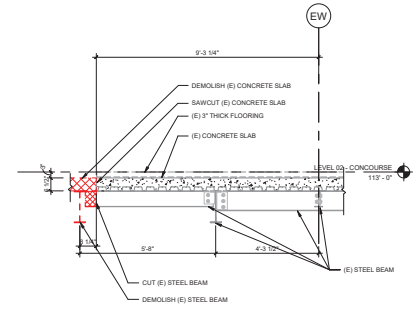
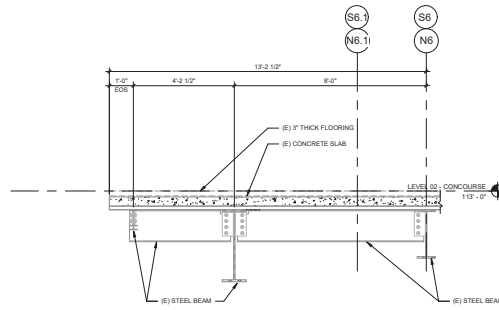
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CONST. CONTRACT NO: 20202618

VOLUME NO: 01

SHEET TITLE
STRUCTURAL DEMO
DETAILS

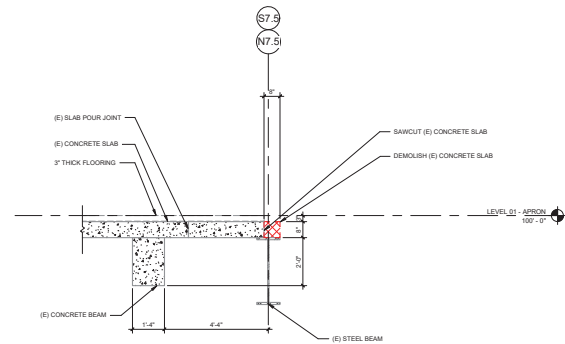
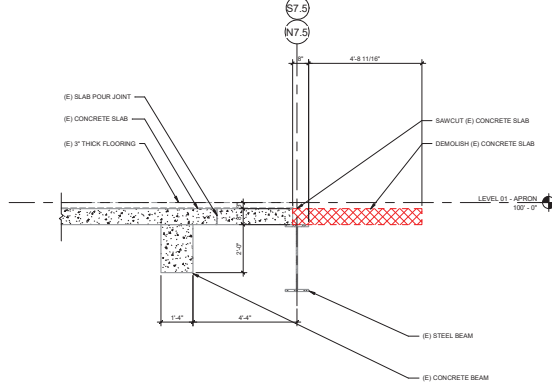
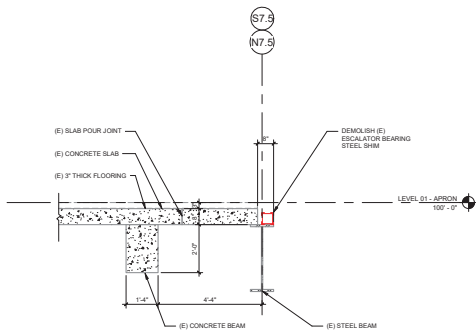
SHEET NO:
SD501



6 CONTOUR SLAB 12' x 1'-0"

5 CONTOUR FLOOR DEMO 12' x 1'-0"

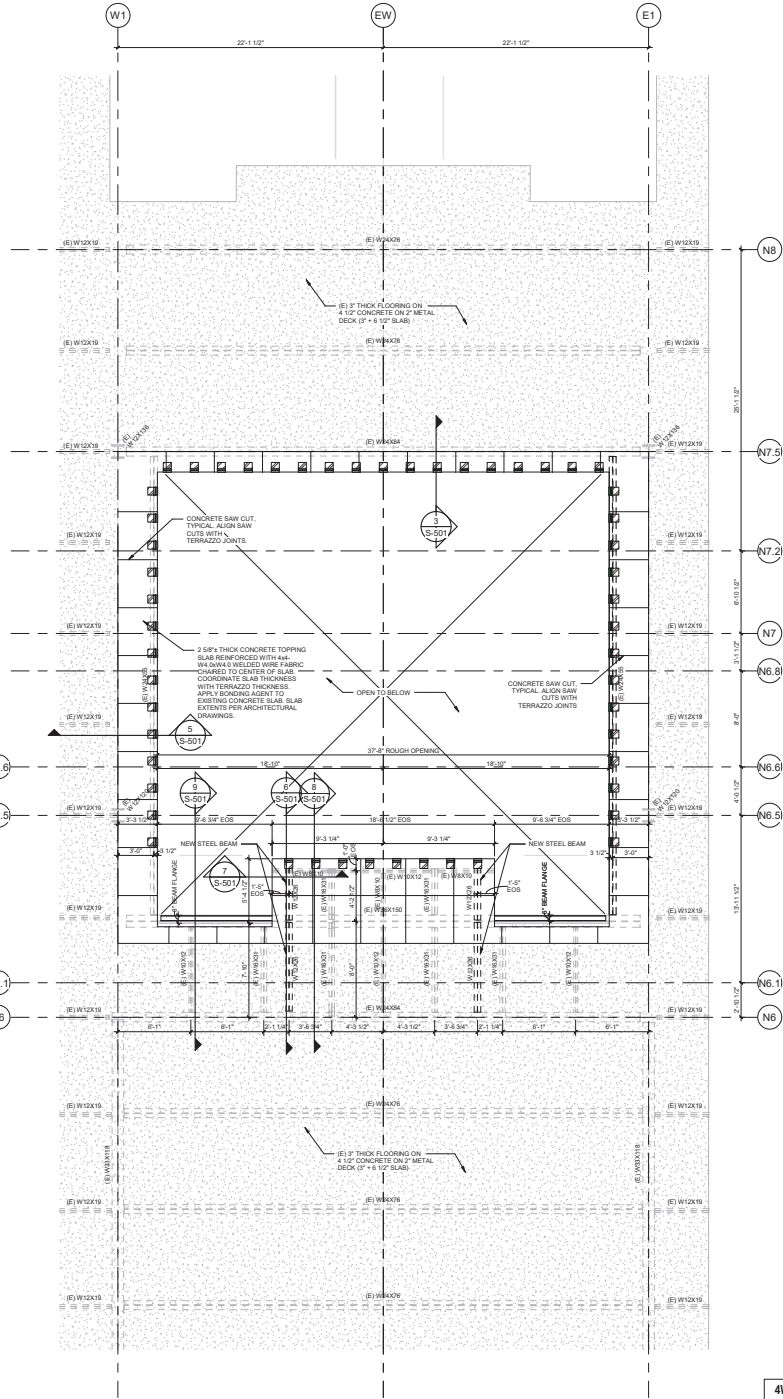
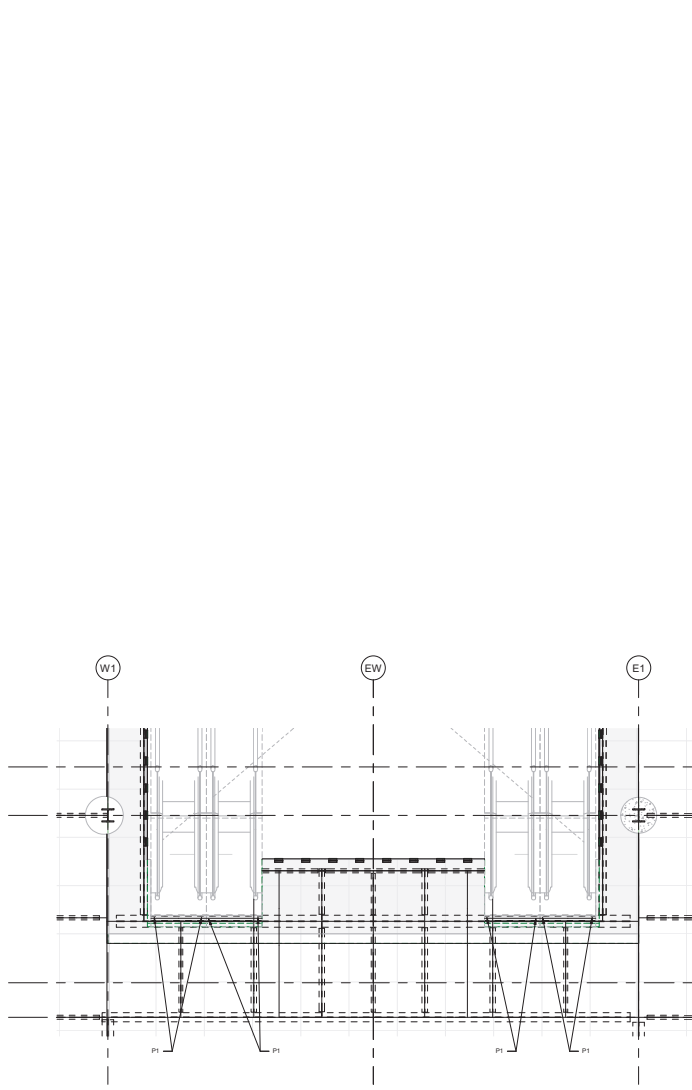
2 SOUTH APRON ESCALATOR FIT DEMO 12' x 1'-0"



3 APRON LEVEL SLAB 12' x 1'-0"

4 APRON LEVEL SLAB DEMO 12' x 1'-0"

1 APRON LEVEL SLAB EDGE DEMO 12' x 1'-0"



GENERAL NOTES

1. REFERENCE ARCHITECTURAL DRAWINGS FOR FLOORING DEMOLITION AND REPLACEMENT EXTENTS.
2. AT NEW TERRAZZO, INSTALL 2.5\"/>

CITY & COUNTY
of DENVER

DENVER
INTERNATIONAL
AIRPORT



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8500 PENA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

| ISSUE RECORD | NO. | DATE | PURPOSE | ISSUED BY | CHKD BY |
|--------------|-----|--------|--------------|-----------|---------|
| 1 | JA | 1/1/20 | IFC | 120626 JA | |
| 2 | JA | 1/1/20 | Contract Set | 120626 JA | |

SCALE: 1/4" = 1'-0"

DATE: 12/09/20

DRAWN BY: AS

CHECKED BY: SM

FAA AP NO:

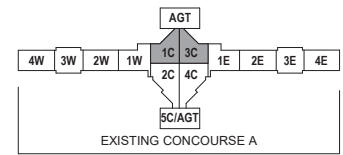
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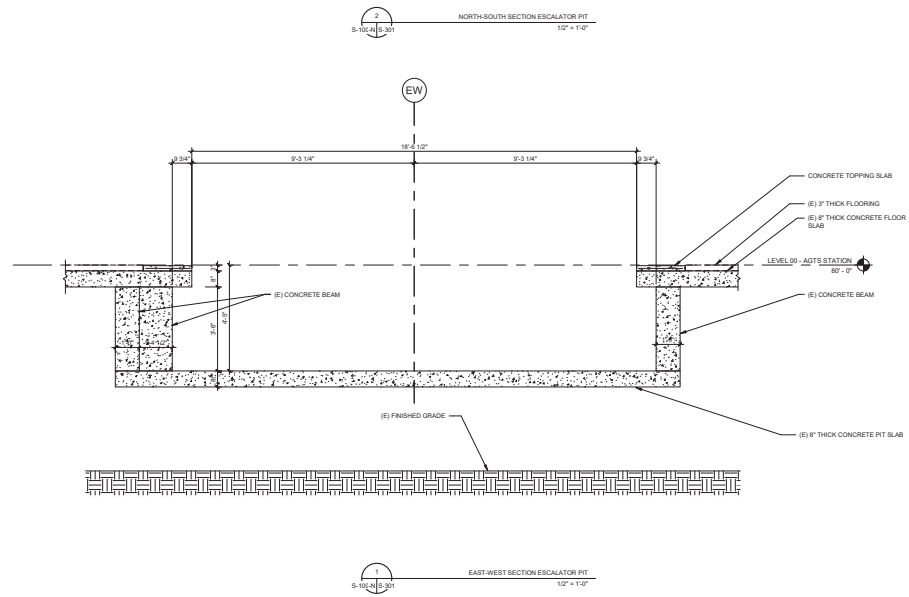
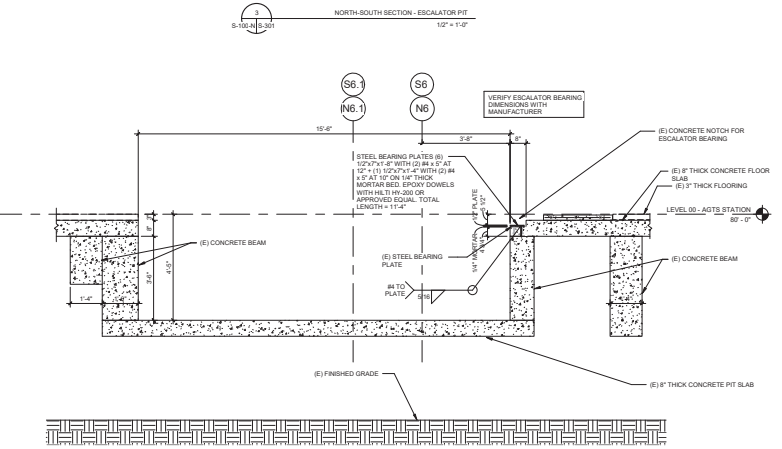
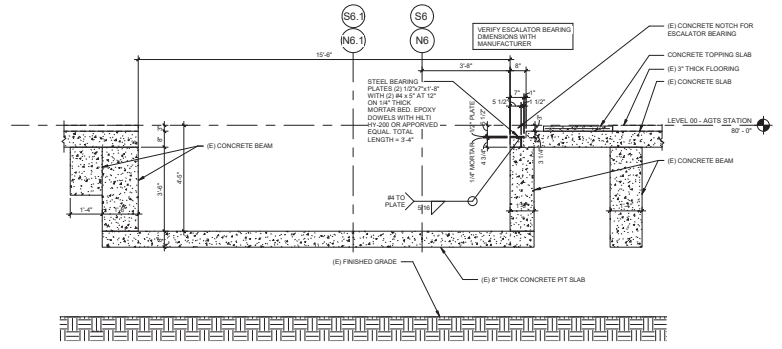
CONST. CONTRACT NO.: 202026518

VOLUME NO.: 01

SHEET TITLE: CONCOURSE LEVEL NORTH FRAMING PLAN

SHEET NO.: S-102-N





DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8500 PENA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

| ISSUE RECORD | NO. | DATE | CHG |
|--------------|-----|----------|-----|
| ISSUE | 1 | 12/09/20 | AS |
| REVISION | 1 | 12/09/20 | SM |

| | |
|----------------------|------------------------|
| SCALE: | 1/2" = 1'-0" |
| DATE: | 12/09/20 |
| DRAWN BY: | AS |
| CHECKED BY: | SM |
| FAA AP NO: | |
| DESIGN CONTRACT NO.: | 20183001 |
| CONST. CONTRACT NO.: | 20206518 |
| VOLUME NO.: | 01 |
| SHEET TITLE: | ESCALATOR PIT SECTIONS |
| SHEET NO.: | S-301 |

48-20713.1



DESIGNER OF RECORD



4-06-21

DENVER INTERNATIONAL AIRPORT CONCRESE A ESCALATOR REPLACEMENT

8500 PENNA BLVD DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750 DENVER, CO 80202

ISSUE RECORD

NO. DATE PURPOSE DATE CND

1 11/14/2020 PC 12/09/20 JA

2 1/14/2021 Contractor 04/01/21 JA

SCALE: 1/2" = 1'-0"

DATE: 12/09/20

DRAWN BY: AS

CHECKED BY: SM

FAA APP NO:

DESIGN CONTRACT NO: 20183001

CONST. CONTRACT NO: 20205618

VOLUME NO:

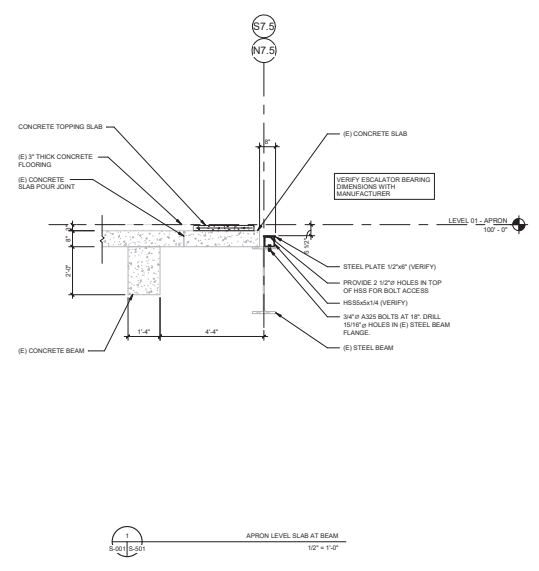
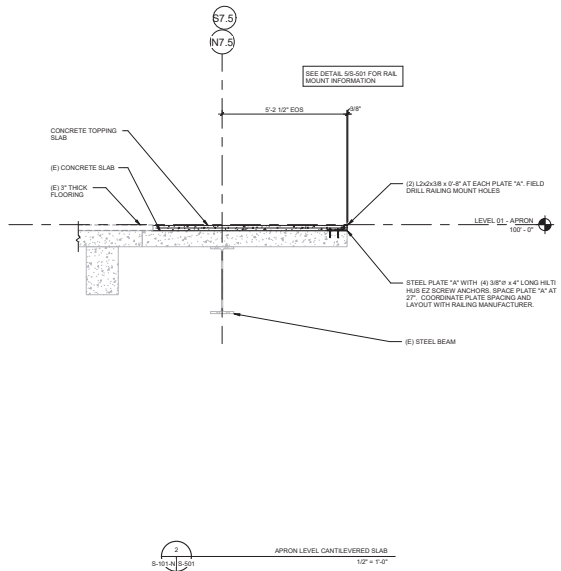
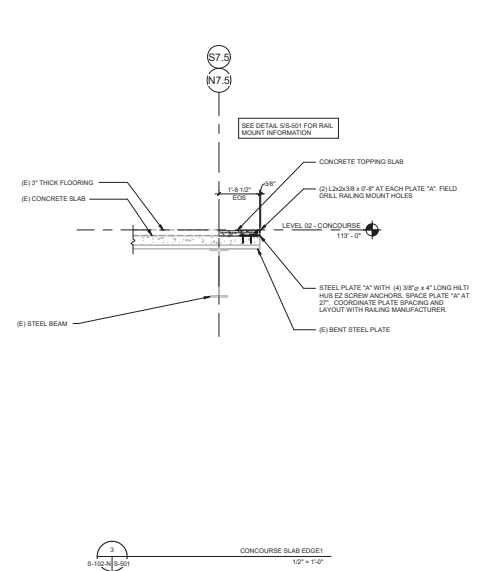
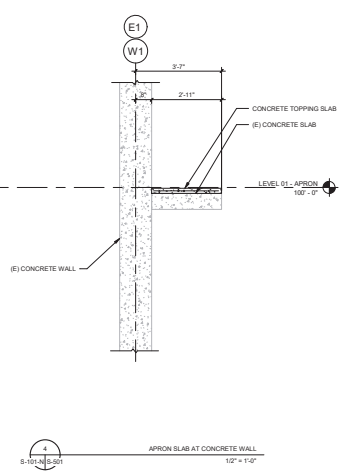
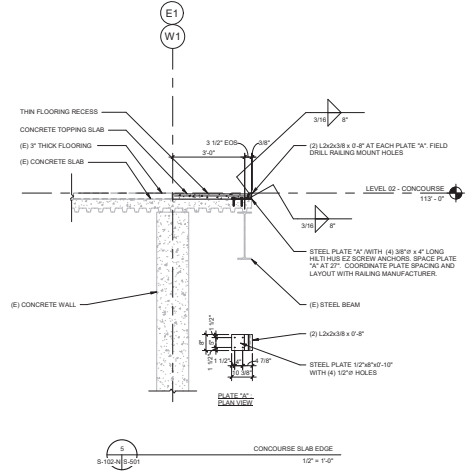
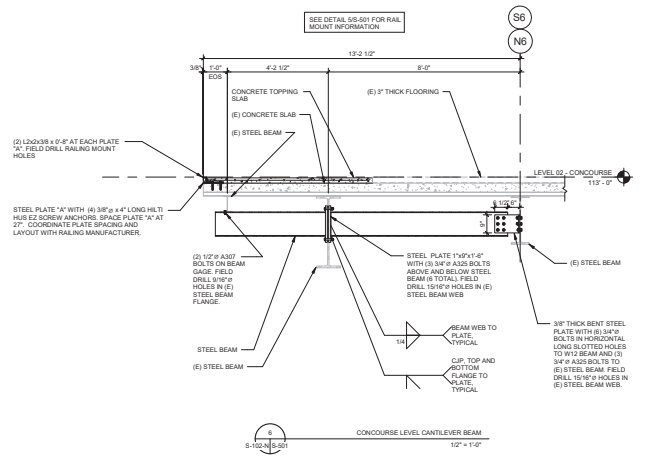
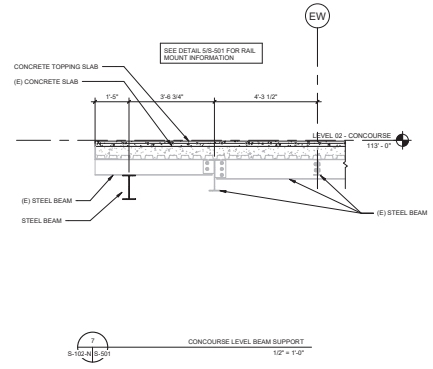
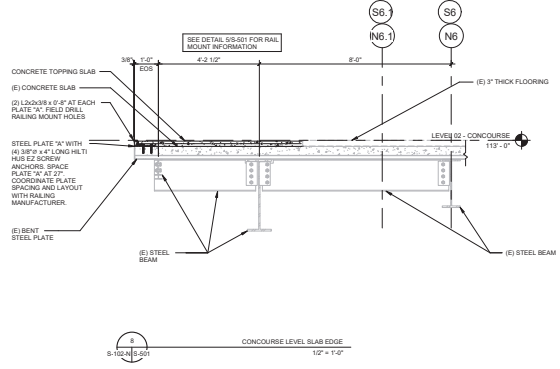
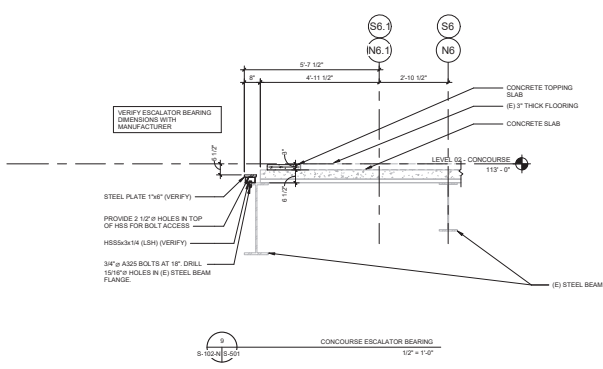
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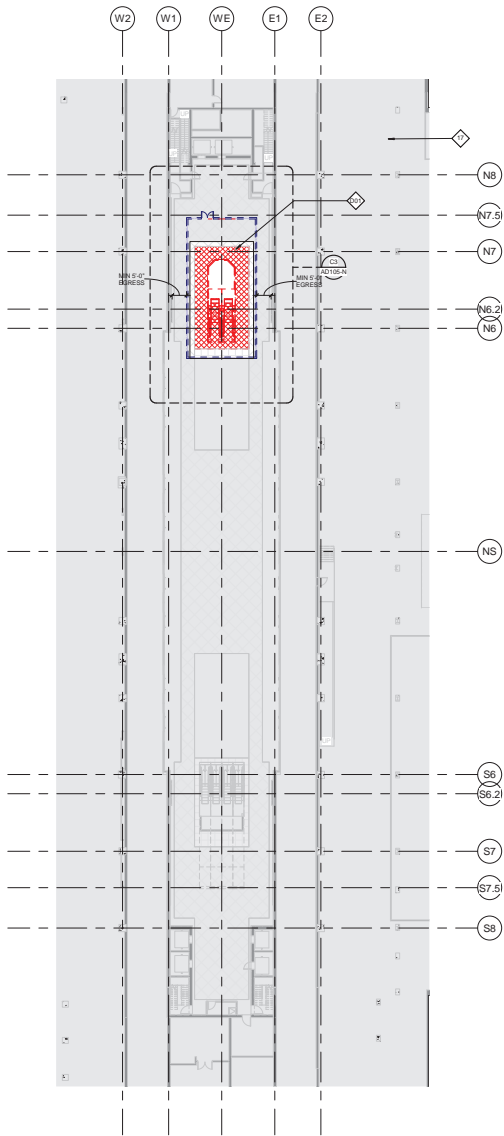
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STRUCTURAL DETAILS

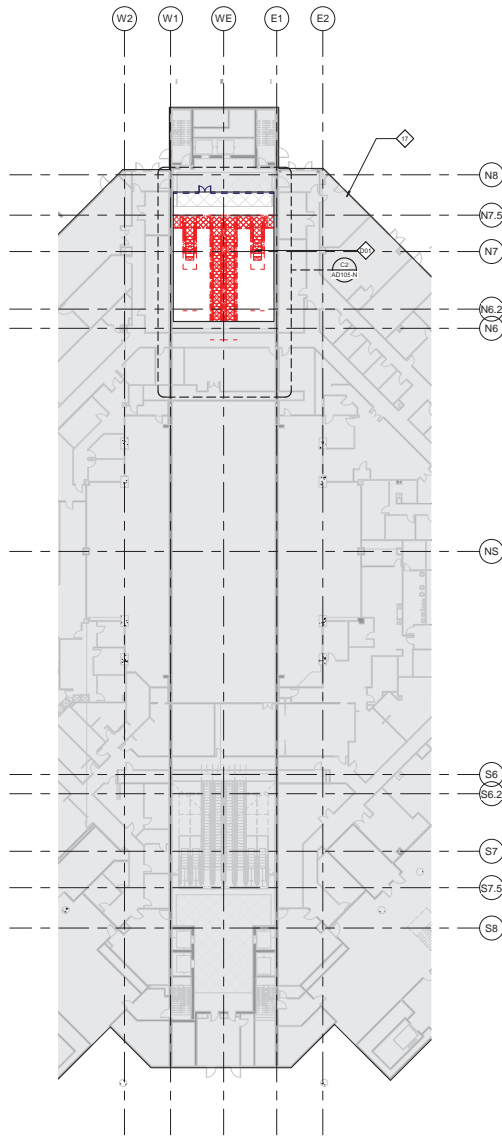
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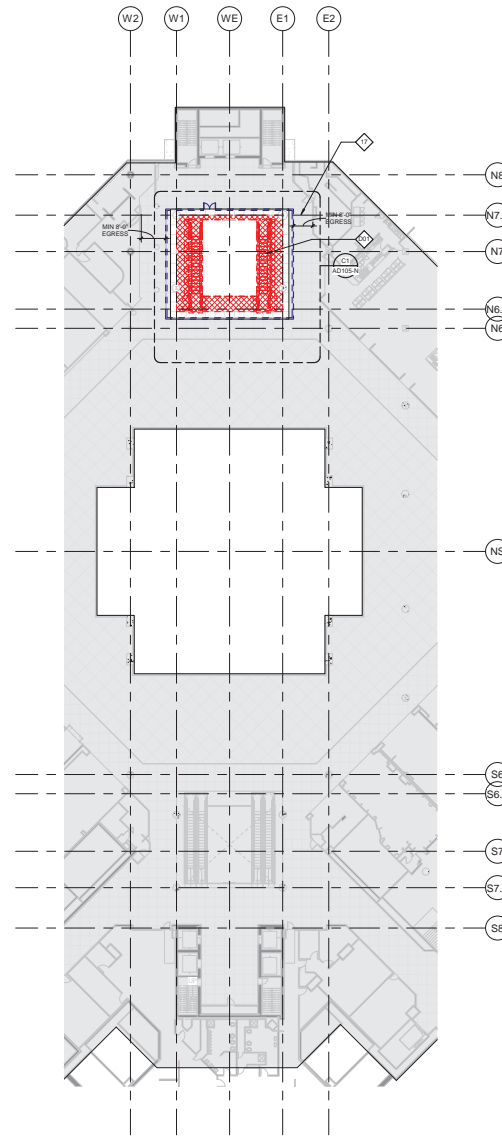




AS 1/8"=0'-0"
LEVEL 00 - AGTS STATION - NORTH OVERALL DEMO PLAN



AS 1/8"=0'-0"
APRON LEVEL - NORTH OVERALL DEMO PLAN



AS 1/8"=0'-0"
CONCOURSE LEVEL - NORTH OVERALL DEMO PLAN

GENERAL NOTES

DEMOLITION NOTES

- REMOVE DESIGNATED CEILINGS & SUPPORTS, FLOORING, DOORS & FRAMES, DESIGNATED PARTITIONS, COMPONENTS, BUILDING EQUIPMENT, AND FIXTURES REQUIRED FOR NEW WORK.
- REMOVE ELECTRICAL DEVICES AND CONDUIT. WIRING SHALL BE REMOVED FROM ALL AREAS EXCEPT WHERE OTHERWISE INDICATED ON THE DRAWINGS. CAP AND GROUND EXPOSED UTILITIES. NOTIFY OWNER AND THE AFFECTED UTILITY COMPANY IN ADVANCE AND OBTAIN APPROVAL BEFORE STARTING THIS WORK.
- PROVIDE TEMPORARY PARTITIONS, BARRICADES, GUARDRAILS AND LIGHTING TO SECURE WORK AREAS, CONTAIN DUST, SMOKE, FUMES, ETC. AND TO PROTECT AND ALLOW CONTINUED BUILDING OCCUPANCY BY OWNER, TENANTS AND VISITORS. UPON COMPLETION REMOVE TEMPORARY PARTITIONS AND REPAIR DAMAGED SURFACES TO MATCH ADJACENT SURFACES. CONTRACTOR TO OBTAIN BUILDING DEPARTMENT APPROVAL FOR EXISTING TEMPORARY DAMAGE AND REPAIRS. ALL TEMPORARY CONSTRUCTION PER APPLICABLE CODE AND SEISMIC REQUIREMENTS.
- THE ARCHITECT/ENGINEERS HAVE NO KNOWLEDGE OF ANY ASBESTOS OR OTHER HAZARDOUS MATERIALS ON THE JOBSITE. THE ARCHITECT SHALL NOT BE HELD LIABLE FOR ANY ASBESTOS OR OTHER HAZARDOUS MATERIALS ON THE JOBSITE. IF ASBESTOS OR OTHER HAZARDOUS MATERIALS ARE DISCOVERED DURING CONSTRUCTION, THE CONTRACTOR SHALL ISOLATE THE AFFECTED AREAS AND CONTACT THE OWNER FOR FURTHER INSTRUCTIONS. BEFORE PROCEEDING, CONTRACTOR SHALL COORDINATE ANY REQUIRED MITIGATION WITH OWNER. CONTRACTOR SHALL NOTIFY ARCHITECT IMMEDIATELY OF ALL UTILITIES DETERMINED IN COURSE OF CONSTRUCTION AS BEING NECESSARY TO BE REMOVED WHICH HAVE NOT OTHERWISE BEEN NOTED FOR REMOVAL IN THE CONSTRUCTION DOCUMENTS. CONTRACTOR SHALL REMOVE SUCH UTILITIES AFTER CONSULTATION WITH ARCHITECT AND OWNER. WHETHER PREDETERMINED IN THE CONSTRUCTION DOCUMENTS OR DISCOVERED LATER IN THE FIELD, DISCONNECT, CUT BACK TO SOURCE, AND CAP ALL UTILITY SERVICES REMOVED. SEAL ALL PENETRATIONS CREATED BY REMOVAL OF UTILITIES TO MATCH ADJACENT CONSTRUCTION AND FINISHES.
- COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION DURING DEMOLITION. PROTECT AND KEEP OPERATIONAL EXISTING BUILDING SYSTEMS INCLUDING SECURITY, SIGNAL, TELECOM, EQUIPMENT AND RACKS, CAMERAS, ETC. COORDINATE WITH THE SWEETS FOR PROTECTION AND EXTENT. PROTECT EXISTING CASB, FINISHES, MAINTAIN AND KEEP OPERATIONAL ALL EXISTING ELEVATORS USED FOR DEMOLITION ACTIVITIES.
- REMOVE ALL DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED, AT NO COST TO THE OWNER.
- CLEAN, DRY, SEAL, AND IN A LOCATION ACCEPTABLE FOR REUSE BY OTHER CONSTRUCTION.
- STRUCTURAL DEMOLITION, AS SHOWN ON THE DRAWINGS, SHALL BE EXECUTED ON DEMOLITION SHEETS AND/OR ENGINEER PRIOR TO COMMENCEMENT OF THE WORK IN ACCORDANCE WITH THE SPECIFICATIONS.
- PROTECT ALL ITEMS AND FINISHES THAT ARE TO REMAIN OR TO BE REUSED, PROTECT ITEMS THAT ARE TO REMAIN OR TO BE REUSED AND APPROVED BY THE ARCHITECT.
- EXISTING BUILDING HVAC SYSTEMS ARE OPERATIONAL. DURING DEMOLITION ACTIVITIES, PROVIDE MINIMUM EFFICIENCY REPORTING VALUE FILTRATION OF ALL INLET EXHAUST. CLEANLINESS AFTER ACTIVITIES. SHALL COORDINATE WITH MECHANICAL SHEETS FOR EXTENT OF WORK.
- ASSESS ACOUSTICAL IMPACTS TO BUILDING OPERATIONS. NOTIFY OWNER AND COORDINATE TASKS TO MIT IMPACTS TO OPERATIONS.
- CONFIRM ALL SALVAGED MATERIALS WITH OWNER.
- CONFIRM STORAGE LOCATION OF ALL SALVAGED MATERIALS, FURNITURE AND EQUIPMENT WITH OWNER.
- CONTRACTOR TO COORDINATE WITH OWNER AND TENANTS ON CALCULATION AREAS AROUND THE TEMPORARY BARRIER PARTITIONS DURING CONSTRUCTION. 8' R/W IS REQUIRED TO ACCESS EGRESS STAIRS.

SHEET KEYNOTES

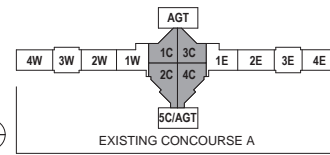
- 17 SHADDED AREA IS OUTSIDE SCOPE OF WORK, SHOWN FOR REFERENCE ONLY.
- DS1 DEMOLISH PARTITION WALL.

LEGENDS

DEMOLITION LEGEND

- PARTITION TO BE REMOVED
- DOOR TO BE REMOVED
- FLOOR/CEILING/WALLS TO BE REMOVED
- CEILING PANELS/GRID TO REMAIN
- LINE OVERHEAD
- LINE OVERHEAD TO BE REMOVED
- TEMPORARY OVERHEAD PROTECTION
- TEMPORARY CONSTRUCTION DOOR
- TEMPORARY 8' TALL BARRICADE PARTITION FOR CONSTRUCTION (FRAMED WALLS WITH DURABLE MATERIALS, MC CAN WALLS OR EQUAL)

REFER TO STRUCTURAL, ELECTRICAL, AND FIRE PROTECTION SHEETS FOR ADDITIONAL DEMOLITION INFORMATION.
REFER TO STRUCTURAL SHEETS FOR CONCRETE SLAB DEMOLITION EXTENT.
REPLACE DAMAGED CEILING AS NEEDED IN THE CEILING IN AREAS TO REMAIN.



CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT



DESIGNER OF RECORD
STATE OF COLORADO
CHRISTINE RAJPA
303667
LICENSED ARCHITECT
04/02/2021

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

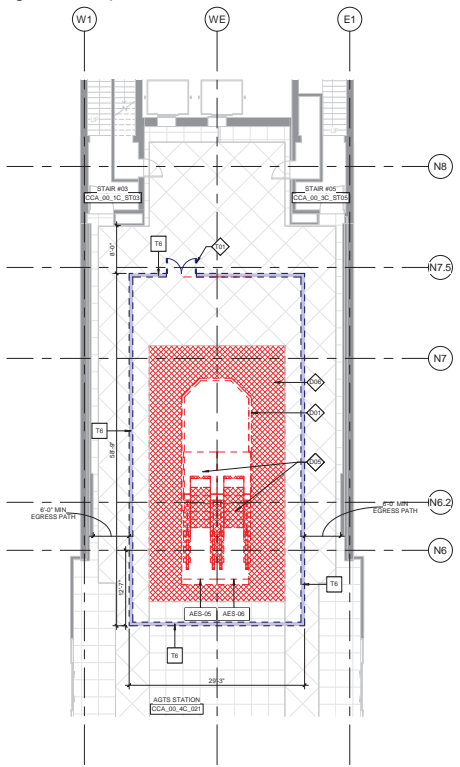
Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

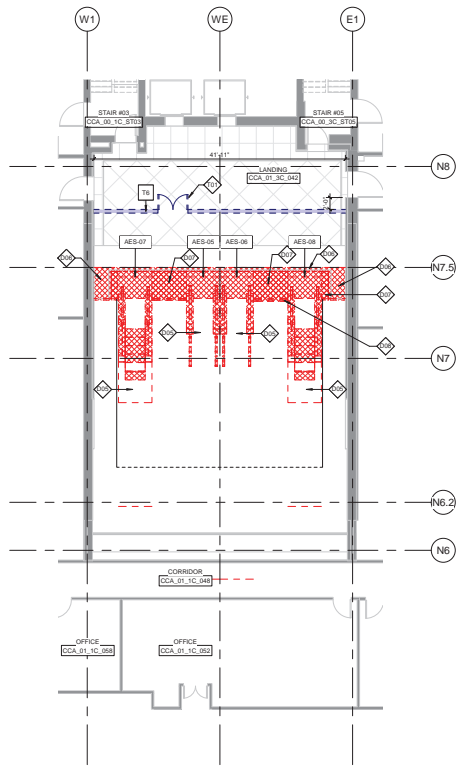
ISSUE RECORD
NO. BY PURPOSE DATE CDD
1 JA JFC 10/26/21 JA
1 A Contract Set 04/20/21 JA

SCALE: As indicated
DATE: 12/09/2020
DRAWN BY: CLM
CHECKED BY: CH
FAA AIR NO.:
DESIGN CONTRACT NO.: 20183001
CONST. CONTRACT NO.: 202056514
VOLUME NO.: 01
SHEET TITLE: NORTH OVERALL DEMO PLANS
SHEET NO.: AD100-N

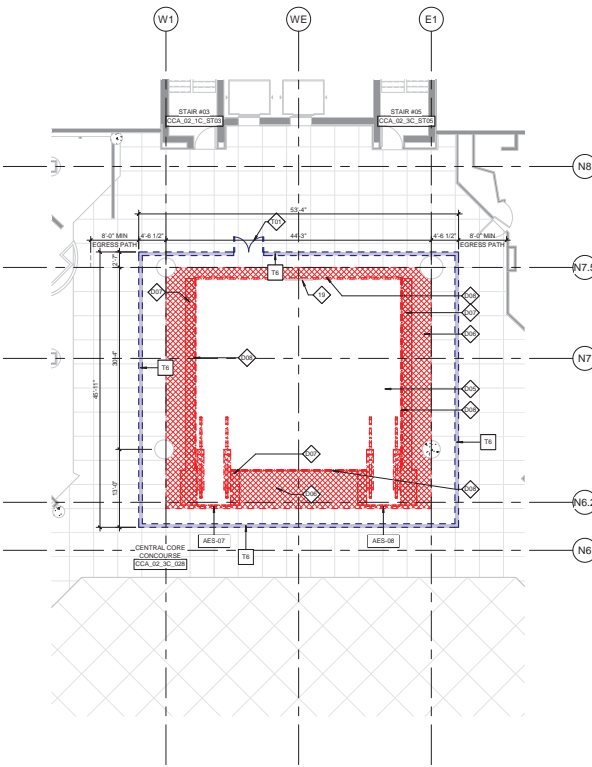
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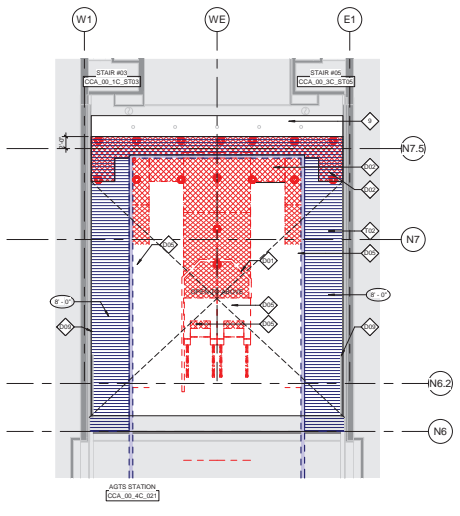
LEVEL 00 - AGTS STATION - NORTH ENLARGED DEMO PLAN
 A-301-N 1/8"=1'-0"



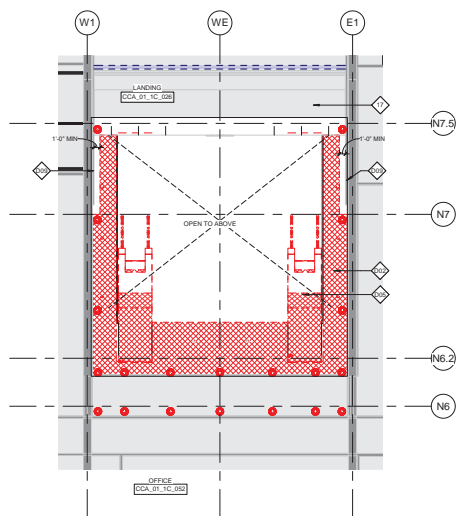
LEVEL 01 - APRON LEVEL - NORTH ENLARGED DEMO PLAN
 A-301-N 1/8"=1'-0"



LEVEL 02 - CONCOURSE LEVEL - NORTH ENLARGED DEMO PLAN
 A-301-N 1/8"=1'-0"



LEVEL 00 - AGTS STATION - NORTH ENLARGED RCP DEMO PLAN
 A-31-N 1/8"=1'-0"



LEVEL 01 - APRON LEVEL - NORTH ENLARGED RCP DEMO PLAN
 A-32-N 1/8"=1'-0"

GENERAL NOTES

- DEMOLITION NOTES**
- REMOVE DESIGNATED CEILING & SUPPORTS, FLOORING, DOORS & FRAMES, DESIGNATED PARTITIONS, COMPONENTS, BUILDING EQUIPMENT, AND FIXTURES REQUIRED FOR NEW WORK.
 - REMOVE ELECTRICAL DEVICES AND CONDUIT. WIRING SHALL BE REMOVED FROM ALL AREAS EXCEPT WHERE OTHERWISE INDICATED ON THE DRAWINGS. CAP AND IDENTIFY EXPOSED UTILITIES. NOTIFY OWNER AND THE AFFECTED UTILITY COMPANY IN ADVANCE AND OBTAIN APPROVAL BEFORE STARTING THIS WORK.
 - PROVIDE TEMPORARY PARTITIONS, BARRICADES, GUARDRAILS AND LIGHTING TO SECURE WORK AREAS, CONTAIN DUST, SMOKE, FUMES, ETC., AND TO PROTECT AND ALLOW CONTINUED BUILDING OCCUPANCY BY OWNER. TEMPORARY PARTITIONS SHALL BE REMOVED IMMEDIATELY AFTER CONSTRUCTION OF PERMANENT PARTITIONS AND REPAIR DAMAGED SURFACES TO MATCH ADJACENT SURFACES. CONTRACTOR TO OBTAIN BUILDING DEPARTMENT APPROVAL FOR EXISTING TEMPORARY BARRIERS AND BARRICADES. ALL TEMPORARY CONSTRUCTION PER APPLICABLE CODE AND SEISMIC REQUIREMENTS.
 - THE ARCHITECT/ENGINEERS HAVE NO KNOWLEDGE OF ANY ASBESTOS OR OTHER HAZARDOUS MATERIALS ON THE JOBSITE. THE ARCHITECT SHALL NOT BE HELD LIABLE FOR ANY ASBESTOS OR OTHER HAZARDOUS MATERIALS ON THE JOBSITE. IF ASBESTOS OR OTHER HAZARDOUS MATERIALS ARE DISCOVERED DURING CONSTRUCTION, THE CONTRACTOR SHALL ISOLATE THE AREA IMMEDIATELY AND CONTACT THE OWNER FOR FURTHER INSTRUCTIONS. BEFORE PROCEEDING, CONTRACTOR TO COORDINATE WITH ANY REQUIRED MITIGATION WITH OWNER.
 - CONTRACTOR SHALL NOTIFY ARCHITECT IMMEDIATELY OF ALL UTILITIES DETERMINED IN COURSE OF CONSTRUCTION AND REMOVE NECESSARY TO PROCEED WITH WORK. CONTRACTOR SHALL NOT BE HELD LIABLE FOR ANY OTHER UTILITIES NOT OTHERWISE NOTICED FOR REMOVAL IN THE CONSTRUCTION DOCUMENTS. CONTRACTOR SHALL REMOVE EACH UTILITY AFTER CONSULTATION WITH ARCHITECT AND OWNER. WHETHER PREDETERMINED IN THE CONSTRUCTION DOCUMENTS OR OTHERWISE DISCOVERED IN THE FIELD, DISCONNECT, CUT BACK TO SOURCE, AND CAP ALL UTILITY SERVICES READY TO BE REINSTALLED. PREPARE AND MAINTAIN RECORD DRAWINGS OF ALL UTILITIES REMOVED TO MATCH ADJACENT CONSTRUCTION AND FINISHES.
 - COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION DURING DEMOLITION PROJECT AND KEEP OPERATIONAL EXISTING BUILDING FUNCTIONAL. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES TO DETECT, IDENTIFY, PROTECT EXISTING GAS, FINISHES, MAINTAIN AND KEEP OPERATIONAL ALL EXISTING UTILITIES USED FOR DEMOLITION ACTIVITIES.
 - REMOVE ALL DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED AT NO COST TO THE OWNER.
 - REMOVE TOOLS AND EQUIPMENT FROM SITE UPON COMPLETION OF WORK. LEAVE CONTRACT AREAS AND SITE CLEAR, ORDERLY, AND IN A CONDITION ACCEPTABLE FOR NEW OR OTHER CONSTRUCTION.
 - STRUCTURAL DEMOLITION, AS SHOWN ON THE DRAWINGS, SHALL BE REVIEWED ON DEMOLITION PLAN SHALL TO BE ENGINEER PRIOR TO COMMENCEMENT OF THE WORK IN ACCORDANCE WITH THE SPECIFICATIONS.
 - PROTECT ALL ITEMS AND FINISHES THAT ARE TO REMAIN OR TO BE RE-USED. PROTECT ALL ITEMS TO BE RE-USED, REVIEWED AND APPROVED BY THE ARCHITECT.
 - EXISTING BUILDING HVAC SYSTEMS ARE OPERATIONAL. DURING DEMOLITION ACTIVITIES, PROVIDE MINIMUM EFFICIENCY REPORTING VALUE FILTRATION OF ALL INLET EXHAUST FLOW. CLEAN ALL FILTERS AND COILS FOR COORDINATE WITH MECHANICAL SHEETS FOR EXTENT OF WORK.
 - ASSESS ACoustICAL IMPACTS TO BUILDING OPERATIONS. NOTIFY OWNER AND PROVIDE REPORT TO MIT IMPACTS TO OPERATIONS.
 - CONFIRM SALVAGED MATERIALS WITH OWNER.
 - CONFIRM STORAGE LOCATION OF ALL SALVAGED MATERIALS, FURNITURE AND EQUIPMENT WITH OWNER.
 - CONTRACTOR TO COORDINATE WITH OWNER AND TENANTS CIRCULATION AREAS AROUND THE TEMPORARY BARRIERS PARTITIONS DURING CONSTRUCTION. 8" ROW IS REQUIRED TO ACCESS EGRESS STAIRS.

SHEET KEYNOTES

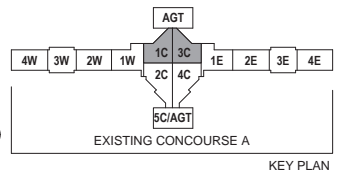
| KEYNOTE | DESCRIPTION |
|---------|--|
| 0 | EXISTING CEILING TO REMAIN |
| 17 | REMOVE AREA TO EXPOSE SCOPE OF WORK, SHOWN FOR REFERENCE ONLY |
| 19 | EXISTING PARTITION, SQUARE TO REMAIN |
| 001 | DEMOLISH PARTITION WALL |
| 002 | DEMOLISH EXISTING CEILING |
| 005 | REMOVE EXISTING PARTITION. COORDINATE WITH DEN TO STONE AT SOME DATE |
| 006 | DEMOLISH EXISTING FINISH FLOORING MATERIAL TO REHARDEN SLAB TO REMAIN |
| 007 | REMOVE FINISH FLOORING MATERIAL AND CONCRETE EXISTING SLAB, RE-STRUCTURE |
| 008 | REMOVE GLASS GUARDRAIL |
| 009 | REMOVE 1/2" TO REMOVE, PROTECT EXISTING GRANITE |
| 011 | TEMPORARY CONSTRUCTION DOOR |
| 012 | TEMPORARY OVERHEAD PROTECTION |

LEGENDS

DEMOLITION LEGEND

- PARTITION TO BE REMOVED
- DOOR TO BE REMOVED
- FLOOR/CEILING/WALLS TO BE REMOVED
- CEILING PANELS/GRID TO REMAIN
- LINE OVERHEAD
- LINE OVERHEAD TO BE REMOVED
- TEMPORARY OVERHEAD PROTECTION
- TEMPORARY CONSTRUCTION DOOR
- 17. TEMPORARY 8' TALL BARRICADE PARTITION FOR CONSTRUCTION (FOR BARRICADE WITH GUARDRAILS, MC CAN WALLS OR EQUAL)

REFER TO STRUCTURAL, ELECTRICAL, AND FIRE PROTECTION SHEETS FOR ADDITIONAL DEMOLITION INFORMATION.
 REFER TO STRUCTURAL SHEETS FOR CONCRETE SLAB DEMOLITION EXTENTS.
 REPLACE DAMAGED CEILING AS NEEDED IN THE CEILING IN AREAS TO REMAIN



CITY & COUNTY OF DENVER
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DESIGNER OF RECORD
CHRISTINE RAJPA
 303667
 LICENSED ARCHITECT
 04/03/2011

DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
 DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
 DENVER, CO 80202

ISSUE RECORD

| NO. | DATE | PURPOSE | DATE | CD |
|-----|------|---------------|----------|----|
| 0 | JA | IFC | 12/05/09 | JA |
| 1 | JA | Contract Rev. | 04/28/10 | JA |

SCALE: 1/8" = 1'-0"

DATE: 12/09/2009

DRAWN BY: CLM

CHECKED BY: CH

FAA AIR NO.:

DESIGN CONTRACT NO.: 20183001

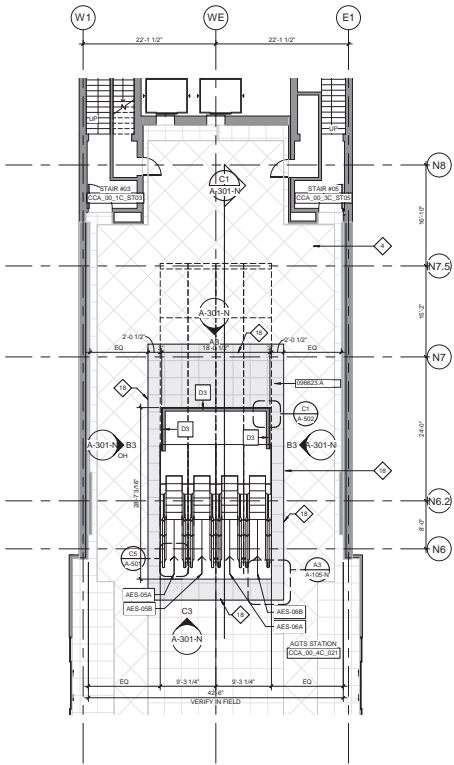
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VOLUME NO.: 01

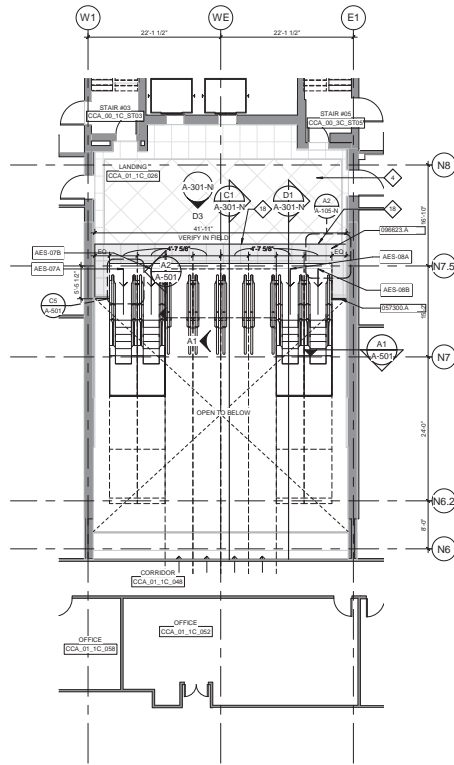
SHEET TITLE: NORTH ENLARGED DEMO PLAN

SHEET NO.: AD105-N

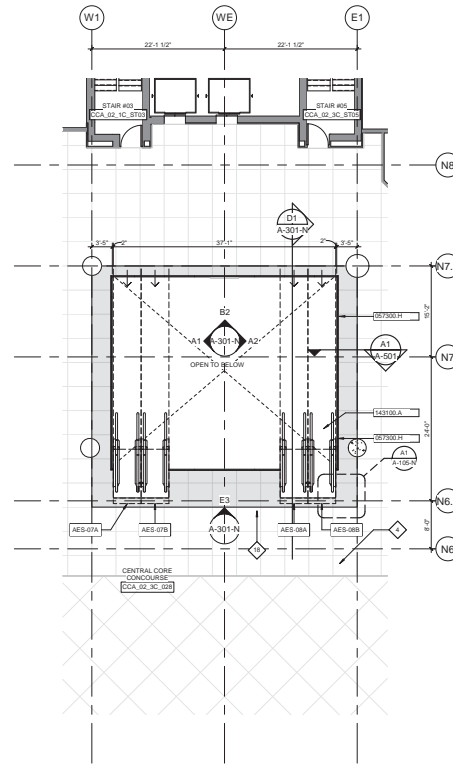
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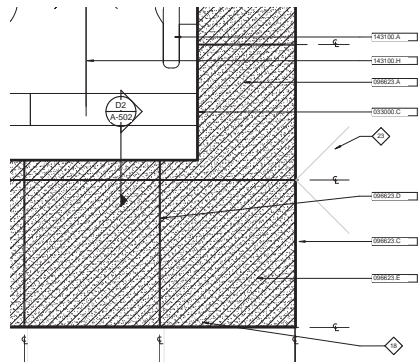
LEVEL 00 - AGTS STATION - NORTH ENLARGED PLAN
A-105-N (1/8"=1'-0")



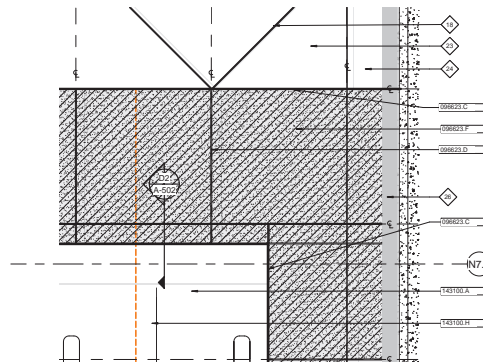
APRON LEVEL - NORTH ENLARGED PLAN
A-105-N (1/8"=1'-0")



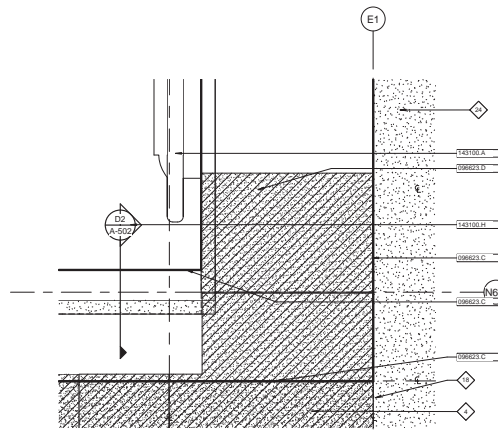
CONCOURSE LEVEL - NORTH ENLARGED PLAN
A-105-N (1/8"=1'-0")



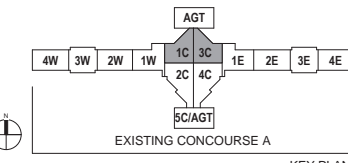
NORTH AGTS FLOOR PATTERN DETAIL
A-105-N (1/8"=1'-0")



NORTH APRON FLOOR PATTERN DETAIL
A-105-N (1/8"=1'-0")



NORTH CONCOURSE FLOOR PATTERN DETAIL
A-105-N (1/8"=1'-0")



GENERAL NOTES

- ALL PARTITIONS SHALL SPAN FROM FLOOR SLAB TO UNFINISHED OF DECK ABOVE UNLESS NOTED BY PARTITION CONDITION CODE.
- DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER DIMENSIONS SHOWN ON SCALE DRAWINGS. HAVE PRIORITY OVER SMALLER SCALE DRAWINGS. CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES IN THE DRAWINGS BEFORE PROCEEDING WITH THE CONSTRUCTION.
- Gypsum board partition control joints are required at approximately 20'-0" O.C. FOR STRAIGHT AND CONTINUOUS WALLS AT OPENING LOCATIONS, OR AS NOTED OTHERWISE ON DRAWINGS. WHERE NOT NOTED, CONTRACTOR'S PROPOSED CONTROL JOINT LOCATIONS TO ARCHITECT FOR APPROVAL.
- FINISH ALL EXPOSED GYPSUM BOARD CONSTRUCTION. ALL GYPSUM BOARD CONSTRUCTION SHALL BE TYPED AND FLOATED. ALL EXPOSED CONSTRUCTION WILL BE SANDED SMOOTH TO REMOVE ALL INDICATION OF THE JOINT WITH A VISUAL INSPECTION AND PREPARED TO RECEIVE THE APPROPRIATE SCHEDULED FINISH. FINISH SHALL BE IN ACCORDANCE WITH THE ROOM FINISH SCHEDULE AND/OR FINISHES NOTED IN THE GYPSUM BOARD SPECIFICATION SECTION 05000.
- PARTITIONS ARE DIMENSIONED TO FACE OF GYPSUM BOARD. FACE OF GYPSUM BOARD CONSTRUCTION, ANY INTERIOR PARTITIONS DIMENSIONED TO FACE OF METAL STUD ARE NOTED "TO FACE OF STUD".
- PARTITIONS ARE PERPENDICULAR AND/OR PARALLEL TO COLUMN GRID O.N.
- NOTES TO ALIGN MEAN TO ALIGN FINISHED FACE OF PARTITION UNLESS OTHERWISE NOTED AND SHALL HAVE PRIORITY OVER A DIMENSIONED LOCATION.
- PERFORM DIMENSIONS ARE TO FACE OF WALL. SHALL UOIN PROVIDE STUDS OF GAUGE AND SPACING ADEQUATE TO SUPPORT APPLIED LOADS INCLUDING HAND-RAILS, GRAB BARS, WALL MOUNTED FIXTURES, ETC.
- REFER TO SPEC SECTION 05000 FOR NON-STRUCTURAL METAL FRAMING & GYPSUM BOARD FOR ADDITIONAL REQUIREMENTS FOR GYPSUM BOARD ASSEMBLIES INCLUDING, BUT NOT LIMITED TO FIRE RATED CONSTRUCTION BRACKING AND BLOCKOUTS, TOLERANCES.
- WHERE NOTED, UL DESIGNING REFERENCED PROPRIETARY MATERIALS, EQUIVALENT MATERIALS FROM OTHER MANUFACTURERS SHALL BE CONSIDERED UPON SUBMISSION BY THE CONTRACTOR OF EVIDENCE OF A SUCCESSFUL FIRE TEST BY AN INDEPENDENT TESTING LABORATORY OF THE PROPOSED MANUFACTURER'S ASSEMBLY INDICATING COMPLIANCE WITH THE LISTED FIRE RESISTANCE RATING AND APPROVED BY THE AIA.
- REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL REQUIREMENTS NOT SHOWN IN THIS SCHEDULE.
- PROVIDE DEFLECTION HEAD AT ALL INTERIOR PARTITIONS FROM GYM FROM THE GYM FLOOR.
- UL NUMBER REFERS TO UNDERWRITERS LABORATORIES LISTED DESIGN.

SHEET KEYNOTES

| | |
|---------|--|
| 4 | EXISTING FINISHED FLOORING TO REMAIN |
| 18 | ALUM. NEW FINISHED FLOORING TO EXISTING FLOORING AT PATTERN MATCHLINE |
| 23 | EXISTING STONE A |
| 24 | EXISTING STONE B |
| 26 | GRANITE WALL TO REMAIN PROTECT EXISTING GRANITE |
| 03000.1 | 1" CONC. OVER TOPPING SLAB TO ALUM. TERRAZZO |
| 07500.0 | STAIN RESISTANT AND/OR DECORATIVE FINISHING |
| 07500.1 | STAINLESS STEEL HANDRAIL |
| 09602.0 | 1" ZINC COATING STRIP AT PERIMETER OF NEW FLOOR WITH JOINT SEALANT |
| 09602.1 | 1" ZINC COATING STRIP ALONG WITH CENTER LINE OF EXISTING JOINTS TO MAINTAIN PATTERNS UPON FINISHED FLOOR |
| 09602.2 | 1/2" OZ. TERRAZZO COLOR TO COORDINATE WITH EXISTING STONE A |
| 09602.3 | 1/2" OZ. TERRAZZO COLOR TO COORDINATE WITH EXISTING STONE B |
| 14310.0 | ESCALATOR |
| 14310.1 | LANDING PLATE, RE MANUFACTURER |

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DESIGNER OF RECORD
STATE OF COLORADO
CHRISTINE RAJPA
30067
LICENSED ARCHITECT
04009201

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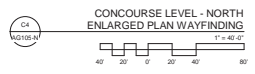
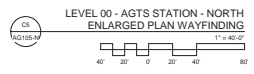
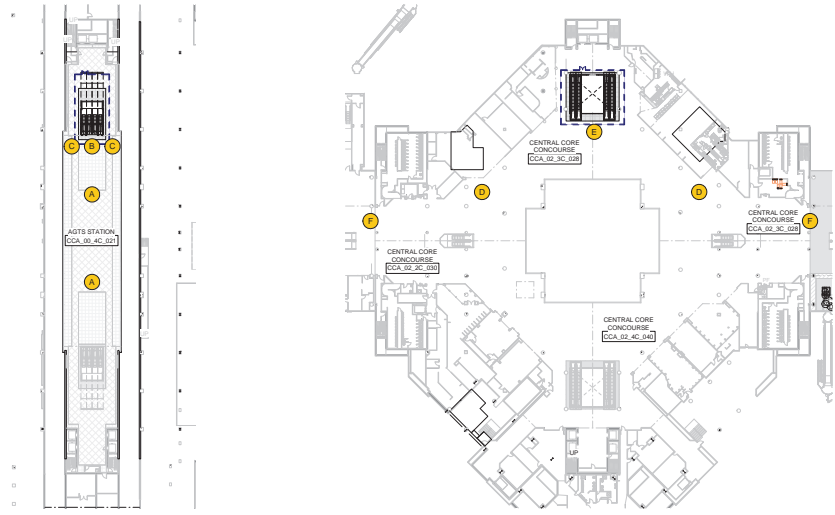
Jacobs

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DENVER, CO 80202

ISSUE RECORD

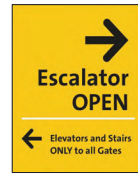
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| 1 | A | 10/26/21 | JR |
| 2 | A | 10/26/21 | JR |

SCALE: As indicated
DATE: 12/09/2020
DRAWN BY: CLM
CHECKED BY: CVI
FAA AIP NO.:
DESIGN CONTRACT NO.: 2018-0001
CONST. CONTRACT NO.: 20205591
VOLUME NO.: 01
SHEET TITLE: NORTH ENLARGED PLANS
SHEET NO.: A-105-N



FOR REFERENCE ONLY

SIGN TYPE A



FRONT
22' X 28" STATION



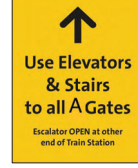
BACK

SIGN TYPE B



SIGNAGE CENTERED HORIZONTALLY ON CONSTRUCTION BARRIER 54" X 14"

SIGN TYPE C



FRONT
22' X 28" STATION

SIGN TYPE D



SIGNAGE PLACED OVER DIRECTIONAL SIGNAGE 54" X 14"

SIGN TYPE E



SIGNAGE CENTERED HORIZONTALLY ON CONSTRUCTION BARRIER 54" X 14"

SIGN TYPE F



RIGHT ARROW



LEFT ARROW

SIGNAGE PLACED OVER DIRECTION ARROWS 14" X 14" PANEL

GENERAL NOTES

- ALL PARTITIONS SHALL BEIN FROM FLOOR SLAB TO UNDERSIDE OF DECK ABOVE UNLESS INDICATED BY PARTITION LOCATION CODE.
- DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS SHALL ESTABLISH LOCATION OF ALL PARTITIONS. LARGER SCALE DRAWINGS HAVE PRIORITY OVER SMALLER SCALE DRAWINGS. CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES IN THE DRAWINGS BEFORE PROCEEDING WITH CONSTRUCTION.
- GYPSON BOARD PARTITION CONTROL JOINTS ARE REQUIRED AT APPROXIMATELY 12" O.C. FOR STATIONING AND CONTINUOUS WALLS AT OPENING LOCATIONS. SEE AS NOTED OTHERWISE ON DRAWINGS. WHERE NOT SPECIFICALLY INDICATED ON THE DRAWINGS, SUBMIT CONTRACTOR'S PROPOSED CONTROL JOINT LOCATIONS TO ARCHITECT FOR APPROVAL.
- FINISH ALL EXPOSED GYPSON BOARD CONSTRUCTION. ALL GYPSON BOARD CONSTRUCTION SHALL BE TYPED AND FLOATED. ALL EXPOSED CONSTRUCTION WILL BE SANDED SMOOTH TO REMOVE ALL INDICATION OF THE JOINT WITH A VISUAL INSPECTION AND PREPARED TO RECEIVE THE APPROPRIATE SCHEDULED WALL FINISH. FINISH SHALL BE IN ACCORDANCE WITH THE ROOM FINISH SCHEDULE AND/OR SPECIFICATION SECTION NUMBER.
- PARTITIONS ARE DIMENSIONED TO FACE OF GYPSON BOARD. FACE OF MASONRY AND TO FACE OF EXISTING CONSTRUCTION. ANY INTERIOR PARTITIONS DIMENSIONED TO FACE OF METAL STUD ARE NOTED. "O" FACE OF STUD.
- PARTITIONS ARE PERPENDICULAR AND/OR PARALLEL TO COLUMN GRID L.O.N.
- NOTES TO "A" ARE MEANT TO ALSO FINISH FACE OF PARTITION UNLESS OTHERWISE NOTED AND SHALL HAVE PRIORITY OVER A DIMENSIONED LOCATION.
- PERIMETER DIMENSIONS ARE TO FACE OF WALL. SEE L.O.N. PROVIDE STUDS OF GAUGE AND SPACING ADEQUATE TO SUPPORT APPLIED LOADS INCLUDING HAND-RAILS, GRAB BARS, WALL-MOUNTED FIXTURES, ETC.
- REFERS TO SPEC SECTION NUMBER FOR NON-STRUCTURAL METAL FRAMING & "GYPSON BOARD" FOR ADDITIONAL REQUIREMENTS FOR GYPSON BOARD ASSEMBLIES INCLUDING, BUT NOT LIMITED TO FIRE RATED CONSTRUCTION, BRACING AND SUPPORT, BLOCKOUTS, SOUND RATED CONSTRUCTION MATERIALS AND TOLERANCES.
- WHERE NOTED, UL DESIGN REFERENCE PROPRIETARY MATERIALS. EQUIVALENT MATERIALS FROM OTHER MANUFACTURERS WILL ONLY BE CONSIDERED UPON SUBMISSION BY THE CONTRACTOR OF EVIDENCE OF A SUCCESSFUL FIRE TEST BY AN INDEPENDENT TESTING LABORATORY OF THE PROPOSED MANUFACTURER'S ASSEMBLY INDICATING COMPLIANCE WITH THE LISTED FIRE RESISTANCE RATING AND APPROVED BY THE JAIL.
- REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL REQUIREMENTS NOT SHOWN IN THIS SCHEDULE.
- PROVIDE DEFLECTION HEAD AT ALL INTERIOR PARTITIONS WHICH SPAN FROM SLAB TO SLAB.
- UL NUMBER REFERS TO UNDERWRITERS LABORATORIES LISTED DESIGN.

LEGENDS

TEMPORARY WAYFINDING LEGEND

- A 22' X 28" TWO SIDED STATION
- B 14' X 54" ONE SIDED VERTICAL HUNG
- C 22' X 28" ONE SIDED STATION
- D 14' X 54" ONE SIDED VERTICAL HUNG
- E 14' X 54" ONE SIDED VERTICAL HUNG
- F 11" X 14" ONE SIDED VERTICAL HUNG

- WAYFINDING:
- WAYFINDING SIGNAGE IS TEMPORARY FOR DURING CONSTRUCTION.
 - SIGNAGE IS MOUNTED ON A PEDISTAL BASE AND LOCATED AS INDICATED ON PLANS.
 - WAYFINDING SIGNAGE IS PROVIDED BY DEN. ALL SIGNAGE FOR CONSTRUCTION TO BE PROVIDED BY CONTRACTOR.

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DESIGNER OF RECORD

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

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DENVER, CO 80249

Jacobs

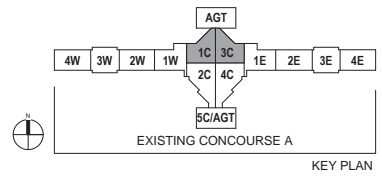
717 17TH STREET SUITE 2750
DENVER, CO 80202

ISSUE RECORD

| NO. | DATE | PURPOSE | DATE | CD |
|-----|------|--------------|----------|----|
| 0 | JA | IFC | 12/26/20 | JA |
| 1 | JA | Construction | 04/20/21 | JA |

SCALE: As indicated
DATE: 12/09/2020
DRAWN BY: CLM
CHECKED BY: CH
FAA AIP NO.:
DESIGN CONTRACT NO.: 201630001
CONST. CONTRACT NO.: 202005014
VOLUME NO.: 01

SHEET TITLE: NORTH ENLARGED PLANS WAYFINDING
SHEET NO.: AG105-N



FOR REFERENCE ONLY

| ASSET IDENTIFICATION - SOUTH | | | | | |
|------------------------------|----------|------------|-----------------|----------------|--------------|
| LEVEL | EQUIP ID | ASSET TYPE | FUNCTIONAL AREA | ASSET_LOCATION | ASSET_STATUS |
| LEVEL 00 - AGTS STATION | RES-01A | ESCALATOR | AGTS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 00 - AGTS STATION | RES-01B | ESCALATOR | AGTS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 00 - AGTS STATION | RES-02A | ESCALATOR | AGTS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 00 - AGTS STATION | RES-02B | ESCALATOR | AGTS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 01 - APRON | RES-03A | ESCALATOR | CENTER CORE | CCA-02-SC-030 | ACTIVE |
| LEVEL 01 - APRON | RES-03B | ESCALATOR | CENTER CORE | CCA-02-SC-030 | ACTIVE |
| LEVEL 01 - APRON | RES-04A | ESCALATOR | CENTER CORE | CCA-02-SC-040 | ACTIVE |
| LEVEL 01 - APRON | RES-04B | ESCALATOR | CENTER CORE | CCA-02-SC-040 | ACTIVE |

| ASSET IDENTIFICATION - NORTH | | | | | |
|------------------------------|----------|------------|-----------------|----------------|--------------|
| LEVEL | EQUIP ID | ASSET TYPE | FUNCTIONAL AREA | ASSET_LOCATION | ASSET_STATUS |
| LEVEL 00 - AGTS STATION | RES-05A | ESCALATOR | AGTS PLATFORM | CCA-01-SC-050 | ACTIVE |
| LEVEL 00 - AGTS STATION | RES-05B | ESCALATOR | AGTS PLATFORM | CCA-01-SC-050 | ACTIVE |
| LEVEL 00 - AGTS STATION | RES-06A | ESCALATOR | AGTS PLATFORM | CCA-01-SC-050 | ACTIVE |
| LEVEL 00 - AGTS STATION | RES-06B | ESCALATOR | AGTS PLATFORM | CCA-01-SC-050 | ACTIVE |
| LEVEL 01 - APRON | RES-07A | ESCALATOR | CENTER CORE | CCA-02-SC-050 | ACTIVE |
| LEVEL 01 - APRON | RES-07B | ESCALATOR | CENTER CORE | CCA-02-SC-050 | ACTIVE |
| LEVEL 01 - APRON | RES-08A | ESCALATOR | CENTER CORE | CCA-02-SC-050 | ACTIVE |
| LEVEL 01 - APRON | RES-08B | ESCALATOR | CENTER CORE | CCA-02-SC-050 | ACTIVE |



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CONCOURSE A ESCALATOR REPLACEMENT

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| NO. | BY | PURPOSE | DATE | CRD |
|-----|----|--------------|----------|-----|
| 0 | JA | FC | 12/22/16 | JA |
| 1 | JA | Contract Set | 04/05/17 | JA |

SCALE:

DATE: 12/09/2016

DRAWN BY: LT

CHECKED BY: CP

FAX AIR NO.

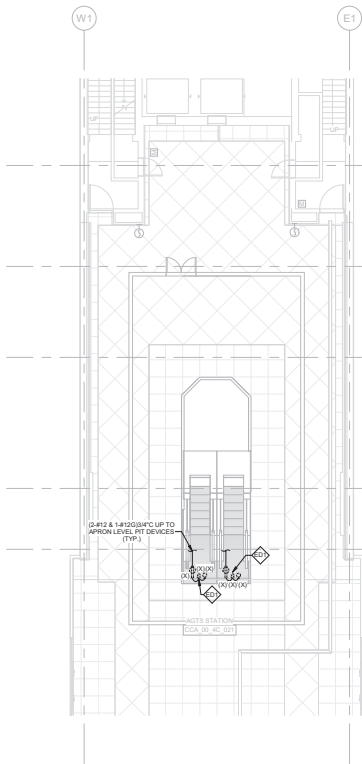
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CONST. CONTRACT NO. 202056514

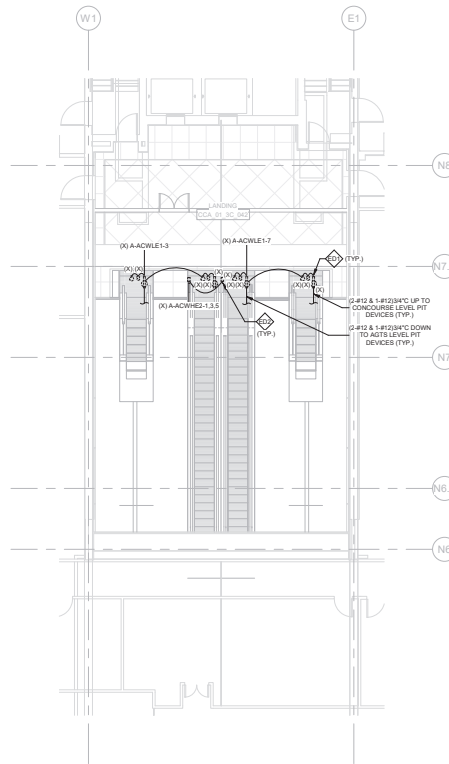
VOLUME NO. 01

SHEET TITLE
ASSETS

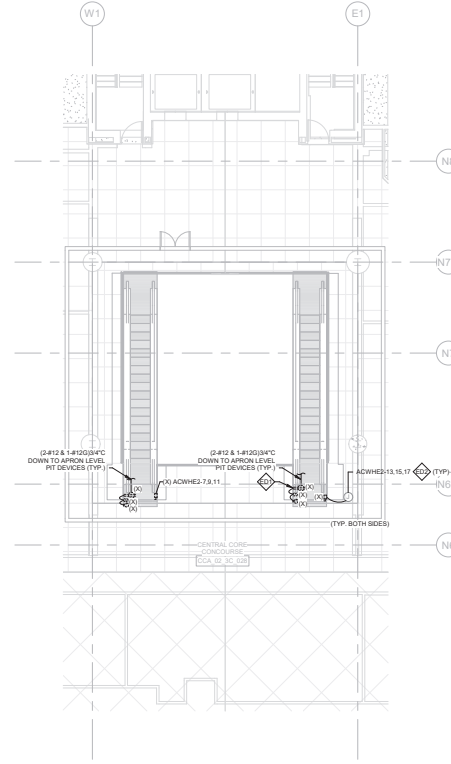
SHEET NO.
A-699



A1
LEVEL 00 - AGTS STATION - NORTH ENLARGED ELECTRICAL DEMO PLAN
1/8" = 1'-0"



A2
APRON LEVEL - NORTH ENLARGED ELECTRICAL DEMO PLAN
1/8" = 1'-0"



A3
CONCOURSE LEVEL - NORTH ENLARGED ELECTRICAL DEMO PLAN
1/8" = 1'-0"

DEMO GENERAL NOTES

- 1 (D) AND OR DASHED LINES INDICATE DEMOLITION WORK. (E) AND OR LIGHT LINES INDICATE EXISTING EQUIPMENT. (R) AND LIGHT LINES INDICATE EQUIPMENT TO BE RELOCATED.
- 2 COORDINATE ALL ELECTRICAL DEMOLITION WORK IN THIS AREA WITH DEN AND CURRENT TENANTS PRIOR TO START OF WORK. THE CONTRACTOR SHALL FOLLOW PROPER SHUT-DOWN PROCEDURES. ALL POWER OUTAGES SHALL BE SCHEDULED WITH DEN MINIMUM 7 DAYS IN ADVANCE.
- 3 IF CONDUCTOR STOPS AT A JUNCTION BOX OUTSIDE OF DEMOLITION AREA, THE CONTRACTOR SHALL MARK LOCATION AND INSURE THAT THE JUNCTION BOX IS LABELED WITH CIRCUIT INFORMATION. KEEP ALL DEVICES OUTSIDE OF WORK AREA ACTIVE. THIS MAY BE HELD TO STAY WITHIN THE AREA OF WORK. THE CONTRACTOR SHALL MAINTAIN AS BUILT DRAWINGS WITH DEMOLISHED DEVICES AND KEEP PAGES SCHEDULED LABELED AT ALL TIMES. THESE AS BUILT SHALL BE AVAILABLE UPON REQUEST.
- 4 ANY CONDUITS REMOVED PASSING THROUGH A FIRE-RATED WALL SHALL BE PROPERLY FIRESTOPPED TO MAINTAIN FIRE RATING.

SHEET KEYNOTES

- E01 DISCONNECT AND REMOVE BRANCH CIRCUIT RACEWAY AND ALL DEVICES BACK TO NEAREST JUNCTION BOX TO REMAIN TO ALLOW FOR ESCALATOR REMOVAL.
- E02 DISCONNECT POWER TO THE ESCALATOR CONTROLLER. DISCONNECT SWITCH TO ALLOW FOR REMOVAL. INTERCEPT THE EXISTING POWER CIRCUIT IN A JUNCTION BOX IN THE DESIGN SPACE FOR REUSE WITH NEW ESCALATOR CONTROLLER.

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**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENA BLVD
DENVER, CO 80249



ISSUE RECORD

| NO. | BY | PURPOSE | DATE | CHKD |
|-----|----|--------------|----------|------|
| 1 | PK | IFC | 12/02/20 | PKS |
| 2 | PK | Contract Set | 05/03/21 | PKS |

SCALE: 1/8" = 1'-0"

DATE: 05/01/2020

DRAWN BY: PKE

CHECKED BY: MG

FAA AP NO:

DESIGN CONTRACT NO.:

CONST. CONTRACT NO.:

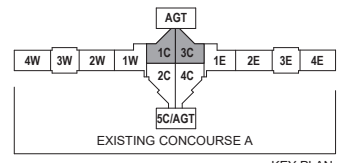
VOLUME NO. 20200518

SHEET TITLE

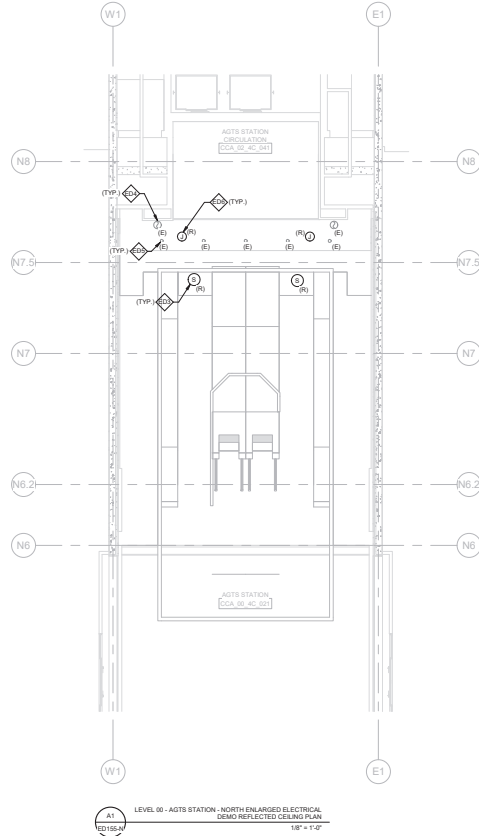
NORTH ENLARGED ELECTRICAL DEMO PLANS

SHEET NO.

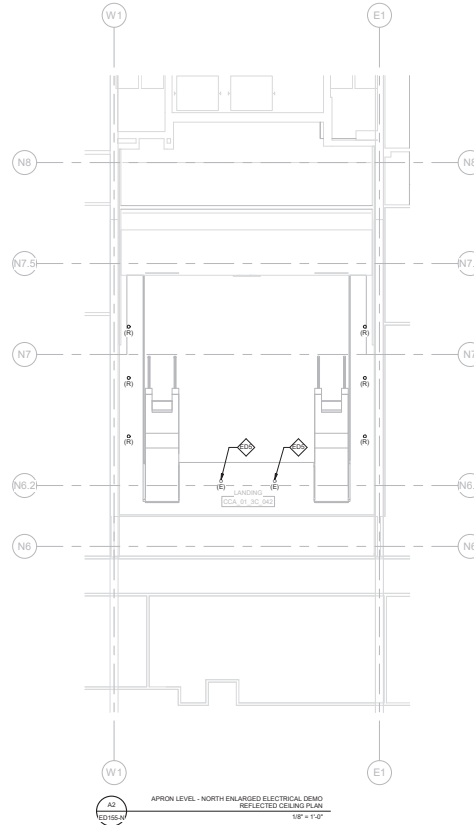
ED105-N



4/20/2020 10:59



A1
ED155-N
LEVEL 00 - AGTS STATION - NORTH ENLARGED ELECTRICAL DEMO REFLECTED CEILING PLAN
1/8" = 1'-0"



A2
ED155-A
APRON LEVEL - NORTH ENLARGED ELECTRICAL DEMO REFLECTED CEILING PLAN
1/8" = 1'-0"

DEMO GENERAL NOTES

1. (D) AND OR DASHED LINES INDICATE DEMOLITION WORK. (E) AND OR LIGHT LINES INDICATE EXISTING EQUIPMENT TO BE RELOCATED.
2. COORDINATE ALL DEMOLITION WORK IN THIS AREA WITH DEN AND CURRENT TENANTS PRIOR TO START OF WORK. THE CONTRACTOR SHALL FOLLOW PROPER SHUT-DOWN PROCEDURES. ALL POWER OUTAGES SHALL BE SCHEDULED WITH DEN MINIMUM OF 48 HOURS IN ADVANCE.
3. THE CONTRACTOR TO PULL CIRCUITS BACK TO PANEL, IF THE CIRCUIT IS A HORNBLUM, REMOVING CONDUIT, CONDUCTOR AND MARKING THE PANEL SCHEDULE AS SPARE.
4. IF CONDUCTOR STOPS AT A JUNCTION BOX OUTSIDE OF DEMOLITION AREA, THE CONTRACTOR SHALL MARK LOCATION AND INSURE THAT THE JUNCTION BOX IS Labeled WITH CIRCUIT INFORMATION. ALL PULL DEVICES OUTSIDE OF WORK AREA ACTIVE THAT MAY BE TIED TO ITEMS WITHIN THE AREA OF WORK.
5. THE CONTRACTOR SHALL MAINTAIN ALL BID DRAWINGS WITH DEMOLISHED DEVICES AND KEEP PANEL SCHEDULES UPDATED AT ALL TIMES. THESE SCHEDULES SHALL BE AVAILABLE UPON REQUEST.
6. ANY CIRCUITS REMOVED PASSING THROUGH A FIRE-RATED WALL SHALL BE PROPERLY FIRESTOPPED TO MAINTAIN FIRE RATING.

SHEET KEYNOTES

- E53 DISCONNECT AND REMOVE P.A. SYSTEM SPEAKERS AND AMBENT SENSORS TO ALLOW FOR ESCALATOR RENEWAL. INTERFERE CONDUIT AND CABLE IN CEILING SPACE TO BE DISCONNECTED. COORDINATE ALL WORK WITH DEN EGS ENGINEER.
- E54 EXISTING DEMOLISHED ESCALATOR PROJECT WORKFACE. COORDINATE ALL WORK IN AREA WITH FIRE COMMAND TO ENSURE BEAM DETECTORS ARE OFF LINE DURING PROJECT WORKING HOURS.
- E55 EXISTING PRUDENT EMERGENCY POWERED ELEVATOR SIGN. SIGN WILL NEED TO BE REMOVED DURING WORK AND RE-INSTALLED UPON COMPLETION. SCHEDULE FOR REUSE.

CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT



DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD DENVER, CO 80249



ISSUE RECORD
NO. BY PURPOSE DATE CND
1 PKC PKC 08/01/2020 PKC
2 PKC PKC 08/01/2020 PKC
3 PKC Continued 08/01/2020 PKC

SCALE: 1/8" = 1'-0"

DATE: 08/01/2020

DRAWN BY: PKC

CHECKED BY: MQ

FAA AP NO:

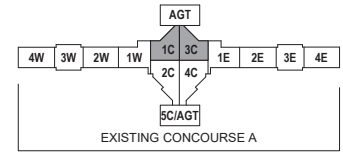
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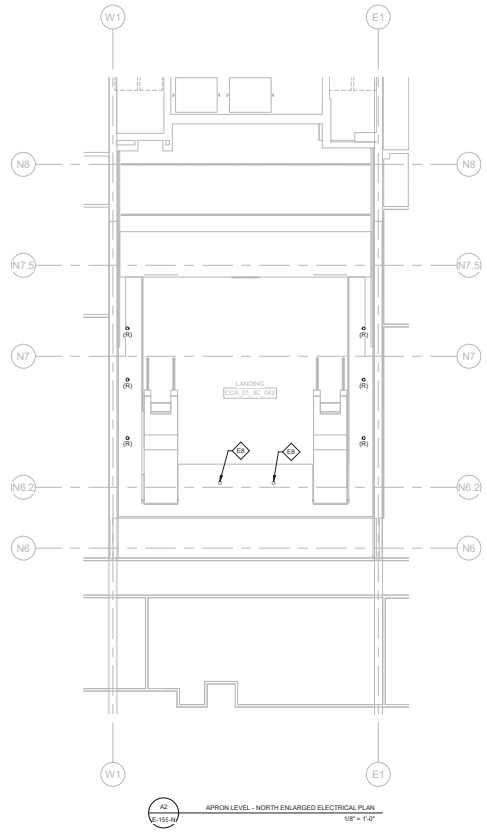
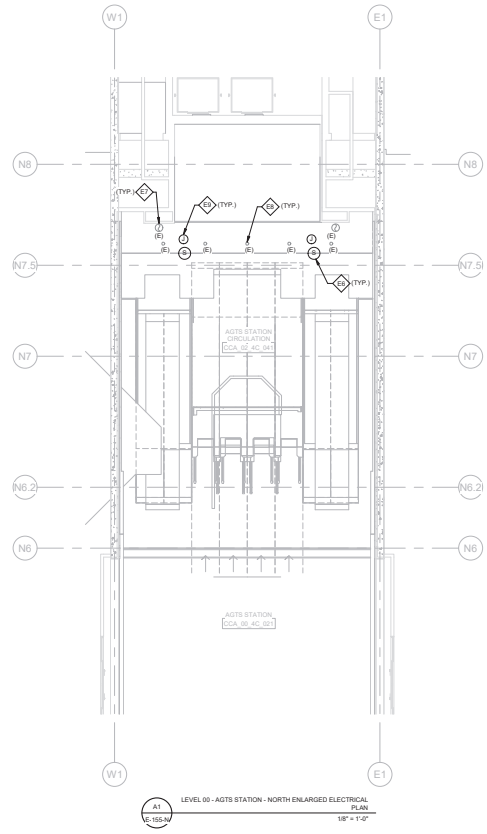
CONST. CONTRACT NO: 202055518

VOLUME NO: 01

SHEET TITLE
NORTH ENLARGED ELECTRICAL DEMO REFLECTED CEILING PLANS

SHEET NO: ED155-N





NEW GENERAL NOTES

- (E) AND/OR HALF TONE LINES INDICATE EXISTING EQUIPMENT (E) AND/OR DASHED LINES INDICATE RELOCATED EQUIPMENT (R) AND/OR SOLID LINES INDICATE NEW EQUIPMENT UNLESS NOTED OTHERWISE.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, ETC. FOR EXACT LOCATION OF LIGHT FIXTURES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING FINAL FIXTURE LOCATIONS, ABOVE-CEILING HOUSING, CLEARANCES, ETC. WITH MECHANICAL, PLUMBING, SPRINKLER CONTRACTOR AND OTHER TRADES PRIOR TO ROUGH-IN.

CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT



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CONCOURSE A ESCALATOR REPLACEMENT

SHEET KEYNOTES

| | |
|----|---|
| E6 | REINSTALL PUBLIC ADDRESS SPEAKER ON UNDERSIDE OF ESCALATOR AND RECONNECT TO PA SYSTEM. |
| E7 | COORDINATE ALL WORK WITH SERVICES ENGINEER, LICENSED ENGINEER AND ORO TO BE PRESENT FOR TESTING. ENSURE BEARING STRUCTURE IS FUNCTIONING AS IT WAS PRIOR TO PROJECT. NOTIFY FIRE COMMAND WHEN WORK IS COMPLETE. |
| E8 | ENSURE DOWNLIGHT IS FUNCTIONING AS IT WAS PRIOR TO PROJECT. |
| E9 | REINSTALL PENDANT MOUNTED, POWERED ELEVATOR SIGN REMOVED DURING DEMOLITION PHASE. |

8700 PENA BLVD
DENVER, CO 80249



ISSUE RECORD

| NO. | BY | PURPOSE | DATE | CHKD |
|-----|-----|---------------|----------|------|
| 1 | PKC | IFC | 12/02/20 | PKC |
| 2 | PKC | IFC | 12/02/20 | PKC |
| 3 | PKC | Continued IFC | 03/03/21 | PKC |

SCALE: 1/8" = 1'-0"

DATE: 06/01/2020

DRAWN BY: PKC

CHECKED BY: MQ

FAA AP NO: .

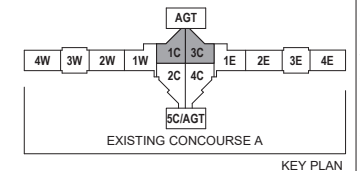
DESIGN CONTRACT NO: .

CONST. CONTRACT NO: .

VOLUME NO: 202005/18

SHEET TITLE: NORTH ENLARGED ELECTRICAL REFLECTED CEILING PLANS

SHEET NO: E-155-N



4/20/21 10:0

NEW GENERAL NOTES

- 1 ALL PANELS ARE EXISTING TO REMAIN. BOLD LINEWORK INDICATES SCOPE OF WORK.

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CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENA BLVD
DENVER, CO 80249



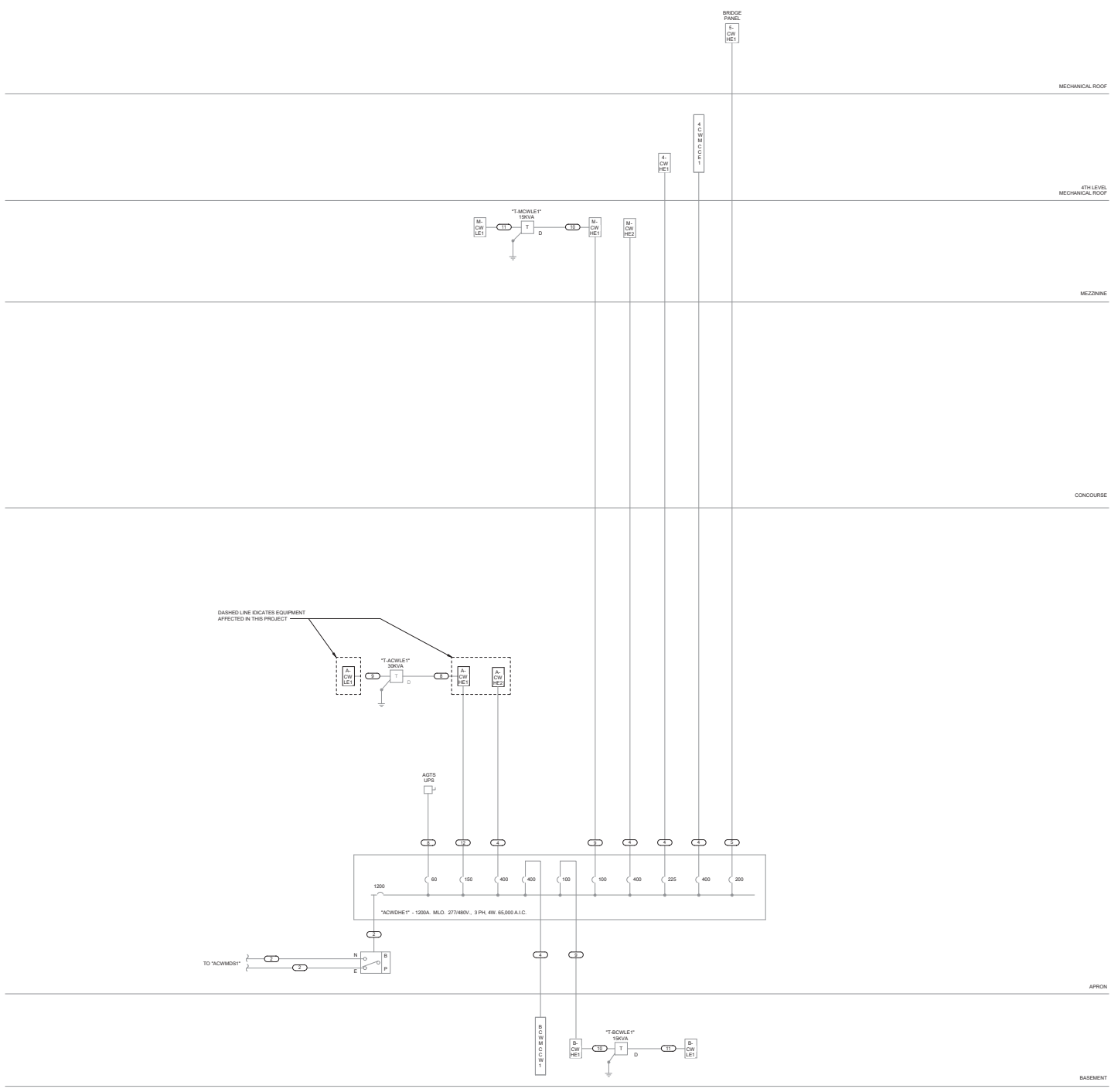
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| NO. | DATE | PURPOSE |
|-----|------------|---------------------|
| 1 | 06/01/2020 | PK Electrical, Inc. |

SCALE: As indicated
DATE: 06/01/2020
DRAWN BY: PKE
CHECKED BY: MK
FAA AP NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01
SHEET TITLE: NORTH ONLINE DIAGRAM
SHEET NO.: E-501-N

FEEDER SCHEDULE

1. 10 (480/208V) 3-12°C
2. 3 (44750MCM & 1400 GRD) 3°C
3. 2 (480/208V) & 1400 GRD) 3-12°C
4. 480/208V & 1400 GRD) 3-12°C
5. 480/208V & 1400 GRD) 3-12°C
6. 480/208V & 1400 GRD) 3-12°C
7. 480/208V & 1400 GRD) 3-12°C
8. 480/208V & 1400 GRD) 3-12°C
9. 480/208V & 1400 GRD) 3-12°C
10. 480/208V & 1400 GRD) 3-12°C
11. 480/208V & 1400 GRD) 3-12°C
12. 480/208V & 1400 GRD) 3-12°C
13. 480/208V & 1400 GRD) 3-12°C
14. 480/208V & 1400 GRD) 3-12°C
15. 480/208V & 1400 GRD) 3-12°C
16. 480/208V & 1400 GRD) 3-12°C
17. 480/208V & 1400 GRD) 3-12°C
18. 480/208V & 1400 GRD) 3-12°C



A1
 EXISTING ONLINE NORTH
 1" = 4'-0"

PK Electrical, Inc. 480/208V & 1400 GRD) 3-12°C

4/20/2013 10:09 AM

| ASSET IDENTIFICATION - CCA ESC REPLACEMENT - NORTH | | | | |
|--|------------|-----------------|----------------|--------------|
| EQUIP ID | ASSET TYPE | FUNCTIONAL AREA | LOCATION | |
| | | | ASSET_LOCATION | ASSET_STATUS |
| LEVEL 01 | | | | |
| AS-01A | DISCONNECT | ELECTRIC | CCA-01-1C-008 | DESIGNED |
| AS-01B | DISCONNECT | ELECTRIC | CCA-01-1C-008 | DESIGNED |
| AS-01C | DISCONNECT | ELECTRIC | CCA-01-1C-008 | DESIGNED |
| AS-01D | DISCONNECT | ELECTRIC | CCA-01-1C-008 | DESIGNED |
| LEVEL 02 | | | | |
| AS-02A | DISCONNECT | ELECTRIC | CCA-02-3C-008 | DESIGNED |
| AS-02B | DISCONNECT | ELECTRIC | CCA-02-3C-008 | DESIGNED |
| AS-02C | DISCONNECT | ELECTRIC | CCA-02-3C-008 | DESIGNED |

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CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD
DENVER, CO 80249



| NO. | BY | PURPOSE | DATE | CHK |
|-----|-----|--------------|----------|-----|
| 1 | PKC | IFC | 10/01/09 | PKC |
| 2 | PKC | Contract Set | 03/01/11 | PKC |

SCALE: _____
 DATE: 10/01/09
 DRAWN BY: PKC
 CHECKED BY: MK
 FAA AP NO: .
 DESIGN CONTRACT NO: .
 CONST. CONTRACT NO: 20258514
 VOLUME NO: 01
 SHEET TITLE: NORTH ASSETS
 SHEET NO: E-701-N

PK Electrical, Inc. 8700 Pena Blvd, Denver, CO 80249. License No. 41990. State of Colorado. Professional Engineer.

| FIRE ALARM SHEET LIST NORTH | |
|-----------------------------|--|
| SHEET # | DRAWING NAME |
| FA001-N | GENERAL NOTES |
| FA002-N | LEVEL 90-AGTS STATION, EXISTING NORTH (OSD) PLAN |
| TOTAL 2 | |

| FIRE ALARM LEGEND | | |
|-------------------|-----------------------------------|--|
| SYMBOL | PART NUMBER | DESCRIPTION |
| | OSE-SPW OR OSE-HPW | BEAM DETECTOR - BEAM TRANSMITTER (EMITTER) |
| | OSB-10, OSB-45 OR OSB-90 | BEAM DETECTOR - BEAM RECEIVER (MAGNET) |
| | 4060-0801 4066-0810, 4066-0809 | MONITOR MODULE (MAM) |

| LINE TYPE LEGEND | |
|------------------|-----------------|
| | OSD SYSTEM BEAM |

DUTY OF COOPERATION:

RELEASE OF THESE PLANS CONTEMPLATES FURTHER COOPERATION AMONG THE OWNER, HIS OR HER ARCHITECT, HIS OR HER CONTRACTOR AND THE ENGINEER. DESIGN AND CONSTRUCTION ARE COMPLEX. ALTHOUGH THE ENGINEER AND HIS OR HER CONSULTANTS HAVE PERFORMED THEIR SERVICES WITH DUE CARE AND DILIGENCE, THEY CANNOT GUARANTEE PERFECTION. COMMUNICATION IS IMPERFECT AND EVERY CONTINGENCY CANNOT BE ANTICIPATED. ANY AMBIGUITY OR INCONSISTENCY OBSERVED BY THE USER OF THESE PLANS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER. FAILURE TO NOTIFY THE ENGINEER COMPOUNDS MISUNDERSTANDING AND INCREASES CONSTRUCTION COSTS. A FAILURE TO COOPERATE BY A SIMPLE NOTICE TO THE ENGINEER SHALL RELIEVE THE ENGINEER FROM RESPONSIBILITY FOR ALL CONSEQUENCES. CHANGES MADE FROM THE PLANS WITHOUT CONSENT OF THE ENGINEER ARE UNAUTHORIZED AND SHALL RELIEVE THE ENGINEER OF RESPONSIBILITY FOR ALL CONSEQUENCES ARISING OUT OF SUCH CHANGES.

PROJECT NOTES:

- KKI IS THE FIRE PROTECTION ENGINEER OF RECORD FOR THIS PROJECT. ONCE THE INSTALLING CONTRACTOR HAS BEEN SELECTED TO WORK ON THIS PROJECT, HE WILL WORK WITH THE CONTRACTOR TO CONVERT THIS SET OF ENGINEERED DRAWINGS INTO THE INSTALLATION SHOP DRAWINGS. CHANGES WILL BE LIMITED TO CONSTRUCTION ISSUES AND EQUIPMENT MANUFACTURER SPECIFIC INSTALLATION REQUIREMENTS.
- THESE DOCUMENTS OUTLINE THE SCOPE OF THE PROJECT'S FIRE ALARM SYSTEMS. THE FIRE PROTECTION ENGINEER OF RECORD HAS COMPLETED THE DESIGN AND ENGINEERING OF THE FIRE ALARM SYSTEMS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN JOB SAFETY AND TO PROVIDE THE MEANS AND METHODS NECESSARY TO FULFILL THE REQUIREMENTS OF THESE DOCUMENTS.
- CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR NECESSARY FOR THE INSTALLATION OF A NEW AUTOMATIC FIRE PROTECTION SYSTEM PURSUANT TO THESE DOCUMENTS. WORK SHALL BE COMPLETED IN EVERY RESPECT RESULTING IN A SYSTEM INSTALLED ENTIRELY IN ACCORDANCE WITH THE APPLICABLE CODES, STANDARDS, MANUFACTURER'S RECOMMENDATIONS AND UNDERWRITERS LABORATORIES, INC. (UL) LISTING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS AND ANY CRITICAL DIMENSIONS ASSOCIATED WITH THE SCOPE OF WORK PRIOR TO FABRICATION. THE CONTRACTOR SHALL CONFIRM THAT ALL WORK OUTLINED WITHIN THESE DOCUMENTS MAY BE ACCOMPLISHED AS SHOWN AND SHALL NOTIFY THE ENGINEER OF ANY CONDITIONS ENCOUNTERED WHICH MAY AFFECT BUILDING CODE COMPLIANCE.
- ALL DEVICES, SYSTEMS, EQUIPMENT AND MATERIALS FURNISHED AND INSTALLED SHALL BE NEW AND LISTED BY UL. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE LIMITATIONS OF THE UL LISTING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL WORK. CONTRACTOR SHALL CONTACT SCHEDULE COORDINATE WITH CITY AND COUNTY OF DENVER AND DENVER INTERNATIONAL AIRPORT PERSONNEL AND OTHER TRADES AS NECESSARY TO COMPLETE THE PROJECT. OUTAGES WILL BE SCHEDULED AND COORDINATED WITH DEN THROUGH THE PROJECT MANAGEMENT TEAM (PMT).
- EXISTING BUILDING SYSTEMS SHALL NOT BE TAKEN OUT OF SERVICE WITHOUT PRIOR WRITTEN APPROVAL AND PROPER NOTIFICATION OF ALL ASSOCIATED PARTIES THROUGH DEN SHUT DOWN REQUEST PROCESS.
- CONTRACTOR SHALL PATCH AND PAINT ALL LOCATIONS WHERE WALLS, CEILING, OR OTHER SURFACES ARE DISTURBED, ALTERED, OR MODIFIED. OSB/10 FLOOR TILES THAT ARE DAMAGED SHALL BE REPLACED.
- ALL SURFACE MOUNTED OR ACCESSIBLE EXISTING CONDUIT AND JUNCTION BOXES THAT ARE ABANDONED AS A RESULT OF THIS PROJECT SHALL BE REMOVED AND THE SURFACE RETURNED TO ORIGINAL CONDITION. CALK SURFACE PENETRATIONS OF WALLS IN FINISHED AREAS. PROVIDE STAINLESS STEEL COVER PLATES OVER ABANDONED JUNCTION BOXES.
- ALL EXISTING WIRE THAT IS ABANDONED AS A RESULT OF THIS PROJECT SHALL BE REMOVED.
- ALL WORK SHALL MEET THE APPLICABLE CODES AND STANDARDS ADOPTED BY THE AUTHORITY HAVING JURISDICTION (AHJ) AND DENVER INTERNATIONAL AIRPORT DESIGN STANDARDS MANUAL, INCLUDING BUT NOT LIMITED TO LIFE SAFETY STANDARDS & CRITERIA.
- CONTRACTOR SHALL MAINTAIN FULL COVERAGE AND OPERABILITY OF ALL FIRE ALARM SYSTEM SMOKE DETECTION IN THE WORK AREA INCLUDING BUT NOT LIMITED TO THE OSD BEAM DETECTION THAT SPANS THE AGTS LEVEL STATION. REFERENCE SHEET FA100 - OSD PLAN.

APPLICABLE CODES AND STANDARDS:

COMPLY WITH THE REQUIREMENTS OF THE REFERENCED CODES AND STANDARDS, EXCEPT WHERE MORE STRINGENT REQUIREMENTS ARE LISTED HEREIN OR OTHERWISE REQUIRED BY THE CONTRACT DOCUMENTS.

- 2018 INTERNATIONAL FIRE CODE (IFC) WITH DENVER AMENDMENTS 2019 EDITION
- 2018 INTERNATIONAL BUILDING CODE (IBC) WITH DENVER AMENDMENTS 2019 EDITION
- 2019 CITY AND COUNTY OF DENVER BUILDING AND FIRE CODE AMENDMENTS
- NFPA 72, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS - 2019 EDITION
- NFPA 70, NATIONAL ELECTRICAL CODE - 2020 EDITION
- NFPA 72, NATIONAL FIRE CODE - 2019 EDITION
- NFPA 415, STANDARD ON AIRPORT TERMINAL BUILDINGS, FUELING RAMP DRAINAGE, AND LOADING WALKWAYS - 2018 EDITION

INSTALLING CONTRACTOR:

TBD



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD
DENVER, CO 80249



KILLEBREW | KILLEBREW, INC.
ENGINEERING CONSULTANTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80559

| ISSUE RECORD | NO. | BY | PURPOSE | DATE | OSD |
|--------------|-----|----|--------------|----------|-----|
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| | 1 | NO | Contract Set | 04/02/21 | NO |

SCALE: 1/2" = 1'-0"

DATE: 12/09/20

DRAWN BY: AJH

CHECKED BY: MCK

FAA AIR NO. .

DESIGN CONTRACT NO. .

CONST. CONTRACT NO. 202056518

VOLUME NO. 01

SHEET TITLE
GENERAL NOTES

SHEET NO.
FA001-N



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

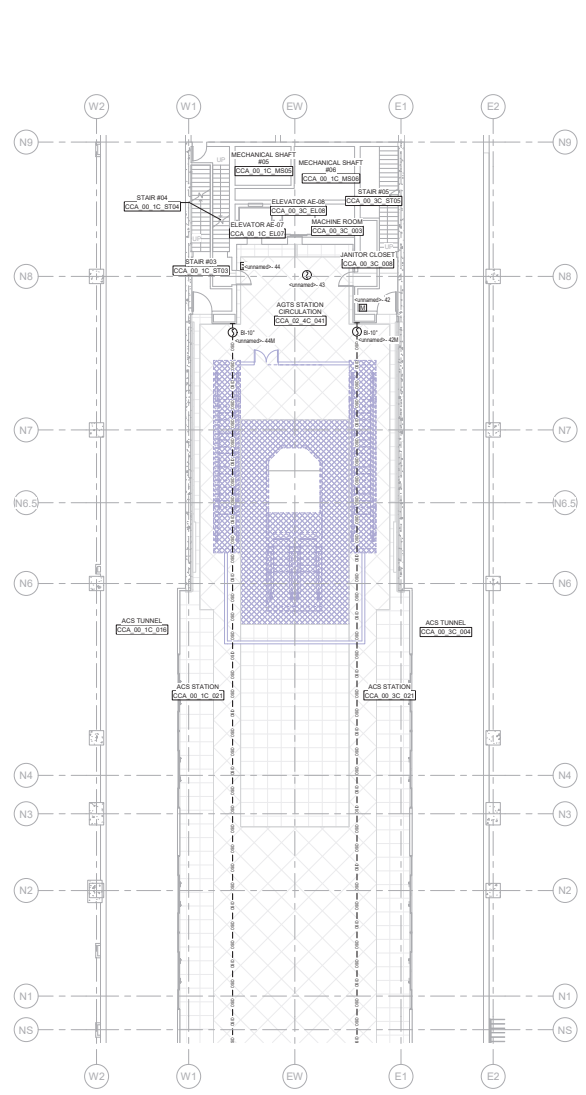
8700 PENNA BLVD
DENVER, CO 80249



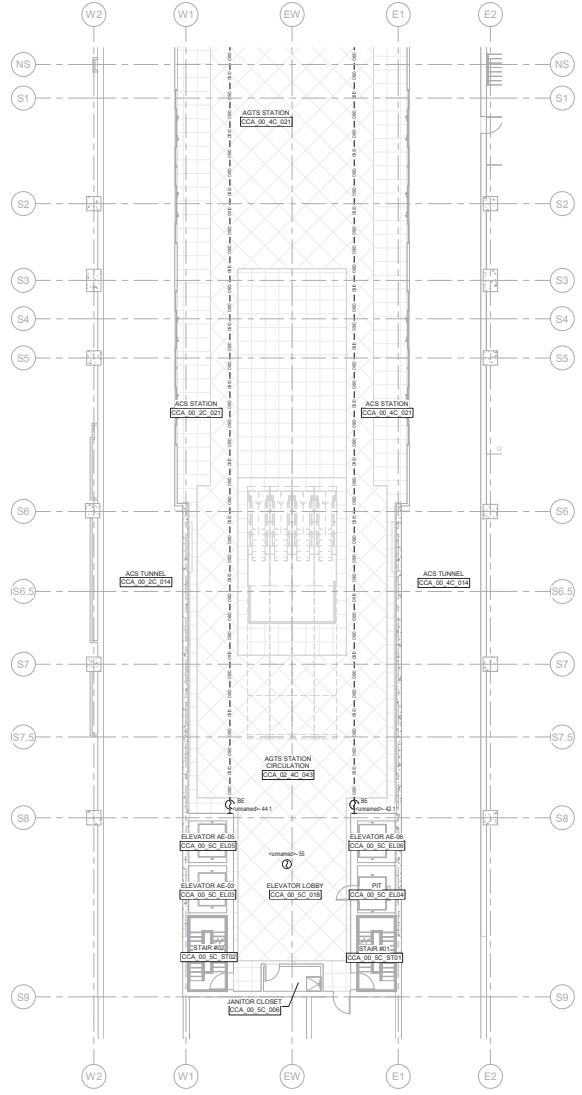
KILLEBREW | KILLEBREW, INC.
PROFESSIONAL ENGINEERS
5011 FARMINGTON DRIVE
WINDSOR, CO 80550

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NO. BY PURPOSE DATE OAD
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1 000 000 000 0000 000

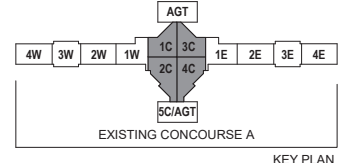
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CHECKED BY: MCK
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DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 51
SHEET TITLE: LEVEL 00 - AGTS STATION - EXISTING NORTH OSID PLAN
SHEET NO.: FA100-N



LEVEL 00 - AGTS STATION - EXISTING NORTH OSID PLAN A1
SCALE: 1" = 10'-0"



LEVEL 00 - AGTS STATION - EXISTING NORTH OSID PLAN A2
SCALE: 1" = 10'-0"



KEY PLAN

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DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249



KILLEBREW | KILLEBREW, INC.
ENGINEERS/ARCHITECTS
5511 FAIRMOUNT DRIVE
WINDSOR, CO 80550

| ISSUE RECORD | NO. | BY | PURPOSE | DATE | OD |
|--------------|-----|------------|---------|------|----|
| 0 | NO | PC | ISSUES | NO | |
| 1 | NO | Contractor | MARK | NO | |

SCALE: 1" = 10'-0"

DATE: 12/09/20

DRAWN BY: AJH

CHECKED BY: MCK

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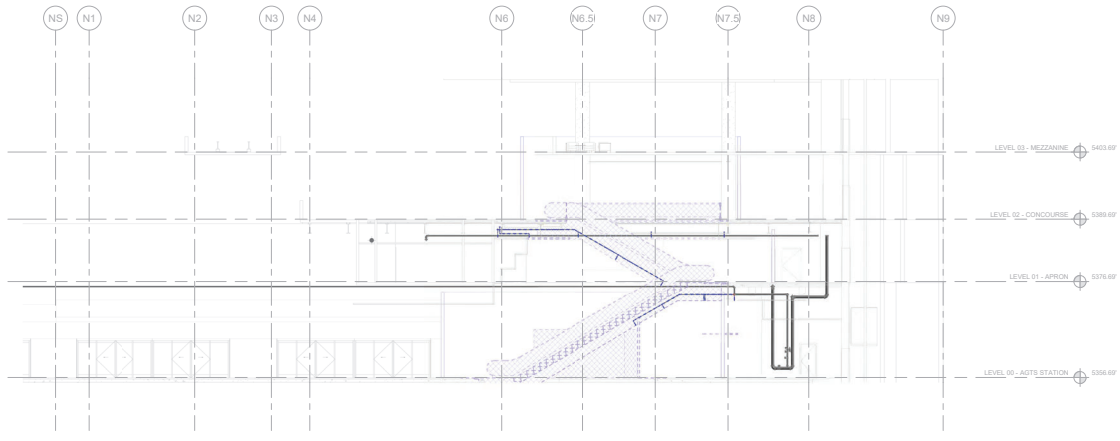
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CONST. CONTRACT NO. 202056518

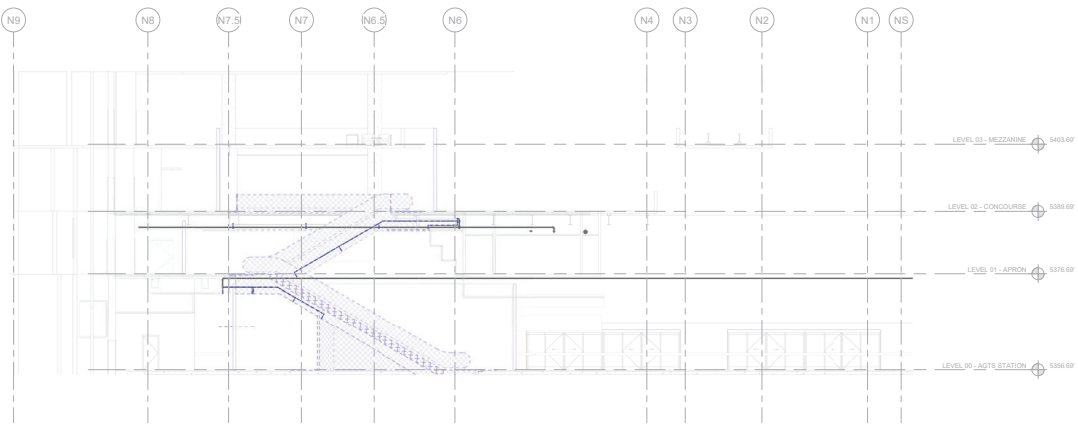
VOLUME NO. 01

SHEET TITLE
NORTH ESCALATOR
DEMOLITION
SECTIONS - WEST AND
EAST VIEWS

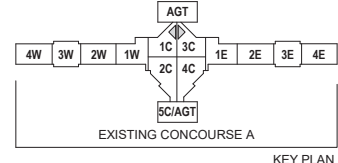
SHEET NO.
FSD300-N



**SECTION 1C - WEST ESCALATOR
DEMOLITION SECTION**
A1
1" = 10'-0"



**SECTION 3C - EAST ESCALATOR
DEMOLITION SECTION**
A2
1" = 10'-0"



KEY PLAN



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD
DENVER, CO 80249

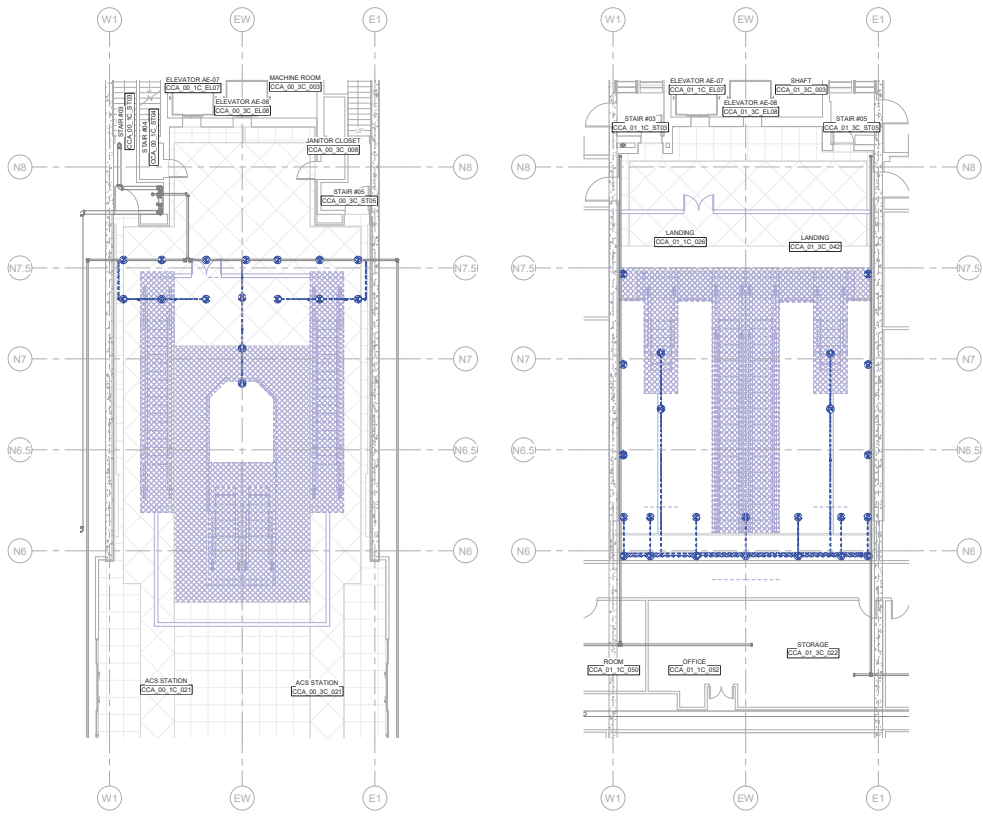
KILLEBREW | KILLEBREW, INC.
ENGINEERS & ARCHITECTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

| ISSUE RECORD | NO. | BY | PURPOSE | DATE | ODD |
|--------------|-----|------------|---------|------|-----|
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| 1 | NO | Contractor | ISSUES | NO | |

SCALE: 1/8" = 1'-0"
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIP NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01

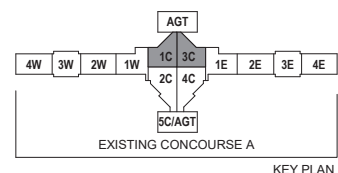
SHEET TITLE
ENLARGED NORTH
DEMOLITION PLANS

SHEET NO.
FSD400-N



A1 LEVEL 00 - AGTS STATION - ENLARGED
NORTH DEMOLITION PLAN
1/8" = 1'-0"

A2 LEVEL 01 - APRON - ENLARGED
NORTH DEMOLITION PLAN
1/8" = 1'-0"



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12/20/20

GENERAL NOTES

- PIPE LENGTHS INDICATED REFLECT THE OUT LENGTH OF PIPING. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
- PIPE ELEVATIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE. ELEVATIONS HAVE BEEN COORDINATED WITH THE 2D MODEL. ALL ELEVATIONS SHALL BE FIELD VERIFIED AGAINST FIELD CONDITIONS.
- THE MAXIMUM UNSUPPORTED PIPE LENGTH BETWEEN THE END FIRE SPRINKLER AND THE LAST HANGER ON THE LINE SHALL NOT EXCEED 12 INCHES.
- THE MAXIMUM UNSUPPORTED ARMOR LENGTH SHALL BE 12 INCHES MAXIMUM.
- SPRINGS 4 FEET OR LONGER SHALL BE PROVIDED WITH LATERAL RESTRAINT FOR OPERATING PRESSURES EXCEEDING 100 PSI. LATERAL RESTRAINT MAY BE ACCOMPLISHED WITH SWAY BRACING AS DETAILED OR OTHER MEANS AND METHODS. THIS REQUIREMENT IS DUE TO SYSTEM OPERATING PRESSURE AND IS NOT DUE TO SEISMIC REQUIREMENTS THEREFORE IS NOT REQUIRED.
- THE LAST HANGER ON EACH BRANCHLINE OR MAIN SHALL BE PROVIDED WITH SURGE RESTRAINT. SEE DETAIL FOR FURTHER REQUIREMENTS.
- SEWALL FIRE SPRINKLERS SHALL BE PROVIDED WITH UNISTRUT AND FIRE CLAMP AT WALL PENETRATION OR WITH WALL FRAMING TO PREVENT FIRE SPRINKLER MOVEMENT DURING OPERATION AT PRESSURES EXCEEDING 100 PSI. SEE DETAIL FOR FURTHER REQUIREMENTS.
- LENGTH AND SIZE OF ALL 1" DIAMETER SPRINGS AND BRIMS ARE NOT INDICATED FOR CLARITY. CONTRACTOR TO FIELD VERIFY THE REQUIRED LENGTH PRIOR TO FABRICATION.
- THE MAJORITY OF THE BASEMENT, APRON AND MECHANICAL LEVELS DO NOT HAVE CEILING. THESE AREAS ARE CONSIDERED OBSTRUCTED CONSTRUCTION PER NFPA 13 WITH DEEP BEAM CONSTRUCTION.

CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT



DESIGNER OF RECORD

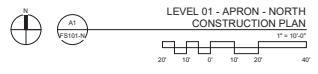
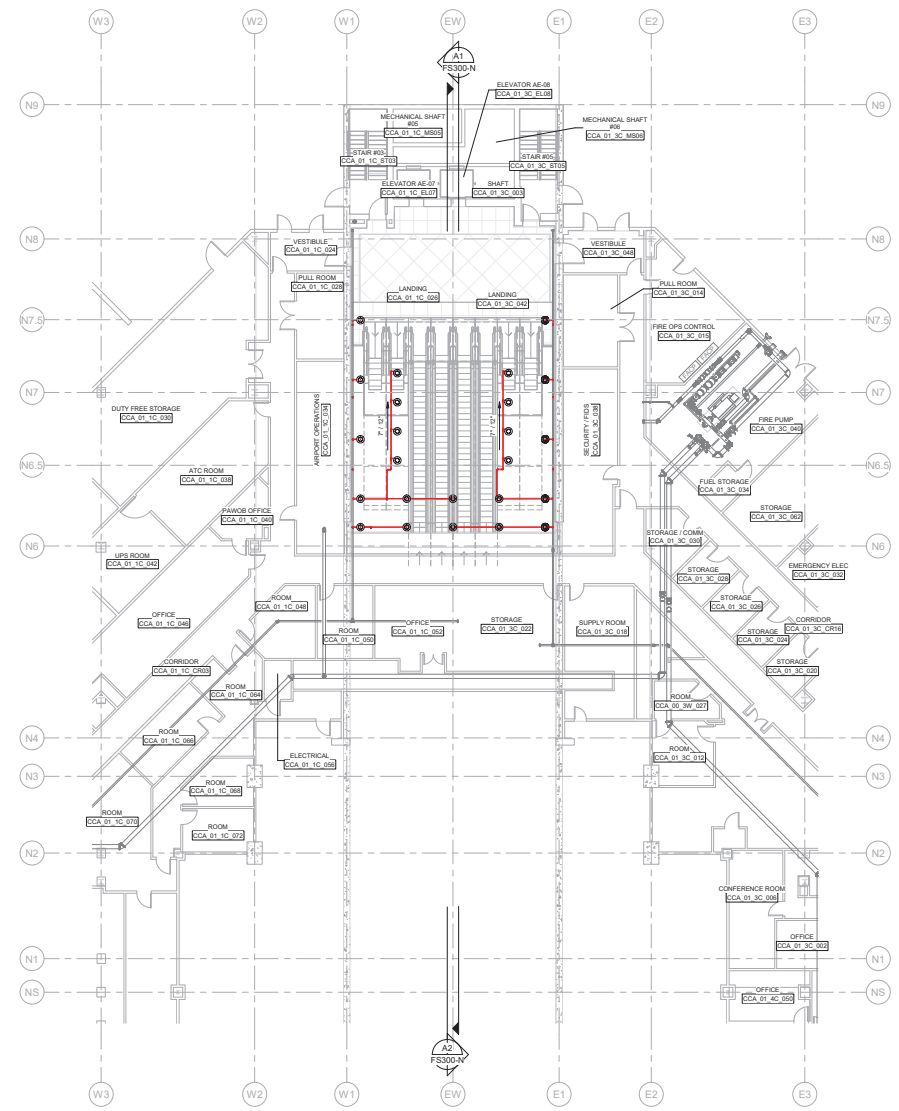


**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENNA BLVD
DENVER, CO 80249

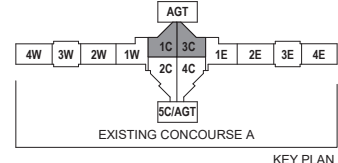
KILLBREW | KILLBREW, INC.
POWER RATED CONSULTANTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550
ISSUE RECORD
NO. BY PURPOSE DATE O/D
0 00 00 12/20/20
1 00 00 12/20/20

SCALE: As indicated
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIR NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 2020256518
VOLUME NO.: 01
SHEET TITLE: LEVEL 01 - APRON - NORTH CONSTRUCTION PLAN
SHEET NO.: FS101-N



SPRINKLER SCHEDULE CCA - APRON LEVEL - NORTH

| SYMBOL | MANUFACTURER | TYPE | -SIN- | TEMPERATURE RATING | K-FACTOR | RESPONSE | FINISH | COUNT | NOTES |
|----------------------|--------------|---------|-------|--------------------|----------|----------|--------|-------|---------------------------|
| ⊙ | WING | PENDENT | W462 | 155°F | 5.6 | Quick | WHITE | 24 | CONC. W/135 F COVER PLATE |
| TOTAL SPRINKLERS: 24 | | | | | | | | | |



100% 02/10/20 CCA-04-01 Key Plan - City Engineer Registration: 301800001/CCA-A1-FS-21052009-ESC REPLACEMENT - 04/11/21



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

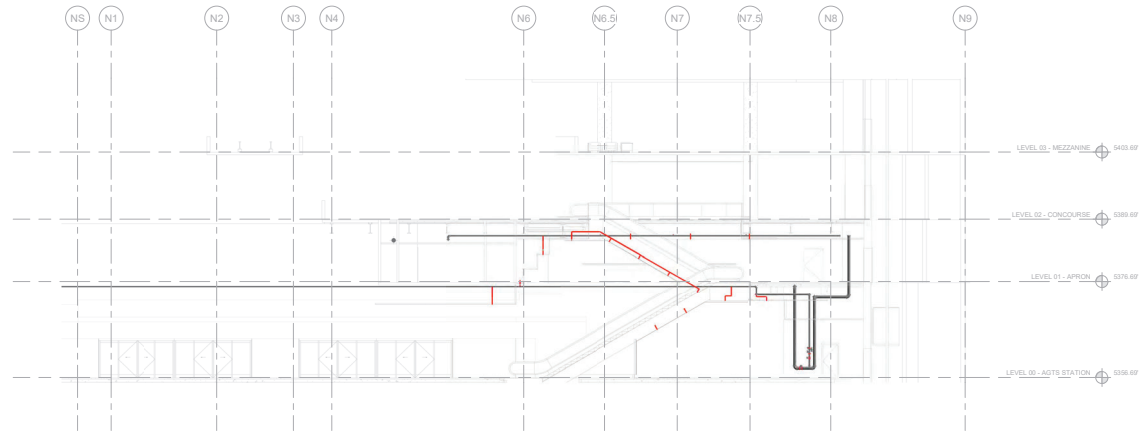
KILLEBREW | KILLEBREW, INC.
ENGINEERS & ARCHITECTS
5211 FAIRMOUNT DRIVE
WINDSOR, CO 80550

| ISSUE RECORD | NO. | BY | PURPOSE | DATE | OD |
|--------------|-----|------------|---------|------|----|
| 0 | NO | PC | ISSUES | NO | |
| 1 | NO | Contractor | ISSUES | NO | |

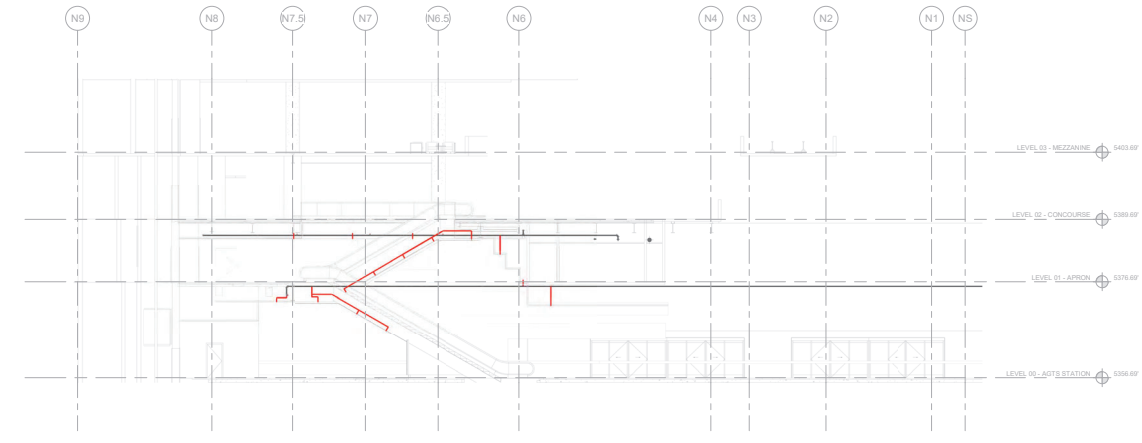
SCALE: 1" = 10'-0"
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIR NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 51

SHEET TITLE
NORTH ESCALATOR
CONSTRUCTION
SECTIONS - WEST AND
EAST VIEWS

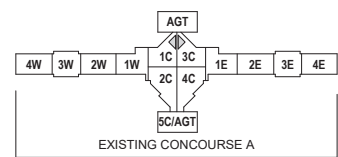
SHEET NO.
FS300-N

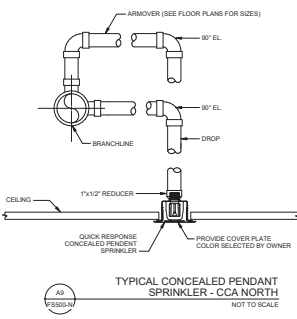
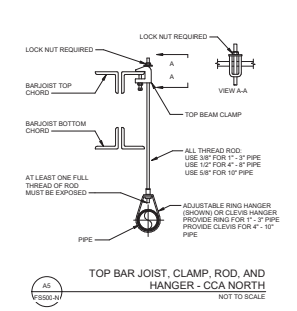
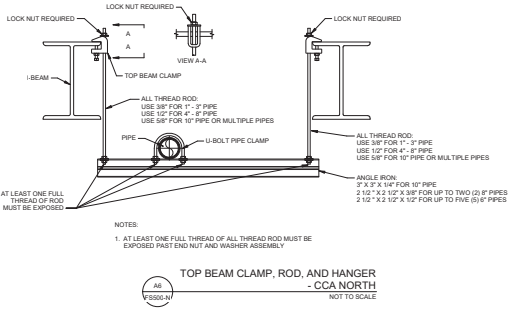
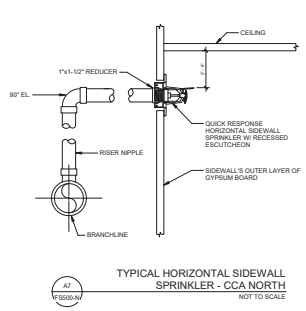
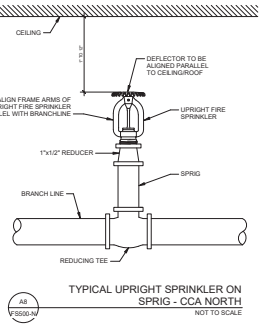
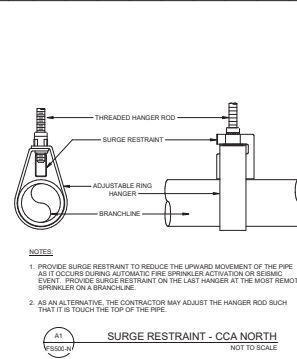
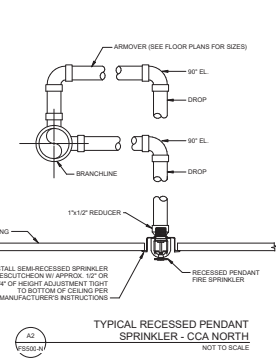
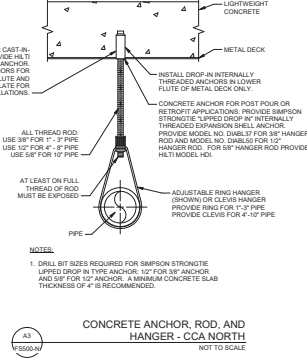
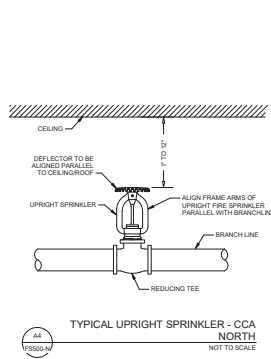


**SECTION 1C - WEST ESCALATOR
CONSTRUCTION SECTION**
A1
V3000-04
1" = 10'-0"
20' 10' 0' 10' 20' 40'



**SECTION 3C - EAST ESCALATOR
CONSTRUCTION SECTION**
A2
V3000-04
1" = 10'-0"
20' 10' 0' 10' 20' 40'





| NOMINAL PIPE SIZE | MAXIMUM DISTANCE BETWEEN HANGERS | | | | | | | | | |
|--------------------------------|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" | 3-1/2" | 4" | 6" | 8" |
| STEEL PIPE SCHEDULE 40 | 12'-0" | 12'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" |
| THREADED LIGHT WALL STEEL PIPE | 12'-0" | 12'-0" | 12'-0" | 12'-0" | 12'-0" | 12'-0" | NA | NA | NA | NA |
| STEEL PIPE SCHEDULE 10 | NA | 12'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" |

CITY & COUNTY OF DENVER
DENVER INTERNATIONAL AIRPORT
DESIGNER OF RECORD
39787 12/09/20

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

KILLEBREW | KILLEBREW, INC.
ENGINEER/ARCHITECTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

| ISSUE RECORD | NO. | BY | PURPOSE | DATE | ODD |
|--------------|-----|----------|---------|------|-----|
| 0 | 00 | PC | ISSUES | 000 | |
| 1 | 00 | Contract | 000 | 0000 | 000 |

SCALE: NOT TO SCALE
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA/AFIP NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01
SHEET TITLE: FIRE SUPPRESSION DETAILS
SHEET NO.: FS500-N



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249



KILLEBREW | KILLEBREW, INC.
ENGINEERS & ARCHITECTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

ISSUE RECORD

| NO. | BY | PURPOSE | DATE | ODD |
|-----|----|--------------|----------|-----|
| 0 | AK | IFC | 12/09/20 | |
| 1 | AK | Contract Set | 04/05/21 | AK |

SCALE: 1" = 10'-0"

DATE: 12/09/20

DRAWN BY: AJH

CHECKED BY: MCK

FAA AIP NO.:

DESIGN CONTRACT NO.:

CONST. CONTRACT NO. 202056518

VOLUME NO. 51

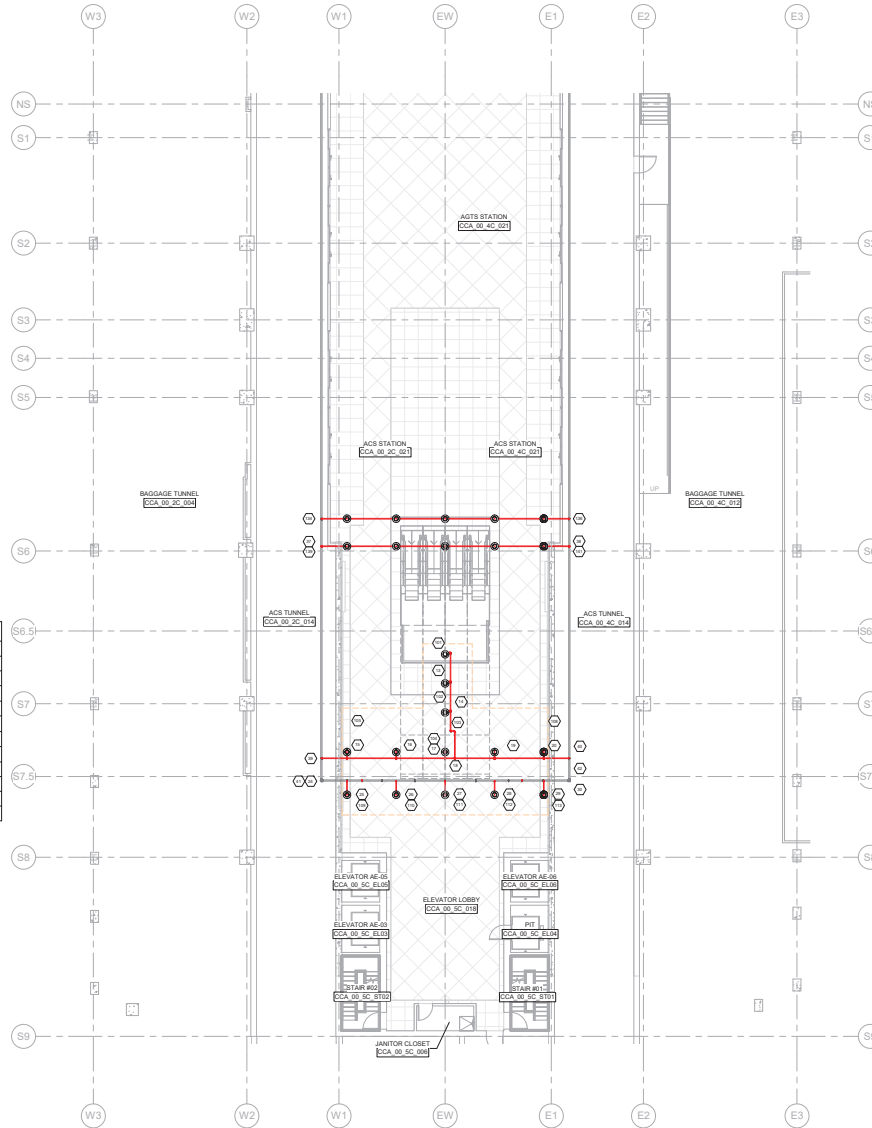
SHEET TITLE

LEVEL 00 - AGTS STATION - SOUTH FIRE

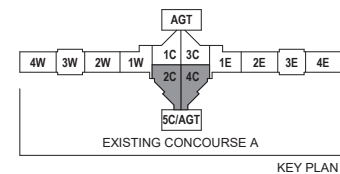
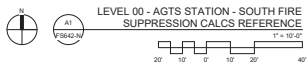
SUPPRESSION CALCS REFERENCE

SHEET NO.

FS642-N



| HYDRAULIC INFORMATION | |
|--------------------------|-------------------------|
| Remote Area Name | BASEMENT SEB |
| Occupancy Classification | Ordinary Hazard Group 1 |
| Density | 0.15 GPM |
| Total Hose Streams | 250.00 GPM |
| Dry Capacity | 0.0 gal |
| Flooring Heads | 13 @ 19.50 GPM |
| K-Factor | 5.8 |
| Total Water Required | 668.03 GPM |
| Total Pressure Required | -51.87 psi |
| Base of Rise | 348.03 GPM |
| Base of Rise | 79.22 psi |
| Safety Margin | +101.1 (150.65%) |



KEY PLAN



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

KILLEBREW | KILLEBREW, INC.
ENGINEERING CONSULTANTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

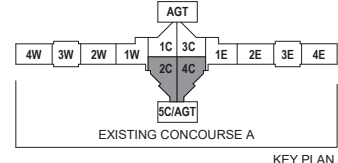
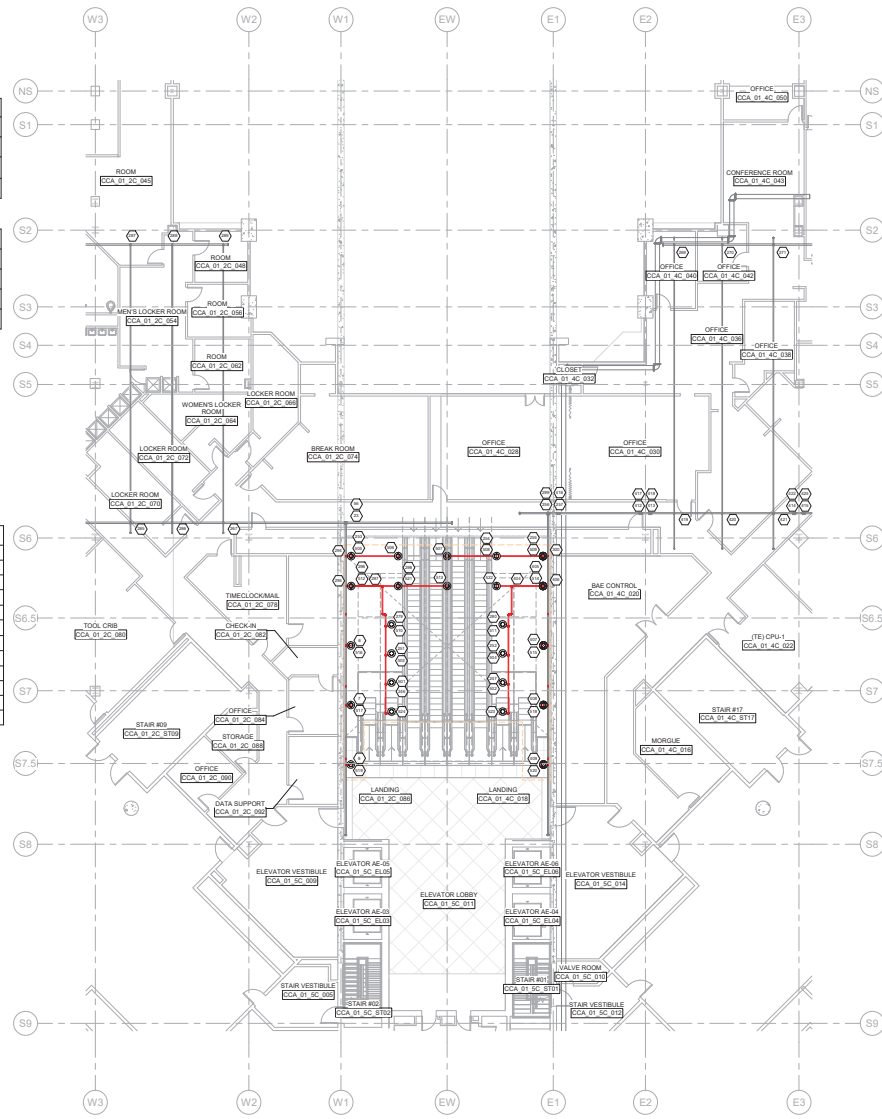
ISSUE RECORD
NO. BY PURPOSE DATE OAD
0 00 00 12/20/20 000
1 00 00 12/20/20 000

SCALE: 1" = 10'-0"
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIR NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01
SHEET TITLE: LEVEL 01 - APRON - SOUTH FIRE SUPPRESSION CALCS REFERENCE
SHEET NO.: FS644-N

| DENVER WATER SUPPLY INFORMATION | | | |
|---------------------------------|-----------|---|-----------|
| FLOW TEST RESULTS | | HYDRAULIC CALCULATION WATER SUPPLY WITH 10% STATIC PRESSURE REDUCTION | |
| STATIC PRESSURE | 65 PSI | STATIC PRESSURE | 58.60 PSI |
| RESIDUAL PRESSURE | 58 PSI | RESIDUAL PRESSURE | 51.50 PSI |
| FLOW RATE | 1,500 GPM | FLOW RATE | 1,500 GPM |

| FIRE PUMP PERFORMANCE CURVE | |
|-----------------------------|-----------|
| PRESSURE | FLOW RATE |
| 139.902 PSI | CHURN |
| 99.936 PSI | 2,500 GPM |
| 64.950 PSI | 3,750 GPM |

| HYDRAULIC INFORMATION | |
|--------------------------|-------------------------|
| Remote Area Name | APRON - BEB |
| Occupancy Classification | Ordinary Hazard Group 1 |
| Density | 0.15 GPM |
| Total Hose Streams | 250.00 GPM |
| Qty Capacity | 5.0 gal |
| Flaming Heads | 24 @ 19.50 GPM |
| K-Factor | 5.8 |
| Total Water Required | 879.03 GPM |
| Total Pressure Required | -36.41 psi |
| Base of Floor | 300.63 GPM |
| Base of Floor | 83.83 psi |
| Safety Margin | +60.3 (166.34%) |



12/09/20 12:00 PM C:\Users\jphillips\OneDrive\Documents\31000001\CCA_A_1_FS_21050009-ESC REPLACEMENT.dgn

CONCOURSE A ESCALATOR REPLACEMENT

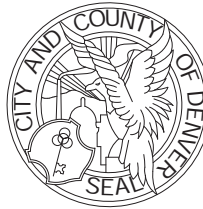
Design Contract No. 201630091
Construction Contract No. 202056518

8700 PENA BLVD
DENVER, CO 80249

Volume No. 01

SOUTH CENTER CORE ESCALATOR ISSUED FOR CONSTRUCTION

12/09/2020



| SHEET INDEX - VOLUME 01 | |
|---|---|
| SHEET # | SHEET NAME |
| GENERAL - SOUTH | |
| G-001 | COVER SHEET |
| G-002 | ABBREVIATIONS, PARTITIONS, AND SYMBOLS |
| G-003 | FIRE SAFETY |
| G-004 | CONSTRUCTION LOGISTICS |
| STRUCTURAL - SOUTH | |
| S-001 | GENERAL NOTES |
| S-0100-S | ACTS LEVEL, SOUTH DEMO PLAN |
| S-0101-S | APRON LEVEL, SOUTH DEMO PLAN |
| S-0102-S | CONCOURSE LEVEL, SOUTH DEMO PLAN |
| S-0103 | ESCALATOR RY DEMO SECTIONS |
| S-0104 | FRAMING WALL DEMO DETAILS |
| S-1101-S | ACTS LEVEL, SOUTH FOUNDATION PLAN |
| S-1101-S | APRON LEVEL, SOUTH FOUNDATION PLAN |
| S-1102-S | CONCOURSE LEVEL, SOUTH FRAMING PLAN |
| S-301 | ESCALATOR RY SECTIONS |
| S-301 | STRUCTURAL DETAILS |
| ARCHITECTURAL - SOUTH | |
| A-1010-S | SOUTH OVERALL DEMO PLANS |
| A-1010-S | SOUTH ENLARGED DEMO PLANS |
| A-1101-S | SOUTH OVERALL PLANS |
| A-1101-S | SOUTH ENLARGED PLANS |
| A-1101-S | SOUTH ENLARGED PLANS |
| A-1101-S | SOUTH ENLARGED PLANS |
| A-1101-S | SOUTH ENLARGED ELEVATIONS AND SECTIONS |
| A-301 | DETAILS |
| A-401 | FINISHES |
| A-4101-S | SOUTH ENLARGED PLANS WAYFINDING |
| ELECTRICAL - SOUTH | |
| E-001 | ELECTRICAL GENERAL NOTES & LEGEND |
| E-0101-S | SOUTH ENLARGED ELECTRICAL LEGEND PLANS |
| E-0101-S | SOUTH ENLARGED ELECTRICAL DEMO REFLECTED CEILING PLANS |
| E-1101-S | SOUTH ENLARGED ELECTRICAL REFLECTED CEILING PLANS |
| E-1101-S | SOUTH ENLARGED ELECTRICAL REFLECTED CEILING PLANS |
| E-1101-S | SOUTH ENLARGED ELECTRICAL REFLECTED CEILING PLANS |
| E-401-S | ELECTRICAL SCHEDULES |
| E-401-S | SOUTH ELECTRICAL SCHEDULES |
| FIRE ALARM AND SUPPRESSION - SOUTH | |
| FS-0101-S | GENERAL NOTES |
| FS-101-S | LEVEL 00 - ACTS STATION - EXISTING SOUTH LEGAL PLAN |
| FS-101-S | GENERAL NOTES |
| FS-101-S | LEVEL 00 - ACTS STATION - SOUTH DEMOLITION PLAN |
| FS-101-S | LEVEL 00 - APRON - SOUTH DEMOLITION PLAN |
| FS-101-S | LEVEL 00 - ACTS STATION - SOUTH CONSTRUCTION PLAN |
| FS-101-S | LEVEL 00 - ACTS STATION - SOUTH CONSTRUCTION PLAN |
| FS-101-S | LEVEL 01 - APRON - SOUTH CONSTRUCTION PLAN |
| FS-101-S | SOUTH ESCALATOR CONSTRUCTION SECTIONS - WEST AND EAST VIEWS |
| FS-101-S | ENLARGED SOUTH CONSTRUCTION PLANS |
| FS-101-S | FIRE SUPPRESSION DETAILS |
| FS-101-S | LEVEL 00 - ACTS STATION - SOUTH FIRE SUPPRESSION CALCUS |
| FS-101-S | LEVEL 00 - ACTS STATION - NORTH FIRE SUPPRESSION CALCUS REFERENCE |
| FS-101-S | LEVEL 01 - APRON - SOUTH FIRE SUPPRESSION CALCUS |
| FS-101-S | LEVEL 01 - APRON - NORTH FIRE SUPPRESSION CALCUS REFERENCE |



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD
DENVER, CO 80249



717 17TH STREET SUITE 2750
DENVER, CO 80202

ISSUE RECORD
NO. | PURPOSE | DATE
1 | IA | Construction | 12/09/20

SCALE: As indicated
DATE: 12/09/2020
DRAWN BY: CLM
CHECKED BY: CVH
FAA AP NO:
DESIGN CONTRACT NO: 201630091
CONST. CONTRACT NO: 202056518
VOLUME NO: 01
SHEET TITLE: COVER SHEET
SHEET NO: G-001-S

| ARCHITECTURAL | STRUCTURAL | ELECTRICAL | FIRE ALARM | FIRE SUPPRESSION | DEFERRED SUBMITTALS |
|---|---|--|---|---|---|
| <p>JACOBS 717 17TH STREET SUITE 2750 DENVER, COLORADO 80202</p> <p>SCOPE OF WORK NARRATIVE</p> <p>THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 4 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. THE ESCALATORS TRAVEL FROM THE ACTS LEVEL (TRAIN PLATFORM TO APRON LEVEL), THEY THEN SWITCH BACK AND TRAVEL THE REMAINING WAY TO CONCOURSE. ALL THE NEW ESCALATORS ARE 32" CLEAR WIDTH.</p> | <p>JACOBS 717 17TH STREET SUITE 2750 DENVER, COLORADO 80202</p> <p>SCOPE OF WORK NARRATIVE</p> <p>THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 4 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. STRUCTURAL SCOPE IS TO VERIFY LOADING ON EXISTING STRUCTURE AND DESIGN SUSPENDING PITS.</p> | <p>PK ELECTRICAL, INC. 5108 DYC PKWY SUITE 420 GREENWOOD VILLAGE, COLORADO 80111</p> <p>SCOPE OF WORK NARRATIVE</p> <p>THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 4 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. ELECTRICAL SCOPE IS TO ADD TO EXISTING PANELS THE NEW ESCALATORS AND VERIFY CAPACITY FOR POWER.</p> | <p>KILLEBREW / KILLEBREW, INC. 5011 FARMMOUNT DRIVE WINDSOR, COLORADO 80550</p> <p>SCOPE OF WORK NARRATIVE</p> <p>THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 4 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. ELECTRICAL SCOPE IS TO VERIFY EXISTING FIRE ALARM MEETS CODE IN AREA OF WORK.</p> | <p>KILLEBREW / KILLEBREW, INC. 5011 FARMMOUNT DRIVE WINDSOR, COLORADO 80550</p> <p>SCOPE OF WORK NARRATIVE</p> <p>THE PROJECT IS THE REMOVAL OF 4 EXISTING ESCALATORS AND THE INSTALLATION OF 4 NEW ESCALATORS. THE ESCALATORS ARE AT THE CENTER CORE OF CONCOURSE A. ELECTRICAL SCOPE IS TO VERIFY EXISTING FIRE ALARM MEETS CODE IN AREA OF WORK.</p> | <p>057300 - DECORATIVE METAL RAILINGS 057500 - DECORATIVE FORMED METAL (ESCALATOR ENCLOSURE) 141000 - ESCALATORS 211111 - FIRE SUPPRESSION SYSTEM</p> |

4/9/2017 12:4



GENERAL NOTES

- REFER TO DIVISION 1 SPECIFICATIONS FOR REQUIREMENTS TO MOVE ESCALATORS IN AND OUT OF THE SITE.
- EXISTING UNITS ARE TO BE REMOVED FROM THE CONCOURSE AND TAKEN TO THE DEN BONEYARD AND UNLOADED. CONTRACTOR TO LEAVE THE AREA THROUGH ACCESS GATE 4 NORTH OF THE CONCOURSES. THE BONEYARD IS LOCATED ON 88TH AVENUE. THE ROUTE TO THE BONEYARD FROM CONCOURSE A IS APPROXIMATELY 1/4 MILE.
- DEN WILL PROVIDE THE TRASH BINS FOR EACH STAGE OF THE CONSTRUCTION. SEE PLAN FOR GENERAL AREA. ALL EXISTING FINISHES AND AREAS WILL BE PROTECTED BY THE CONTRACTOR MOVING INTO AND OUT OF THE AREA OF WORK.
- ACCESS TO THE INTERIOR CONSTRUCTION HAUL ROUTE IS CONCOURSE LEVEL AT GATE A38 AND THROUGH A DOORWAY WITHIN THE CURTAIN WALL.

LEGENDS

CONSTRUCTION I.E. END

- TRASH BIN AREA
- ACCESS POINT
- INTERIOR HAUL ROUTES
- VEHICLE HAUL ROUTES
- DEN BONEYARD

CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT

DESIGNER OF RECORD

**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENNA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

ISSUE RECORD

| NO. | DATE | PURPOSE | GATE | CD |
|-----|------|--------------|----------|----|
| 0 | JA | IFC | 12/20/16 | JA |
| 1 | JA | Contract Set | 04/07/17 | JA |

SCALE: As Indicated

DATE: 12/09/2016

DRAWN BY: CV

CHECKED BY: ER

FAA AIP NO.

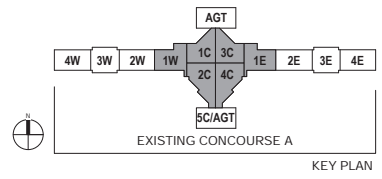
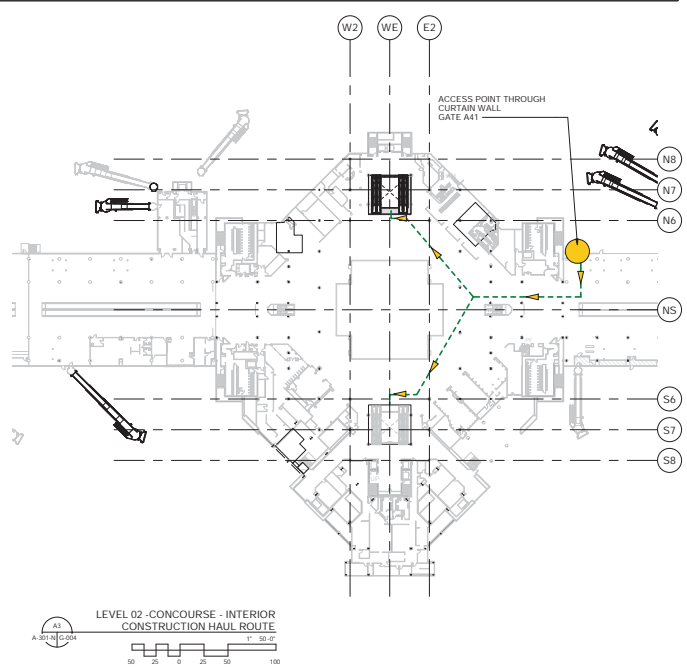
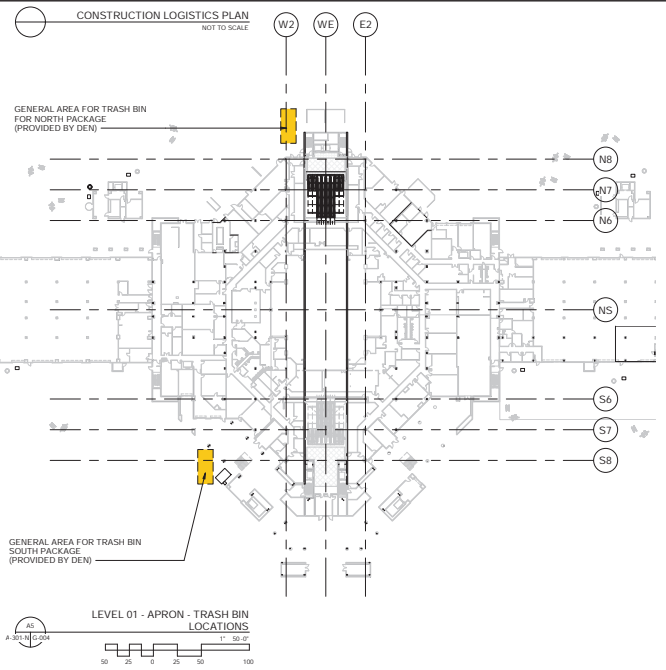
DESIGN CONTRACT NO.: 2016.30091

CONST. CONTRACT NO.: 202016114

VOLUME NO.: 01

SHEET TITLE: CONSTRUCTION LOGISTICS

SHEET NO.: G-004



8700 PENNA BLVD DENVER, CO 80249
 717 17TH STREET SUITE 2750 DENVER, CO 80202
 303.733.3333
 WWW.JACOBS.COM

4829721.1

| ABBREVIATIONS (ALL ABBREVIATIONS/SYMBOLS SHOWN ARE NOT NECESSARILY USED ON THE DRAWINGS) | | |
|---|---|---|
| A | H | R |
| AE ARCHITECT/ENGINEER ACI AMERICAN CONCRETE INSTITUTE ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS ASTM AMERICAN SOCIETY FOR TESTING AND MATERIALS | HORIZ HORIZONTAL HRSB HOLLOW STRUCTURAL SECTION K KPS (1000 LBS) L ANGLE SHAPE LB # POUND LHV LONG LEG HORIZONTAL LLV LONG LEG VERTICAL | RO ROUGH OPENING S STEEL DECK INSTITUTE T TOP OF TAB TOP & BOTTOM TYP TYPICAL |
| B | L | T |
| BOTTOM | ON CENTER | WELDED WIRE FABRIC |
| C | O | W |
| CONT CONTINUOUS OR CONTINUED | | |
| E | | |
| EX EXISTING ELEV EL ELEVATION EOD EDGE OF METAL DECK EOS EDGE OF SLAB | | |
| G | | |
| GA GAGE OR GAUGE GB GRADE BEAM | | |
| STRUCTURAL SYMBOLS | | |
| | SURFACE - STEPPED | SLOPE INDICATOR |
| | SURFACE - SLOPE UP | STRUCTURAL ARROW (DIRECTION OF SPAN) |
| | SURFACE - SLOPE DOWN | COLUMN PASSING THRU THIS LEVEL |
| | SURFACE - SLOPE (2) WAYS | TOP OF STEEL + DEVIATION FROM TYPICAL |
| | TOP OF WALL | ELEVATION POINT (TOP OR BOTTOM OF ELEMENT) |
| | TOP OF CONCRETE EL. | NUMBER OF EVENLY SPACED SHEAR STUDS |
| | TOP OF MEMBER EL. | SPECIAL STUD SPACING |
| | WORKPOINT | THE AMOUNT OF MID-SPAN DEAD LOAD CAMBER |
| | MOMENT CONNECTION | DOUBLE ANGLE CONNECTION REQUIRED IN LEU OF SINGLE SHEAR PLATE |
| | KICKER FRAMING SYMBOL | X INDICATES HIGH POINT, DOUBLE ARROW INDICATES BRACE DIRECTION |
| DRAWING/DETAIL REFERENCE KEY | | |
| | REFER TO DRAWING/DETAIL NUMBER | REFER TO DRAWING/DETAIL REFERENCED TO |
| | SECTION OR PLAN NUMBER | ELEVATION OF WALL OR FRAME |
| | SHEET | ENLARGED PLAN |

| MATERIAL GRAPHIC SYMBOLS | | | |
|---|-----------------------------------|--|------------------------|
| THE FOLLOWING SYMBOLS ARE USED TO REPRESENT THE MATERIALS SHOWN ON THE DRAWINGS. REFER TO SPECIFICATIONS AND GENERAL NOTES FOR MATERIAL QUALITIES REQUIRED. | | | |
| | EARTH | | ROCK |
| | PRECAST CONCRETE | | CAST-IN-PLACE CONCRETE |
| | CMU | | EXISTING CONCRETE |
| | STRUCTURAL STEEL IN CROSS SECTION | | |
| SHEET SYMBOLS | | | |
| | SECTION OR PLAN NUMBER | | SECTION CUTS |
| | ENLARGED PLAN | | |

GENERAL NOTES

- BUILDING AND DESIGN CODES**
 - INTERNATIONAL BUILDING CODE 2018 EDITION WITH THE 2019 AMENDMENTS TO THE BUILDING CODE FOR THE CITY AND COUNTY OF DENVER
 - ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.
 - ASCE MANUAL OF STEEL CONSTRUCTION, 15TH EDITION.
 - ACI 318-14 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
 - 2017 SDI CODE OF RECOMMENDED STANDARD PRACTICE FOR COMPOSITE DECK, FORM DECKS, AND ROOF DECK CONSTRUCTION.
- LOADS**
 - 1. ADTS LEVEL**
LIVE LOAD: 100 PSF
DEAD LOAD: 150 PSF SLAB WEIGHT + 25 PSF + 38 PSF (3" THICK FLOORING)
 - 2. APRON LEVEL**
LIVE LOAD: 100 PSF
DEAD LOAD: 150 PSF SLAB WEIGHT + 25 PSF + 38 PSF (3" THICK FLOORING)
 - 3. CONCOURSE LEVEL**
LIVE LOAD: 100 PSF
DEAD LOAD: 150 PSF SLAB WEIGHT + 25 PSF + 38 PSF (3" THICK FLOORING)
 - 4. WIND LOADS**
NOT APPLICABLE
 - 5. SNOW LOADS**
NOT APPLICABLE
 - 6. SEISMIC LOADS**
BUILDING CATEGORY: B
SEISMIC IMPORTANCE FACTOR: I = 1.25
MAPSDS (SEISMIC RESPONSE ACCELERATIONS): S_s = 0.150, S₁ = 0.054
SITE CLASS: D
SEISMIC RESPONSE COEFFICIENT: R = 8
SEISMIC DESIGN CATEGORY: B
- GENERAL REQUIREMENTS**
 - SPECIFICATIONS ARE PART OF THE CONSTRUCTION DOCUMENTS AND MUST BE USED IN CONJUNCTION WITH THE DRAWINGS.
 - VERIFY EXISTING CONDITIONS AND DIMENSIONS PRIOR TO BEGINNING WORK OR FABRICATING MATERIALS. NOTIFY AS OF DISCREPANCIES BEFORE PROCEEDING WITH ANY PHASE OF WORK.
 - VERIFY THE LOCATION OF CHASES, INSERTS, OPENINGS, SLAB EDGES, FINISHES, DEPRESSIONS, PADS, AND WALL OPENINGS.
 - DO NOT SCALE DRAWINGS FOR THE PURPOSE OF ESTABLISHING DIMENSIONS.
 - DETAILS UNLESS TYPICAL DETAILS ON DRAWINGS APPLY TO SITUATIONS OCCURRING ON THE PROJECT THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. SLOTTED DETAILS APPLY WHETHER OR NOT DETAILS ARE REFERENCED AT EACH LOCATION. NOTIFY ENGINEER OF CONFLICTS REGARDING APPLICABILITY OF "TYPICAL DETAILS".
 - DO NOT LOAD THE SLAB ON GRADE OR SUPPORTED SLAB ON ERECTION CRANES OR ERECTION EQUIPMENT. THE SLABS HAVE NOT BEEN DESIGNED FOR CRANE LOADS AND WILL REQUIRE AN INCREASE IN THICKNESS AND/OR REINFORCEMENT. OBTAIN AE APPROVAL ON PROPOSED CRANE SUPPORT PLAN FOR SLABS PRIOR TO COMMENCING WORK.
 - DO NOT STORE OR STACK CONSTRUCTION MATERIALS ON POURED OR ERECTED FLOORS/ROOFS IN EXCESS OF 80 PERCENT OF THE LIVE LOAD. GENERAL CONTRACTOR WILL ENSURE THAT ALL SUB-CONTRACTORS ARE INFORMED OF LOADING RESTRICTIONS. AVOID IMPACT WHEN PLACING MATERIALS ON POURED OR ERECTED FLOOR OR ROOFS.
 - THE CONTRACT STRUCTURAL DOCUMENTS REPRESENT THE FINISHED STRUCTURE. THE CONTRACTOR IS RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION. PROVIDE ALL NECESSARY EQUIPMENT TO PROTECT THE STRUCTURE, WORKMAN, AND OTHER PERSONS DURING CONSTRUCTION INCLUDING BRACING, SHORING FOR CONSTRUCTION EQUIPMENT, SHORING FOR THE BUILDING, FORMS AND SCAFFOLDING, SHORING OR RETAINING WALLS AND OTHER TEMPORARY SUPPORTS AS REQUIRED.
 - PRINCIPAL OPENINGS THROUGH THE FRAMING ARE SHOWN ON DRAWINGS. EXAMINE THE ARCHITECTURAL AND MECHANICAL DRAWINGS FOR THE REQUIRED OPENINGS AND PROVIDE FOR REQUIRED OPENINGS WHETHER SHOWN ON THE STRUCTURAL DRAWINGS OR NOT. VERIFY SIZE AND LOCATION OF OPENINGS WITH THE MECHANICAL CONTRACTOR. DEVIATIONS FROM THE OPENINGS SHOWN ON THE STRUCTURAL DRAWINGS MUST BE APPROVED PRIOR TO IMPLEMENTING THE CHANGES.
 - DO NOT CUT OR DRILL THROUGH EXISTING REINFORCING OR CABLE TENDONS. X-RAY TO LOCATE REINFORCING OR CABLE TENDONS AT LOCATIONS REQUIRING CUTTING OR DRILLING PRIOR TO START OF CONSTRUCTION. SUBMIT REINFORCEMENT LOCATION IN CONFLICT WITH DRAWING FOR AE REVIEW.
 - WHERE NO SPECIFIC DETAIL OR INFORMATION IS SPECIFIED DETAIL AND INFORMATION IS TO BE THE SAME AS OTHER AREAS WHERE IT IS SPECIFIED.

CONCRETE NOTES

- PROVIDE BATCH MIXING, TRANSPORTATION, PLACING, AND CURING OF CONCRETE IN ACCORDANCE WITH RECOMMENDATIONS OF ACI 301, ACI 318 AND ASTM C94. USE TYPE III PORTLAND CEMENT UNLESS OTHERWISE NOTED. PROVIDE CURING AND SPECIAL REQUIREMENTS AS SPECIFIED.
- PROVIDE CONCRETE MIXES DESIGNED BY A QUALIFIED TESTING LABORATORY FOR REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER.
- PROVIDE THE FOLLOWING CONCRETE:
 - CONCRETE TOPPING SLAB: 5088 PSI, SLUMP = 4" ± 1"; MAXIMUM WATER/CEMENT RATIO = 0.40; FINISH LIGHT BROOM.

FIREPROOFING NOTES

- RE: SPECIFICATIONS FOR FIREPROOFING ASSEMBLIES, MATERIALS AND PROCEDURES. FIRE-RESISTANCE RATING REQUIREMENTS TO COMPLY WITH ICC 2018 TABLE 601 FOR BUILDING TYPE I-A.
- ALL STRUCTURAL ROOF FRAMING BEAMS REQUIRING FIREPROOFING SHALL BE CONSIDERED UNRESTRAINED.
- ALL FLOOR FRAMING BEAMS, ORDERS AND JOISTS SUPPORTING COMPOSITE CONCRETE FLOOR CONSTRUCTION SHALL BE CONSIDERED PRIMARY.
- ALL STRUCTURAL COLUMNS AND ALL STRUCTURAL MEMBERS INCLUDING BEAMS, ORDERS AND LATERAL BRACING CONNECTED TO STRUCTURAL COLUMNS SHALL BE CONSIDERED PRIMARY.
- ALL STRUCTURAL FLOOR BEAMS NOT CONNECTED TO STRUCTURAL COLUMNS SHALL BE SECONDARY WITH THE FOLLOWING EXCEPTIONS WHICH SHALL BE CONSIDERED PRIMARY:
 - ALL BUILDING PERIMETER BEAMS AND ORDERS SUPPORTING EXTERIOR CURTAIN WALLS OR EXTERIOR STEEL STUD WALLS.
 - ALL CANTILEVER BEAMS CONNECTED TO COLUMNS AND ORDERS SUPPORTED BY CANTILEVER BEAMS. ORDERS CONSIDERED AS MEMBERS SUPPORTING REACTIONS FROM FRAMED BEAMS.
- ALL MISCELLANEOUS STRUCTURAL MEMBERS SUCH AS FLOOR EDGE BRACING AND THE LIKE WHICH SUPPORT FLOOR OR ROOF LOADS SHALL BE FIREPROOFED PER SECONDARY MEMBER CRITERIA.
- SPECIAL INSPECTION AND TESTS FOR FIRE-RESISTANCE MATERIALS SHALL BE REQUIRED PER ICC SECTION 7105.14 AND 7105.14.1 FOR PHYSICAL AND VISUAL TESTS.
- SPECIAL INSPECTION AND TESTS FOR MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS SHALL BE REQUIRED PER ICC SECTION 7105.17.
- SPECIAL INSPECTIONS AND TESTS FOR FIRE-RESISTANT PENETRATIONS AND JOINTS SHALL BE REQUIRED PER ICC SECTION 7105.17.

STRUCTURAL STEEL NOTES

- PROVIDE STRUCTURAL STEEL OF THE FOLLOWING ASTM DESIGNATIONS UNLESS OTHERWISE NOTED:
 - STRUCTURAL STEEL WIDE FLANGE AND WT SHAPES - ASTM A992.
 - STRUCTURAL STEEL STANDARD SHAPES, CHANNELS AND ANGLES - ASTM A36.
 - EDGE ANGLES, BENT PLATES, HANGER AND BRACES - ASTM A36.
 - STRUCTURAL TUBING (SQUARE OR RECTANGULAR) - ASTM A500, GRADE B.
 - BASE PLATES AND MISCELLANEOUS STEEL PLATES - ASTM A36, MINIMUM.
 - CONNECTION MATERIALS:
 - BEAM COLUMN STIFFENER PLATES AND DOUBLER PLATES TO MATCH THE GRADE STEEL OF STRUCTURAL ELEMENT.
 - ALL CONNECTION MATERIALS, EXCEPT AS OTHERWISE NOTED HEREIN OR IN THE DRAWINGS, INCLUDING BEARING PLATES, GUSSET PLATES, STIFFENER PLATES, ANGLES, ETC., - ASTM A36.
 - BEAM SINGLE PLATE SHEAR CONNECTIONS SHALL BE ASTM A572 GRADE 50 PLATE.
 - HIGH STRENGTH BOLTS - ASTM A325, A500 OR ASTM F1852 (FULLY TENSIONED).
 - HARDENED STEEL WASHERS - ASTM F436.
 - HEAVY HEX NUTS - ASTM A563.
- WELD MINIMUM SIZE AND STRENGTH
 - PROVIDE MINIMUM SIZE OF FILLET WELDS AS SPECIFIED IN TABLE J.2 OF THE AISC MANUAL.
 - PROVIDE MINIMUM EFFECTIVE THROAT THICKNESS OF PARTIAL PENETRATION GROOVE WELDS AS SPECIFIED IN TABLE J.3 OF THE AISC MANUAL.
 - DEVELOP THE FULL TENSILE STRENGTH OF THE MEMBER ELEMENT JOINED ON ALL SHOP AND FIELD WELDS UNLESS OTHERWISE NOTED ON THE DRAWINGS.
 - WHERE CONNECTIONS ARE NOTED ON DRAWINGS AS MOMENT CONNECTIONS, PROVIDE WELDS TO DEVELOP FULL FLEXURAL CAPACITY OF THE LESSEER MEMBER.
- PROVIDE ELECTRODES FOR FIELD OR SHOP WELDING THAT CONFORM TO AWS D1.1 CLASS EXXX.
- PROVIDE MINIMUM OF TWO BOLTS PER CONNECTION. MINIMUM BOLT DIAMETER TO BE 3/4 INCH.
- PROVIDE BOLTS, NUTS AND WASHERS THAT ARE HOT DIP GALVANIZED ACCORDING TO ASTM A153. CLASS 2 WHEN USED TO CONNECT STEEL ELEMENTS THAT ARE HOT DIP GALVANIZED AFTER FABRICATION.
- STEEL FABRICATION
 - FABRICATE AND ASSEMBLE STRUCTURAL MEMBERS/ASSEMBLIES IN SHOP TO GREATEST EXTENT POSSIBLE.
 - SPlicing OF STRUCTURAL STEEL MEMBERS IS PROHIBITED WITHOUT PRIOR APPROVAL BY THE AE.
 - FABRICATOR SHALL BE RESPONSIBLE FOR ALL ERRORS OF DETAILING ON THE SHOP DRAWINGS, ERRORS IN FABRICATION, AND THE CORRECT FITTING OF STRUCTURAL STEEL MEMBERS.
- CONFORM TO THE AISC CODE OF STANDARD PRACTICES FOR ERECTION TOLERANCES. FIELD MODIFICATION TO STRUCTURAL STEEL IS PROHIBITED WITHOUT PRIOR APPROVAL BY THE AE.
- CLEAN STEEL OF RUST, LOOSE MIL SCALE AND OTHER FOREIGN MATERIALS WHERE REQUIRED FOR FABRICATION, FITTING UP, OR WELDING.
- DO NOT CUT STRUCTURAL STEEL MEMBERS FOR THE WORK OF OTHER TRADES WITHOUT PRIOR REVIEW AND APPROVAL BY THE AE.
- FURNISH STEEL SHOP DRAWINGS FOR ARCHITECTS AND STRUCTURAL ENGINEER'S REVIEW PRIOR TO FABRICATION. INCLUDE WELDING PROCEDURES, TESTING PROGRAMS FOR WELDS AND HIGH STRENGTH BOLTS, COATING MATERIAL, AND ERECTION SEQUENCE ON SHOP DRAWINGS.
- PROVIDE TEMPORARY SHORING OR BRACING AS REQUIRED PRIOR TO PERFORMING DEMOLITION.

SPECIALTY ENGINEERING REQUIREMENTS NOTES

- ALL DESIGNATED ENGINEERING SUBMITTALS REQUIRE CONTRACTOR TO ENGAGE A QUALIFIED PROFESSIONAL ENGINEER TO PROVIDE SIGNED AND SEALED PLANS AND CALCULATIONS TO STRUCTURAL ENGINEER FOR REVIEW PRIOR TO THE START OF FABRICATION OF THE SYSTEM OR COMPONENT PART AND PRIOR TO ANY FIELD CONSTRUCTION THAT MAY BE AFFECTED BY THE SYSTEM OR COMPONENT PART.
 - COLD-FORMED STEEL FRAMING, INCLUDING BUT NOT LIMITED TO WALLS, FACIAS AND SOFFITS SHALL BE DESIGNED BY A SPECIALTY ENGINEER. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND MUST BE SIGNED AND SEALED BY AN ENGINEER REGISTERED IN THE STATE OF COLORADO.
 - ALUMINUM FRAMING FOR SIGNAGE MUST BE DESIGNED FOR COMPLIANCE WITH DM STANDARDS. CALCULATIONS SHALL BE SUBMITTED FOR REVIEW AND MUST BE SIGNED AND SEALED BY AN ENGINEER REGISTERED IN THE STATE OF COLORADO.

SPECIAL INSPECTION NOTES

- SPECIAL INSPECTIONS ARE TO BE PROVIDED BY AN AGENCY APPROVED BY THE LOCAL BOARD OF EQUAL OPPORTUNITY BY THE OWNER. SPECIAL INSPECTION IS REQUIRED FOR THE FOLLOWING TYPES OF WORK. REFERENCE PROJECT SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
 - POST-INSTALLED SCREW ANCHORS IN CONCRETE.
 - COLD-FORMED STEEL FRAMING.
 - SPRAY APPLIED FIREPROOFING.
 - BOLTS AND DOWELS INSTALLED IN MASONRY AND CONCRETE.
 - ALL FIELD WELDING (EXCEPT METAL STUDS, FURRING CHANNELS, ETC.)
- GENERAL
 - STRUCTURAL TESTS AND SPECIAL INSPECTIONS SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 1704 OF THE 2018 INTERNATIONAL BUILDING CODE AND AS INDICATED IN THIS SECTION. THE SPECIAL INSPECTOR SHALL BE A QUALIFIED PERSON OR AGENCY, CONTRACTED BY THE OWNER WHO SHALL DEMONSTRATE COMPETENCE TO THE SATISFACTION OF THE BUILDING OFFICIAL. CONSTRUCTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION, REGARDING SPECIAL INSPECTION.
 - REPORT REQUIREMENTS:
 - THE SPECIAL INSPECTORS SHALL KEEP RECORDS OF SPECIAL INSPECTIONS. THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS TO THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. REPORTS SHALL INDICATE THAT WORK INSPECTED TO WAS DONE IN ACCORDANCE TO THE APPLICABLE CONSTRUCTION DOCUMENTS. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF THE DISCREPANCIES ARE NOT CORRECTED IN RESPONSIBLE CHARGE PRIOR TO THE COMPLETION OF THAT PHASE OF THE WORK, A FINAL REPORT AND THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE PRIOR TO THE COMPLETION OF THAT PHASE OF THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE OF ANY DISCREPANCIES NOTED IN THE INSPECTIONS SHALL BE SUBMITTED AT A POINT IN THE AGREED UPON BY THE OWNER AND THE BUILDING OFFICIAL PRIOR TO THE START OF WORK.
 - STEEL CONSTRUCTION:
 - THE SPECIAL INSPECTION OF STEEL ELEMENTS OF THE BUILDINGS AND STRUCTURES SHALL BE AS REQUIRED IN ICC SECTION 1704.3 AND TABLE 1704.3.
 - ALL STRUCTURAL WELDING, INCLUDING FLOOR AND ROOF DECKING TO HAVE CONTINUOUS SPECIAL INSPECTION.
 - CONCRETE CONSTRUCTION:
 - THE SPECIAL INSPECTION AND VERIFICATIONS FOR CONCRETE CONSTRUCTION SHALL BE AS REQUIRED IN ICC SECTION 1704.4 AND THIS SECTION FOR ALL STRUCTURAL CONCRETE ELEMENTS. THE EXCEPTIONS INDICATED IN ICC SECTION 1704.4 SHALL NOT APPLY.
 - CONTINUOUS SPECIAL INSPECTIONS FOR REINFORCING STEEL PLACEMENT.
 - INSPECTION OF BOLTS AND DOWELS INSTALLED IN CONCRETE.
 - CONTINUOUS INSPECTION OF BOLTS TO BE INSTALLED IN CONCRETE PRE AND DURING PLACEMENT OF CONCRETE.
 - CONTINUOUS INSPECT DURING INSTALLATION OF POST-INSTALLED ANCHORS (BOLTS AND DOWELS).
- REFERENCE SPECIFICATIONS FOR REQUIRED TESTS AND INSPECTIONS FOR FIRE-RESISTANT MATERIALS AND SMOKE EVACUATION SYSTEMS.

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | |
|---|--|---|--|
| POST-INSTALLED SCREW ANCHORS IN CONCRETE | TEST SCREW ANCHORS WITH A CALIBRATED TORQUE WRENCH TO THE TORQUE SPECIFIED IN THE ACCESS REPORT. VERIFY TRENCH TO ICC E REPORT. | PERIODIC INSPECTION | SPECIAL INSPECTOR |
| GAS ACTUATED FASTENERS | VERIFY MATERIALS HAVE BEEN DRAWN TOGETHER AND FASTENERS ARE FULLY DRIVEN. VERIFY INSTALLATION PER ICC E REPORT. | PERIODIC INSPECTION | SPECIAL INSPECTOR |
| STEEL FRAMING | VERIFY MATERIALS COMPLY WITH CONTRACT DOCUMENTS (MIL CERTIFICATION FOR STEELS, WELDING MATERIALS, FASTENERS, ETC.) INSPECTIONS OF WELDED CONNECTIONS AT ROOF BEAMS AND PURLINS INSPECTION OF BOLTED CONNECTIONS AT FLOOR BEAMS, ROOF PURLINS | PERIODIC INSPECTION CONTINUOUS INSPECTION PERIODIC INSPECTION | SPECIAL INSPECTOR AWS CERTIFIED WELDING INSPECTOR EMPLOYED BY SPECIAL INSPECTOR OR INDEPENDENT TESTING LABORATORY SPECIAL INSPECTOR |
| STRUCTURAL STEEL, BOLTING, AND WELDING SPECIAL INSPECTION | INSPECTION OF STRUCTURAL STEEL, BOLTING, AND WELDING SHALL BE IN ACCORDANCE WITH QUALITY CONTROL AND QUALITY ASSURANCE PLAN REQUIREMENTS OF AISC 308-19 (CHAPTER 6) SPECIAL INSPECTION AND TESTS OF STRUCTURAL STEEL FIRE-PROOFING SHALL BE IN ACCORDANCE WITH 2018 ICC SECTIONS 7105.14, 7105.15, AND 7105.17. | | SEE AISC 308-19 FOR ADDITIONAL AND MORE SPECIFIC INSPECTION REQUIREMENTS |
| STRUCTURAL COLD-FORMED STEEL FRAMING INSPECTION | VERIFICATION OF COLLATED-DESIGN STEEL STRUCTURAL MEMBERS COMPLIANCE AND CONNECTOR COMPLIANCE SHALL BE PERFORMED IN ACCORDANCE WITH QUALITY CONTROL AND QUALITY ASSURANCE PLAN REQUIREMENTS OF AISI S400-15 (SECTION D6.5) INSPECTION OF WELDING TASKS SHALL BE PERFORMED IN ACCORDANCE WITH QUALITY CONTROL AND QUALITY ASSURANCE PLAN REQUIREMENTS OF AISI S400-15 (SECTION D6.6) INSPECTION OF MECHANICAL FASTENING TASKS SHALL BE PERFORMED IN ACCORDANCE WITH QUALITY CONTROL AND QUALITY ASSURANCE PLAN REQUIREMENTS OF AISI S400-15 (SECTION D6.7) | | SEE AISI S400-15 FOR ADDITIONAL AND MORE SPECIFIC INSPECTION REQUIREMENTS. SEE AISI S400-15 FOR ADDITIONAL AND MORE SPECIFIC INSPECTION REQUIREMENTS. |



DESIGNER OF RECORD



6/8/21

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8500 PENNA BLVD
DENVER, CO 80249

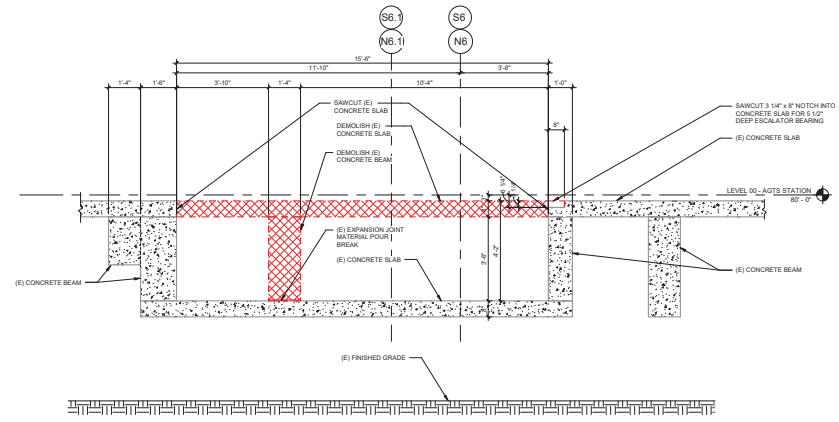
Jacobs

717 17th STREET SUITE 2750
DENVER, CO 80202
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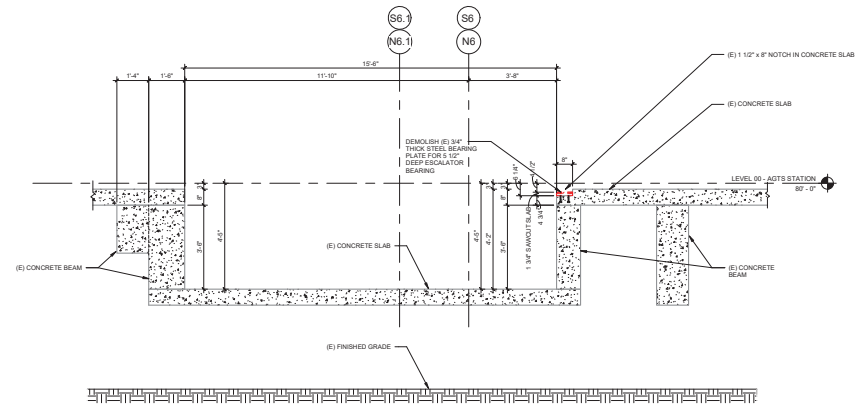
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DRAWN BY: AS
CHECKED BY: SM
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CONST. CONTRACT NO: 202026218
VOLUME NO: 01

SHEET TITLE
GENERAL NOTES

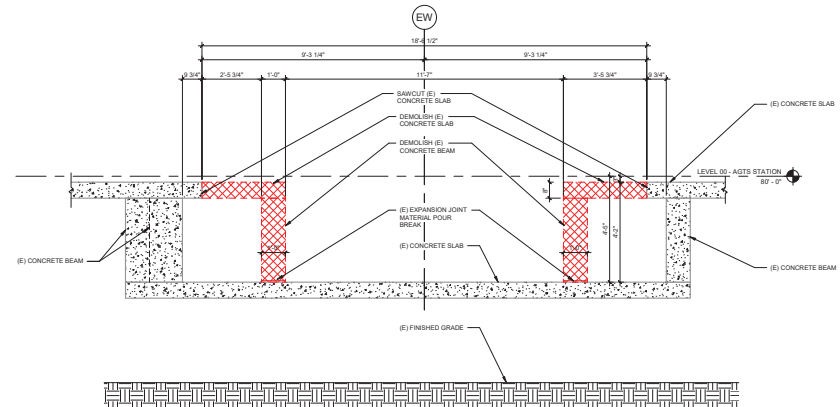
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S-01



3 AGTS LEVEL NORTH-SOUTH SECTION - ESCALATOR PIT DEMO
SD104 NS SD301 1/2" = 1'-0"



2 AGTS LEVEL NORTH-SOUTH SECTION - ESCALATOR PIT DEMO
SD104 NS SD301 1/2" = 1'-0"



1 DET 1 AGTS LEVEL EAST-WEST SECTION - ESCALATOR PIT DEMO
SD104 EW SD301 1/2" = 1'-0"



DESIGNER OF RECORD



4-05-21

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8500 PENNA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

| ISSUE RECORD | DATE | CHD |
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| 1 | JA | 02/02/21 |

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| DRAWN BY: | AS |
| CHECKED BY: | SM |
| FAA AP NO: | |
| DESIGN CONTRACT NO: | 201833001 |
| CONST. CONTRACT NO: | 202026518 |
| VOLUME NO: | 01 |
| SHEET TITLE: | ESCALATOR PIT DEMO SECTIONS |
| SHEET NO: | SD301 |



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8500 PENNA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

ISSUE RECORD
NO. DATE PURPOSE DATE CND
1 11 2020 PC 10/26/20 JA
2 1 2021 Construction 09/03/21 JA

SCALE: 1/2" = 1'-0"

DATE: 12/09/20

DRAWN BY: AS

CHECKED BY: SM

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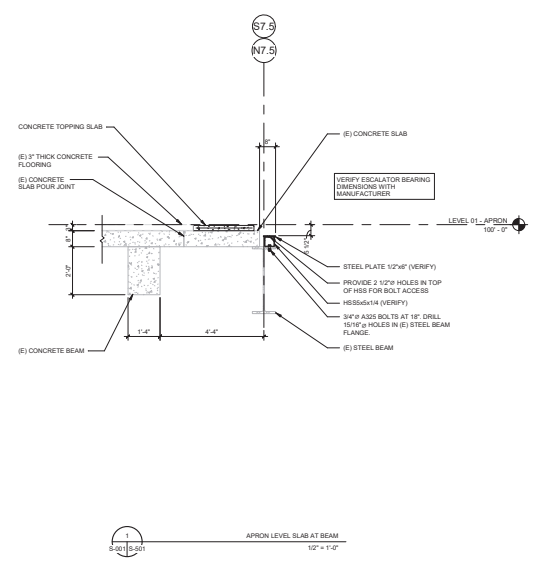
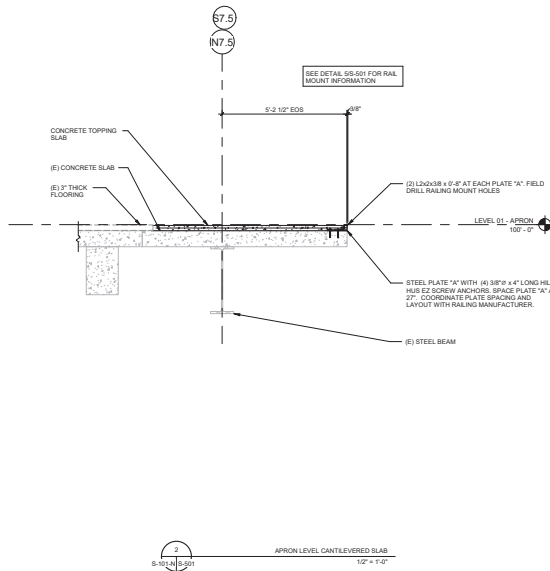
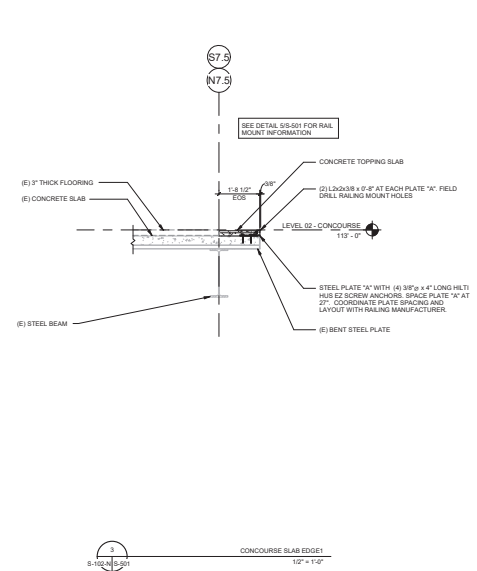
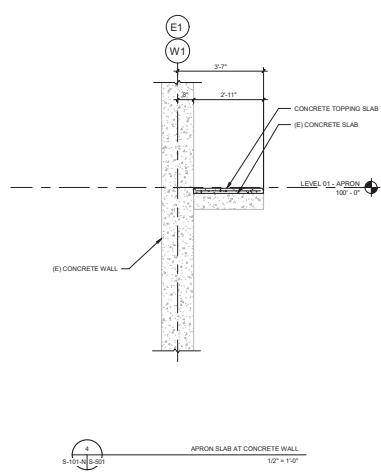
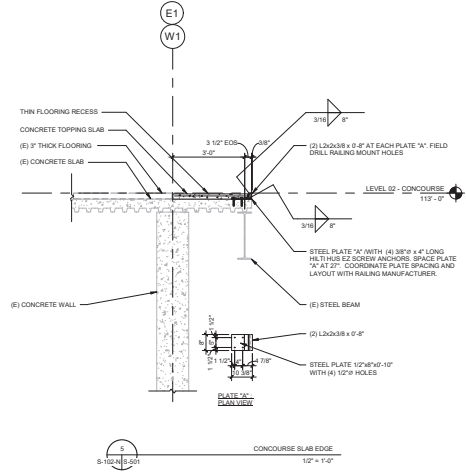
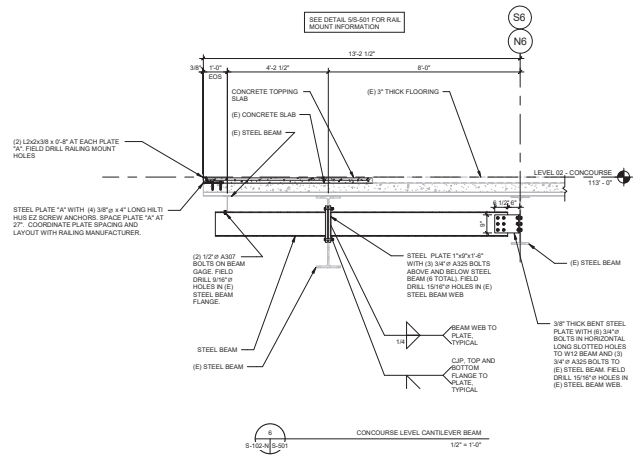
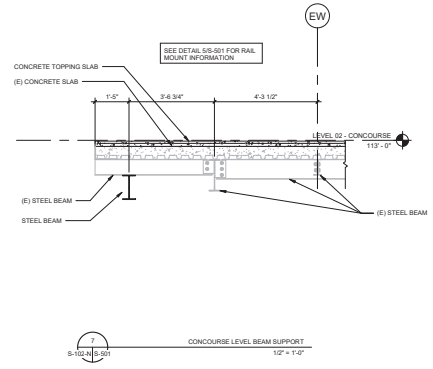
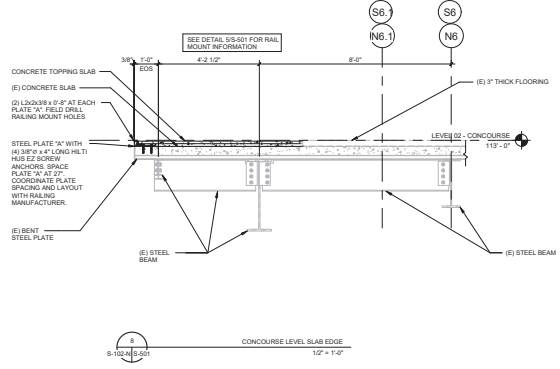
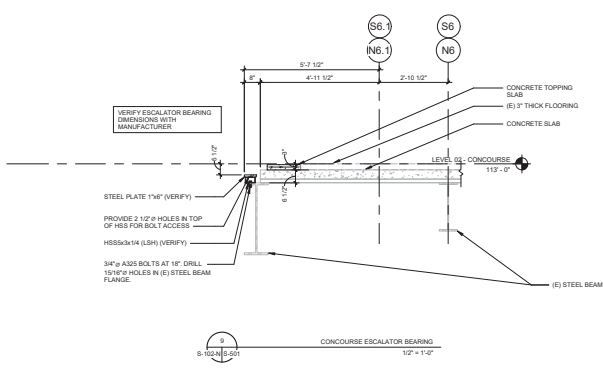
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VOLUME NO: 01

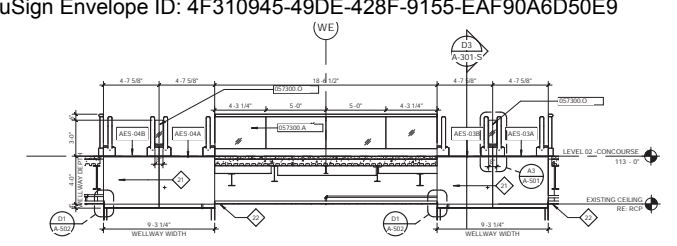
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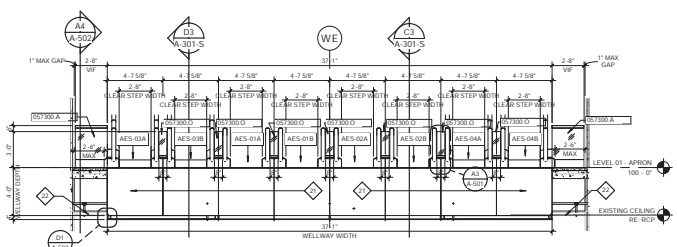
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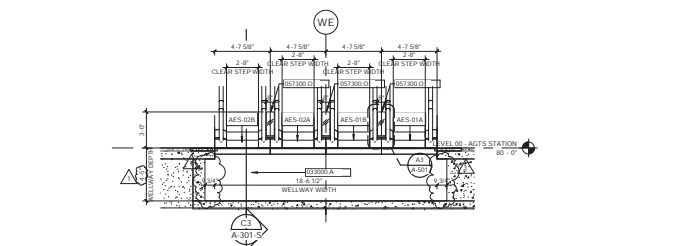
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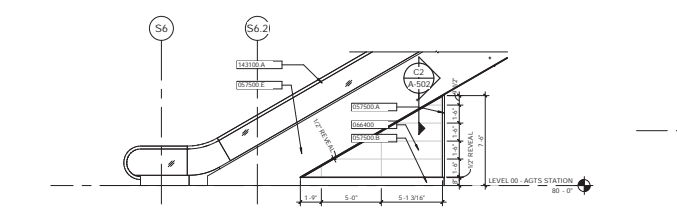
SOUTH CONCOURSE LEVEL ELEVATION
1/4" = 1'-0"



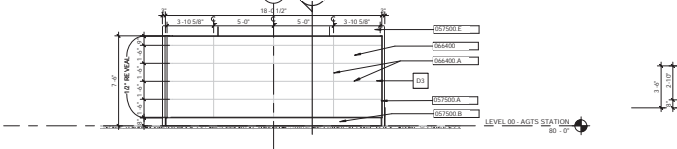
SOUTH APRON LEVEL ELEVATION
1/4" = 1'-0"



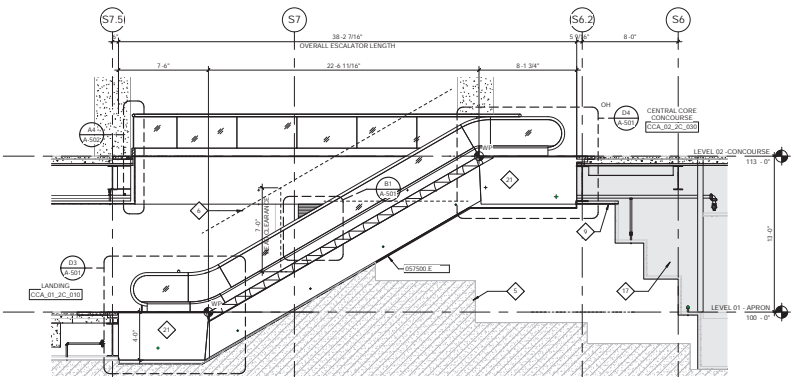
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1/4" = 1'-0"



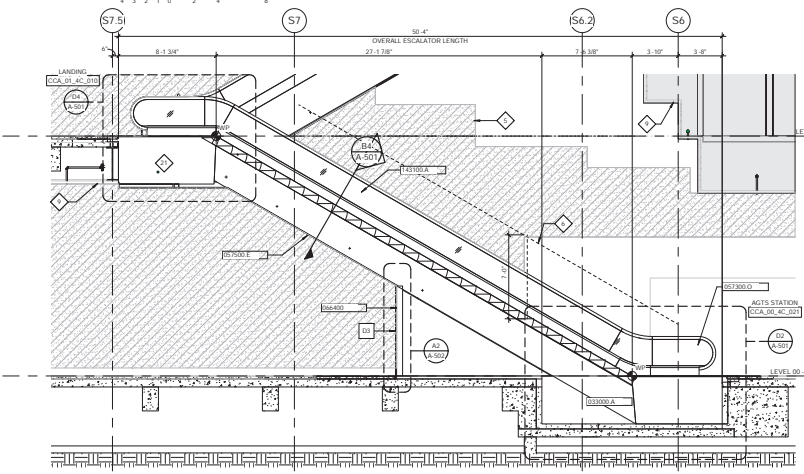
WEST ELEVATION SOUTH ESCALATOR
1/4" = 1'-0"



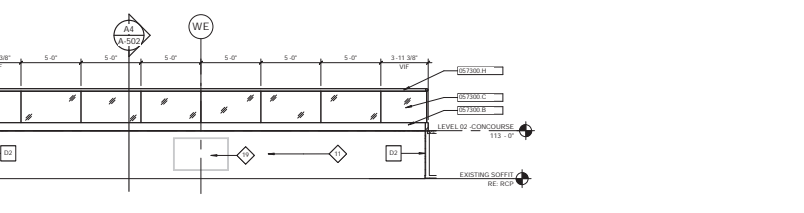
SOUTH ELEVATION SOUTH ESCALATOR
1/4" = 1'-0"



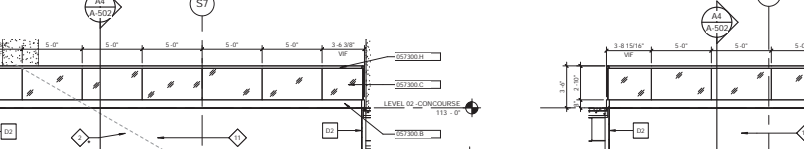
SOUTH APRON TO CONCOURSE ESCALATOR SECTION
1/4" = 1'-0"



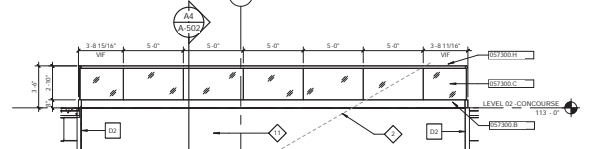
SOUTH AGTS TO APRON ESCALATOR SECTION
1/4" = 1'-0"



SOUTH CONCOURSE LEVEL SOUTH ELEVATION
1/4" = 1'-0"



SOUTH CONCOURSE LEVEL EAST ELEVATION
1/4" = 1'-0"



SOUTH CONCOURSE LEVEL WEST ELEVATION
1/4" = 1'-0"

- GENERAL NOTES**
- ALL PARTITIONS SHALL SPAN FROM FLOOR SLAB TO UNDERSIDE OF DECK ABOVE UNLESS INDICATED BY PARTITION CONNECTIONS.
 - DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS SHALL ESTABLISH LOCATION OF ALL PARTITIONS. LARGER SCALE DRAWINGS HAVE PRIORITY OVER SMALLER SCALE DRAWINGS. CONTACT US IMMEDIATELY IF THE ARCHITECT OF RECORD HAS ANY CHANGES TO THE PARTITIONS BEING PROCEEDED WITH CONSTRUCTION.
 - CONTRACTOR SHALL VERIFY CONTROL JOINTS ARE LOCATED AT APPROXIMATELY 10' O.C. FOR STRAIGHT AND CONTROL JOINTS ARE LOCATED AT APPROXIMATELY 10' O.C. FOR STAIRS AND NOT SPECIFICALLY INDICATED ON DRAWINGS. SUBMIT CONTRACTOR'S PROPOSED CONTROL JOINT LOCATIONS TO ARCHITECT FOR APPROVAL.
 - FINISH ALL EXPOSED CYPRESS BOARD CONSTRUCTION. ALL CYPRESS BOARD CONSTRUCTION SHALL BE FINISHED AND SMOOTH TO REMOVE ALL INDICATION OF THE JOINT WITH A VISUAL INSPECTION. SCHEDULE WALL FINISH SHALL BE IN ACCORDANCE WITH THE ROOM FINISH SCHEDULE AND/OR FINISH LEVELS NOTED IN THE CYPRESS BOARD SPECIFICATION SECTION WORK.
 - PARTITIONS ARE DIMENSIONED TO FACE OF CYPRESS BOARD. FACE OF HARDWARE AND TO FACE OF EXISTING CONSTRUCTION. ANY INTERIOR PARTITIONS DIMENSIONED TO FACE OF METAL STUD ARE NOTED. "FACE" OF FACE OF PARTITIONS ARE PERPENDICULAR AND/OR PARALLEL TO COLUMN GRID (L1).
 - NOTES TO "ALIGN" MEAN TO ALIGN FINISHED FACE OF PARTITION UNLESS OTHERWISE NOTED AND SHALL HAVE PRIORITY OVER A DIMENSIONED LOCATION.
 - PERMITTER DIMENSIONS ARE TOP FACE OF WALL. SHALL U.O.N. PROVIDE STUDS OF GAUGE AND SPACING. DATE TO SUPPORT APPLIED INCLUDING HAND RAILS, GRAB BARS, SHALL BE NOTED IN THE SPECIFICATION SECTION WORK. REFER TO SPEC SECTION WORK FOR NON STRUCTURAL REPAIRS FOR CYPRESS BOARD ASSEMBLIES INCLUDING BUT NOT LIMITED TO FIRE RATED CONSTRUCTION, BRACING AND SUPPORT, BLOCKOUTS, SOUND RATED CONSTRUCTION MATERIALS AND TOLERANCES.
 - WHERE NOTED, ALL DESIGN REFERENCE PROPRIETARY MATERIALS, EQUIVALENT MATERIALS FROM OTHER MANUFACTURERS SHALL ONLY BE CONSIDERED UPON APPROVAL BY THE CONTRACTOR OF RECORD. A SUCCESSFUL FIRE TEST BY AN INDEPENDENT TESTING LABORATORY OF THE MANUFACTURER'S ASSEMBLY INDICATING COMPLIANCE WITH THE LISTED FIRE RESISTANCE RATING AND APPROVED BY THE AUTHORITY HAVING JURISDICTION SHALL BE REQUIRED FOR ADDITIONAL REVISIONS FOR CYPRESS BOARD ASSEMBLIES INCLUDING BUT NOT LIMITED TO FIRE RATED CONSTRUCTION, BRACING AND SUPPORT, BLOCKOUTS, SOUND RATED CONSTRUCTION MATERIALS AND TOLERANCES.
 - REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL REVISIONS NOT LIMITED TO FIRE RATED CONSTRUCTION, BRACING AND SUPPORT, BLOCKOUTS, SOUND RATED CONSTRUCTION MATERIALS AND TOLERANCES.
 - UL NUMBER REFERS TO UNDERWRITERS LABORATORIES LISTED DESIGN.

SHEET KEYNOTES

| | |
|-----|---|
| 2 | EDGE OF ESCALATOR |
| 3 | EXISTING WALL EXTEND |
| 4 | PERIMETER HEAD CLEARANCE |
| 5 | EXISTING CEILING TO REMAIN |
| 6 | MATCH EXISTING SLOTTED PAINT AND FINISH |
| 7 | CONCRETE TO REMAIN |
| 8 | CONCRETE TO REMAIN |
| 9 | CONCRETE TO REMAIN |
| 10 | CONCRETE TO REMAIN |
| 11 | CONCRETE TO REMAIN |
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| 99 | CONCRETE TO REMAIN |
| 100 | CONCRETE TO REMAIN |

LEGENDS

ELEVATION LEGEND

| | |
|----------|--------------------------------|
| [Symbol] | EXISTING STONE WALL |
| [Symbol] | SHADED AREA OUT OF SCOPE |
| [Symbol] | CONCRETE |
| [Symbol] | GLASS |
| [Symbol] | PLASTIC LAMINATED PANEL SYSTEM |



**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENNA BLVD
DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750
DENVER, CO 80202

ISSUE RECORD

| NO. | DATE | PURPOSE | BY | CHKD |
|-----|----------|------------------|----|------|
| 1 | 02/01/24 | ISSUE FOR PERMIT | JR | JA |

SCALE: As Indicated
DATE: 12/09/2020
DRAWN BY: CLM
CHECKED BY: CH
FAA AIP NO:
DESIGN CONTRACT NO.: 2016-30091
CONST. CONTRACT NO.: 2020-64514
VOLUME NO.: 01
SHEET TITLE: SOUTH ESCALATORS ELEVATIONS AND SECTIONS
SHEET NO.: A-301-S



DESIGNER OF RECORD



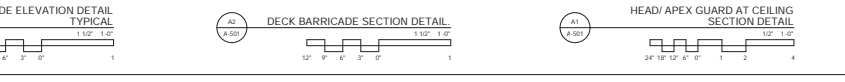
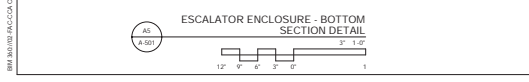
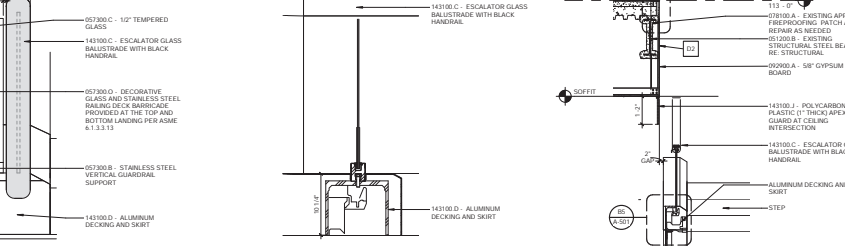
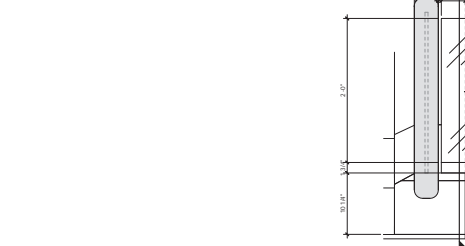
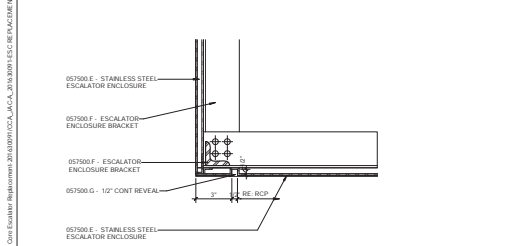
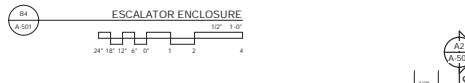
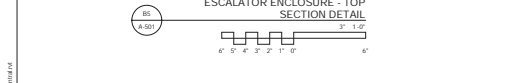
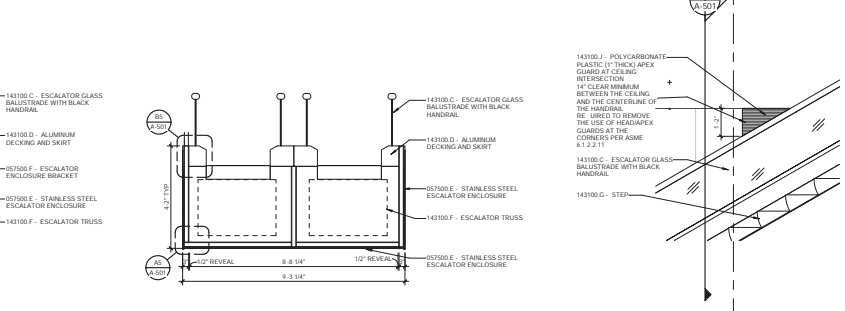
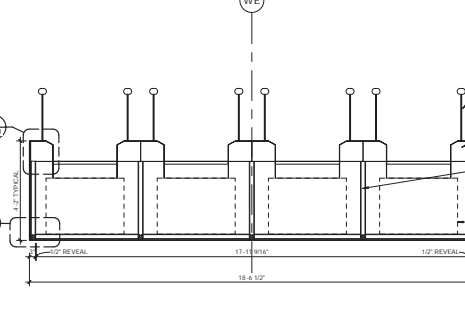
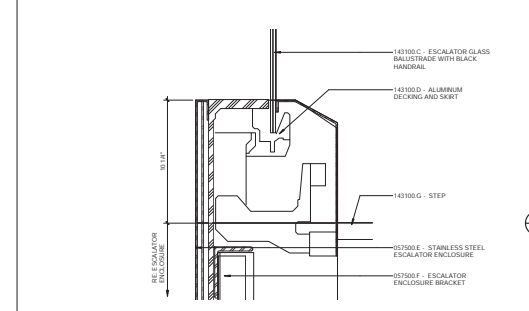
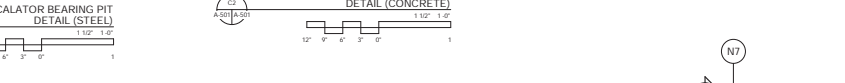
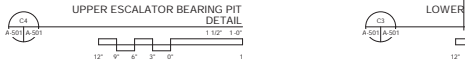
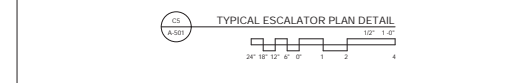
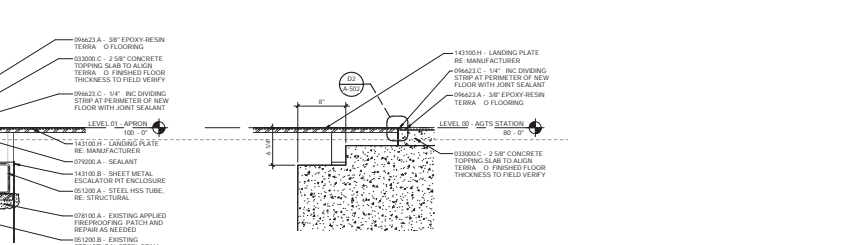
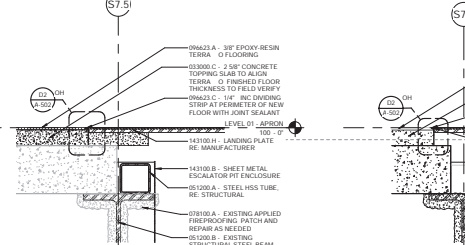
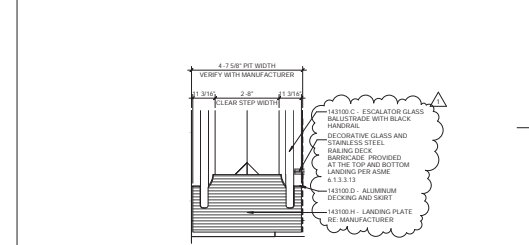
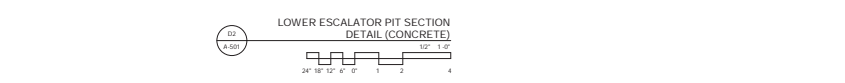
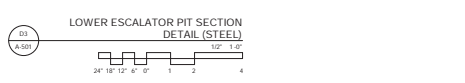
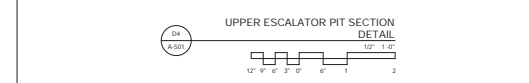
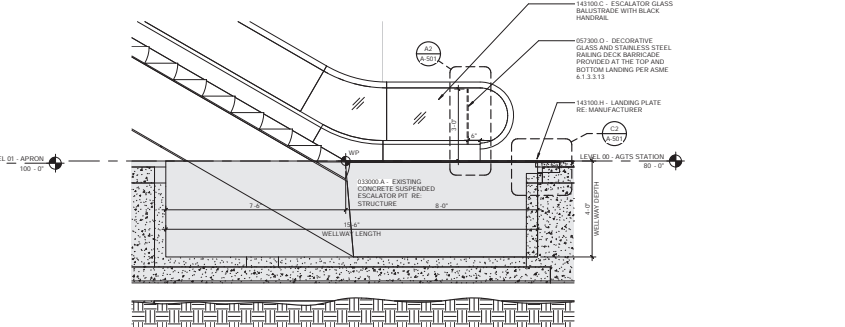
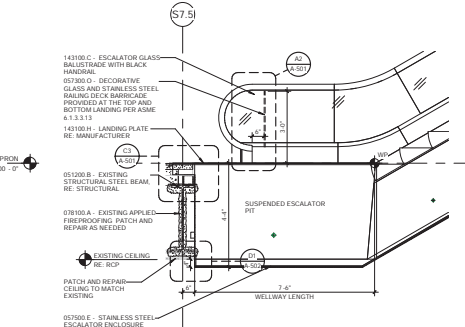
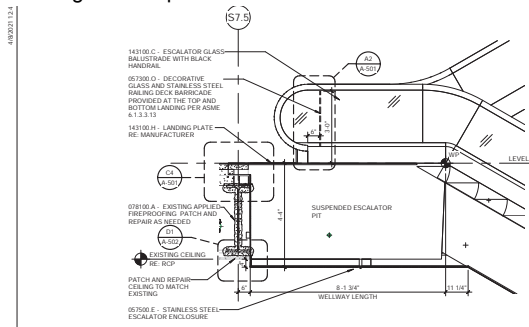
DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD DENVER, CO 80249

Jacobs

717 17TH STREET SUITE 2750 DENVER, CO 80202

Table with project details including Scale, Date, Drawn By, Checked By, Design Contract No., Const Contract No., Volume No., Sheet Title, and Sheet No.





DESIGNER OF RECORD

| ASSET IDENTIFICATION - SOUTH | | | | | |
|------------------------------|----------|------------|-----------------|----------------|--------------|
| LEVEL | E UIP ID | ASSET TYPE | FUNCTIONAL AREA | ASSET_LOCATION | ASSET_STATUS |
| LEVEL 00 - AGIS STATION | RES-03A | ESCALATOR | AGIS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 00 - AGIS STATION | RES-03B | ESCALATOR | AGIS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 00 - AGIS STATION | RES-03A | ESCALATOR | AGIS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 00 - AGIS STATION | RES-03B | ESCALATOR | AGIS PLATFORM | CCA-01-SC-011 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03A | ESCALATOR | CENTER CORE | CCA-02-CC-030 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03B | ESCALATOR | CENTER CORE | CCA-02-CC-030 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03A | ESCALATOR | CENTER CORE | CCA-02-CC-040 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03B | ESCALATOR | CENTER CORE | CCA-02-CC-040 | ACTIVE |

| ASSET IDENTIFICATION - NORTH | | | | | |
|------------------------------|----------|------------|-----------------|----------------|--------------|
| LEVEL | E UIP ID | ASSET TYPE | FUNCTIONAL AREA | ASSET_LOCATION | ASSET_STATUS |
| LEVEL 00 - AGIS STATION | RES-03A | ESCALATOR | AGIS PLATFORM | CCA-01-SC-006 | ACTIVE |
| LEVEL 00 - AGIS STATION | RES-03B | ESCALATOR | AGIS PLATFORM | CCA-01-SC-006 | ACTIVE |
| LEVEL 00 - AGIS STATION | RES-03A | ESCALATOR | AGIS PLATFORM | CCA-01-SC-006 | ACTIVE |
| LEVEL 00 - AGIS STATION | RES-03B | ESCALATOR | AGIS PLATFORM | CCA-01-SC-006 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03A | ESCALATOR | CENTER CORE | CCA-02-CC-030 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03B | ESCALATOR | CENTER CORE | CCA-02-CC-030 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03A | ESCALATOR | CENTER CORE | CCA-02-CC-030 | ACTIVE |
| LEVEL 01 - AIRCON | RES-03B | ESCALATOR | CENTER CORE | CCA-02-CC-030 | ACTIVE |

FOR REFERENCE ONLY

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

Jacobs

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DENVER, CO 80202

ISSUE RECORD
NO. BY PURPOSE DATE CSD
0 JA .FC 10/20/14
1 JA Contract 04/09/17 JA

SCALE:

DATE: 12/09/2020

DRAWN BY: LT

CHECKED BY: CP

FAA AIP NO.:

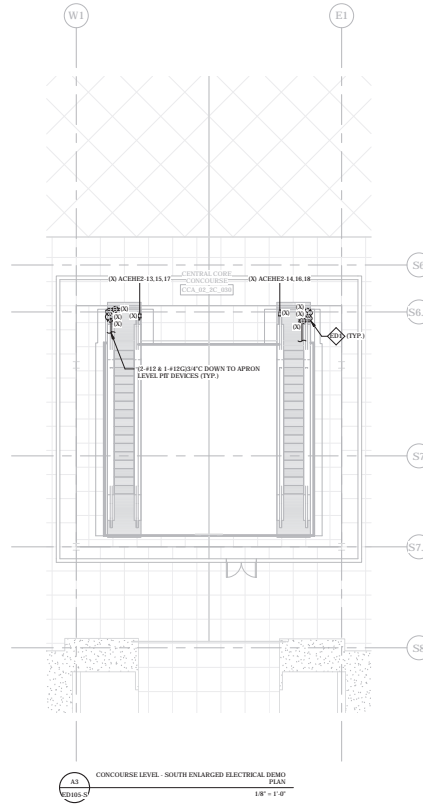
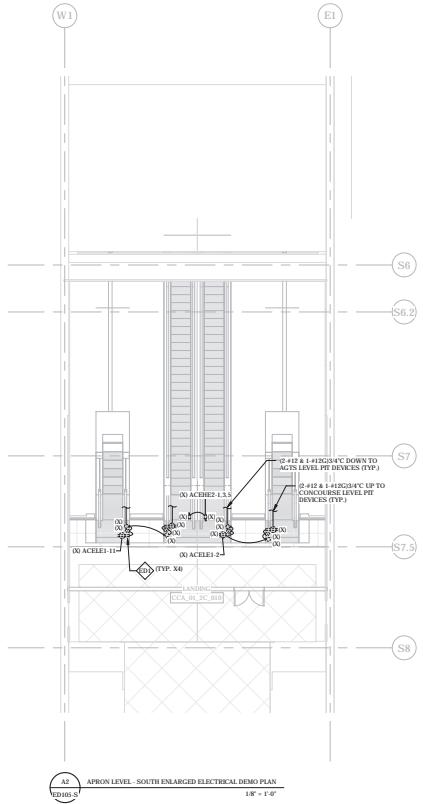
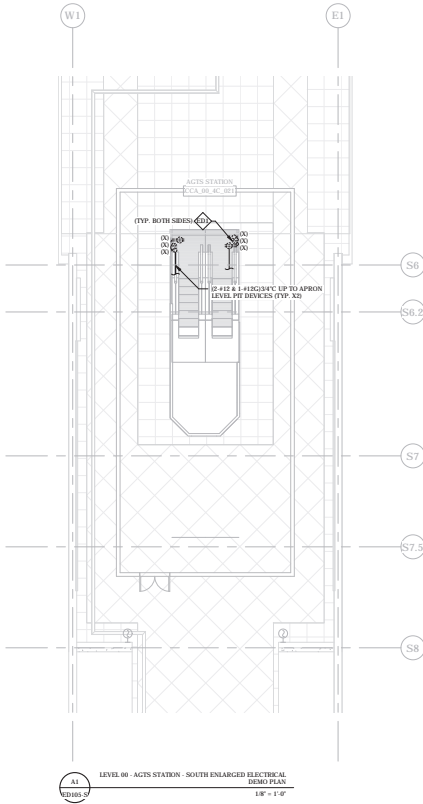
DESIGN CONTRACT NO. 2016-30091

CONST. CONTRACT NO. 202016414

VOLUME NO. 01

SHEET TITLE
ASSETS

SHEET NO.
A-699



DEMO GENERAL NOTES

1. (D) AND/OR DASHED LINES INDICATE DEMOLITION WORK. (U) AND/OR LIGHT LINES INDICATE EXISTING EQUIPMENT. (R) AND/OR LIGHT LINES INDICATE EQUIPMENT TO BE RELOCATED.
2. COORDINATE ALL ELECTRICAL DEMO/WORK IN THIS AREA WITH DEN AND CURRENT TENANTS PRIOR TO START OF WORK. THE CONTRACTOR SHALL FOLLOW PROPER SITE DEMO PROCEDURES. ALL POWER OUTAGES SHALL BE SCHEDULED WITH THE NUMBER OF DAYS IN ADVANCE.
3. IF CONTRACTOR STOPS AT A JUNCTION BOX OUTSIDE OF DEMO AREA, THE CONTRACTOR SHALL MARK LOCATION AND INSURE THAT THE JUNCTION BOX IS LABELED WITH CIRCUIT INFORMATION. KEEP ALL DEVICES OUTSIDE OF WORK AREA. ACTIVE THIS MAY BE REFERRED TO THE AREA OF WORK. THE CONTRACTOR SHALL MAINTAIN AS BUILT DRAWINGS WITH DEMOLISHED DEVICES AND KEEP PANEL SHEET/FILES UPDATED AT ALL TIMES. THESE AS BUILT SHALL BE AVAILABLE UPON REQUEST.
5. ANY CONDUITS REMOVED PASSING THROUGH A FIRE RATED WALL SHALL BE PROPERLY FIRESTOPPED TO MAINTAIN FIRE RATING.

CITY & COUNTY OF DENVER

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SHEET KEYNOTES

- BDI DISCONNECT AND RESTATE BEHIND CIRCUIT BREAKER AND ALL DEVICES BACK TO NEAREST JUNCTION BOX TO REMAIN TO ALLOW FOR ESCALATOR REMOVAL.

**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENNA BLVD
DENVER, CO 80249



| ISSUE RECORD | NO. | DATE | CHKD |
|--------------|-----|------------|------|
| 1 | PKC | 06/01/2020 | PKC |
| 2 | PKC | 06/01/2020 | PKC |

SCALE: 1/8" = 1'-0"

DATE: 06/01/2020

DRAWN BY: PKC

CHECKED BY: JAC

FAA AP NO:

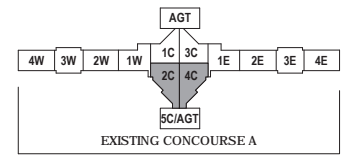
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CONST. CONTRACT NO. 202006034

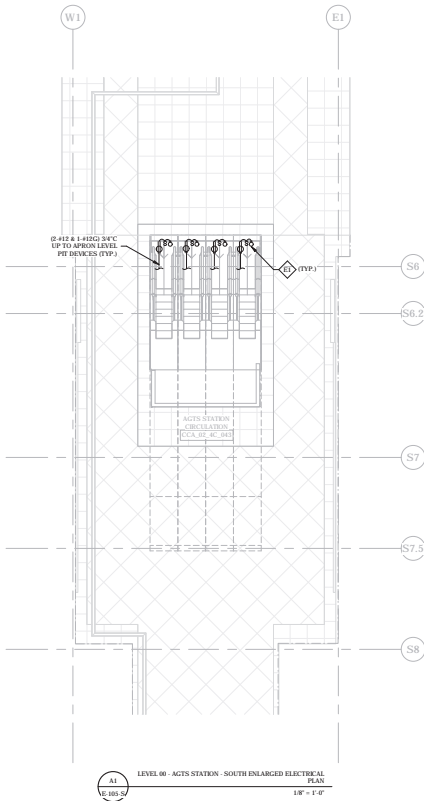
VOLUME NO. 01

SHEET TITLE
SOUTH ENLARGED ELECTRICAL DEMO PLANS

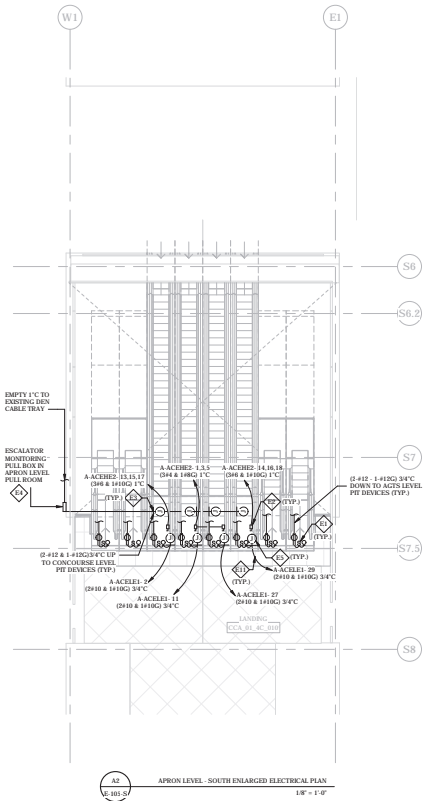
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ED105-S



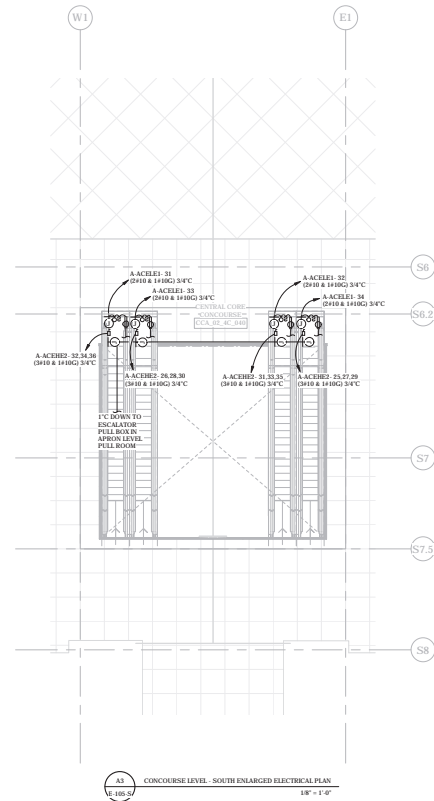
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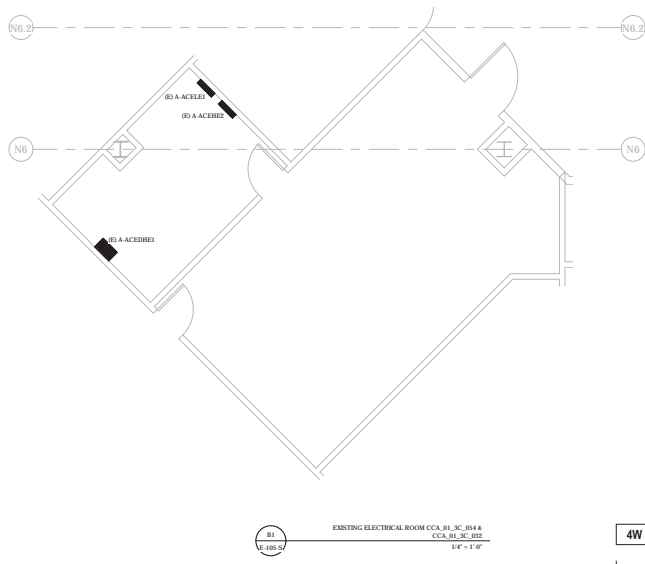
LEVEL 00 - AGTS STATION - SOUTH ENLARGED ELECTRICAL PLAN
1/8" = 1'-0"



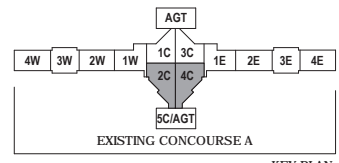
APRON LEVEL - SOUTH ENLARGED ELECTRICAL PLAN
1/8" = 1'-0"



CONCOURSE LEVEL - SOUTH ENLARGED ELECTRICAL PLAN
1/8" = 1'-0"



EXISTING ELECTRICAL ROOM CCA_01_3C_054 & CCA_01_3C_052
1/8" = 1'-0"



NEW GENERAL NOTES

1. (D) AND/OR LIGHTER LINES INDICATE EXISTING EQUIPMENT, (S) AND/OR (L) LINES INDICATE NEW EQUIPMENT UNLESS NOTED OTHERWISE.
2. VERIFY EXACT ELECTRICAL REQUIREMENTS, PULC CONFIGURATIONS, ETC. AND FINAL LOCATIONS OF OWNER PROVIDED EQUIPMENT WITH OWNERS REPRESENTATIVE PRIOR TO ORDERING OF MATERIALS AND HANGERS.
3. COORDINATE EXACT MOUNTING HEIGHTS AND LOCATIONS OF GENERAL RECEPTACLES, SPECIAL OUTLETS AND DISCONNECT SWITCHES WITH OWNER AND EQUIPMENT SUPPLIERS PRIOR TO HANGING.

SHEET KEYNOTES

- E1 PROVIDE (A) LOW VOLTAGE RECEPTACLE LIGHT SWITCH AND WARM UP LIGHTS (LED) PE LIGHT FIXTURE WITH WIRE CAGE. THESE DEVICES ARE LOCATED IN THE TOP AND BOTTOM ESCALATOR PITS AND ARE PRE-WIRED AND CONNECTED TOGETHER BY ESCALATOR SUPPLIER. THESE DEVICES ARE CONNECTED TO A SMALL BREAKER PANEL LOCATED IN THE TOP PIT OF EACH ESCALATOR.
- E2 ESCALATORS ARE 18 BBL. 480V. 3PH. PROVIDE BOX OF 400 AMP (ESCALATOR CONTROLLER) AND 100 AMP CONTROLLER IN ESCALATOR PIT. PROVIDE FUSES PER MANUFACTURER'S RECOMMENDATIONS. DISCONNECT SWITCHES TO BE WALL MOUNTED ADJACENT TO THE ESCALATOR CONTROLLER AND TO BE EASILY ACCESSIBLE WITH CLEARANCE IN FRONT.
- E3 PROVIDE (S) EMPTY 1/2\"/>

CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENA BLVD
DENVER, CO 80249



ISSUE RECORD
NO. BY PURPOSE DATE CSD
1 PKC 01 10/01/2020 PKC
2 PKC 02 10/01/2020 PKC
3 PKC 03 04/01/2018 PKC

SCALE: As noted
DATE: 06/01/2020
DRAWN BY: PKC
CHECKED BY: JAC
FAA AP NO:
DESIGN CONTRACT NO:
CONST. CONTRACT NO: 202006314
VOLUME NO: 01
SHEET TITLE: SOUTH ENLARGED ELECTRICAL PLANS
SHEET NO: E-105-S

NEW GENERAL NOTES

1 ALL PANELS ARE EXISTING TO REMAIN. BOLD LINEWORK INDICATES SCOPE OF WORK.

CITY & COUNTY of DENVER

DENVER INTERNATIONAL AIRPORT



**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENA BLVD
DENVER, CO 80249



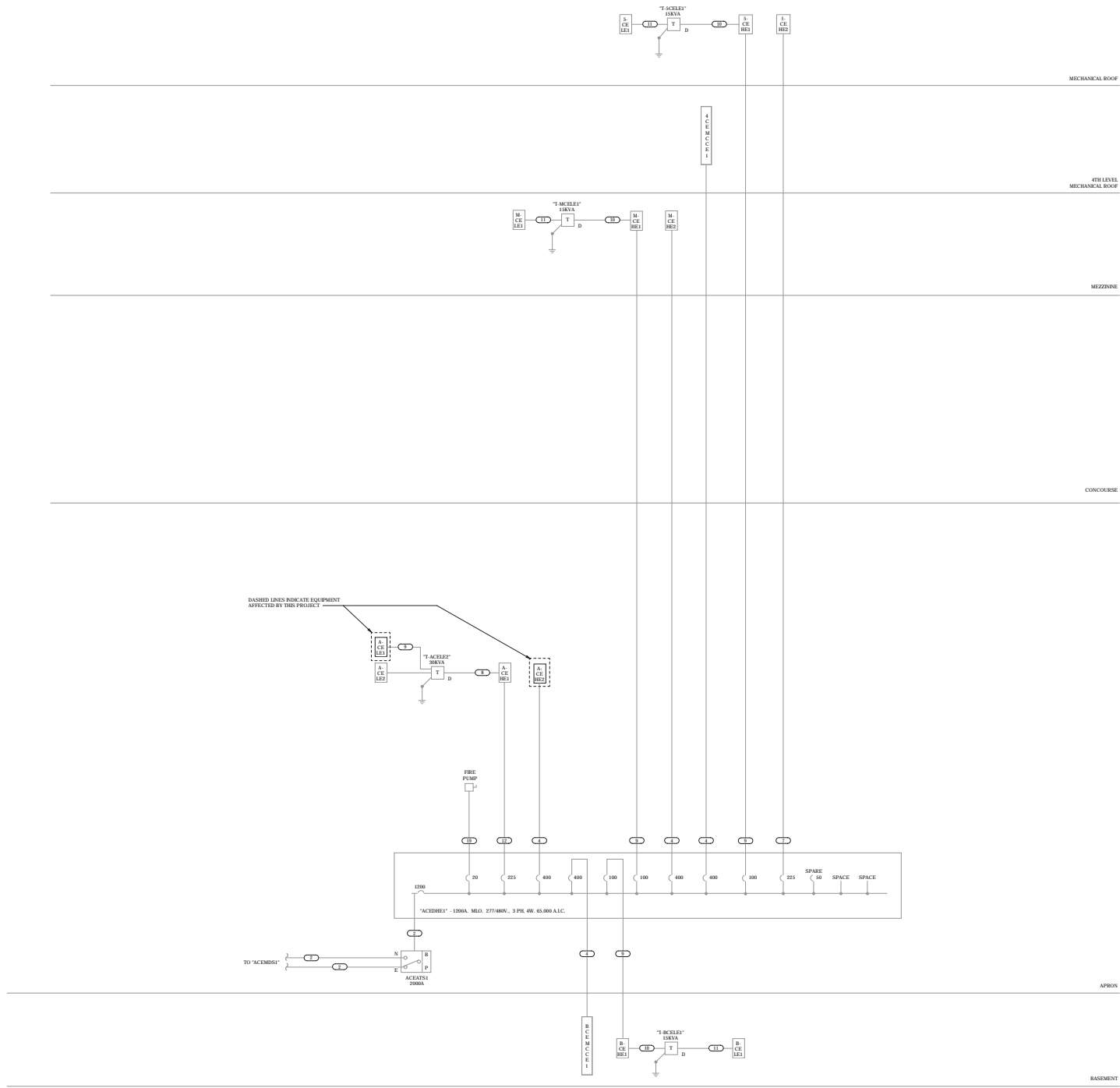
ISSUE RECORD

| NO. | BY | PURPOSE | DATE | CD |
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| 2 | PK | Continued | 04/03/20 | PK2 |

SCALE: As indicated
DATE: 06/01/2020
DRAWN BY: PKE
CHECKED BY: MC
FAA AP NO:
DESIGN CONTRACT NO:
CONST. CONTRACT NO: 202006014
VOLUME NO: 01
SHEET TITLE: SOUTH ONLINE DIAGRAM
SHEET NO: E-501-S

FEEDER SCHEDULE

1. 10 [4] 400MCM 3-1/2" C.I.
2. 3 [4] 400MCM 4-1/2" CND 3" C.I.
3. 2 [4] 400MCM 4-1/2" CND 3" C.I.
4. 400MCM 4-1/2" CND 3" C.I.
5. 400MCM 4-1/2" CND 3" C.I.
6. 400MCM 4-1/2" CND 3" C.I.
7. 400MCM 4-1/2" CND 3" C.I.
8. 400MCM 4-1/2" CND 3" C.I.
9. 400MCM 4-1/2" CND 3" C.I.
10. 400MCM 4-1/2" CND 3" C.I.
11. 400MCM 4-1/2" CND 3" C.I.
12. 400MCM 4-1/2" CND 3" C.I.
13. 400MCM 4-1/2" CND 3" C.I.
14. 2 [4] 400MCM 4-1/2" CND 3" C.I.
15. 400MCM 4-1/2" CND 3" C.I.
16. 400MCM 4-1/2" CND 3" C.I.
17. 2 [4] 400MCM 4-1/2" CND 3" C.I.
18. 400MCM 4-1/2" CND 3" C.I.



EXISTING ON-LINE SOUTH
T-1-P

| ASSET IDENTIFICATION - CCA ESC REPLACEMENT - SOUTH | | | | |
|--|------------|-----------------|----------------|--------------|
| EQUIP ID | ASSET TYPE | FUNCTIONAL AREA | LOCATION | |
| | | | ASSET_LOCATION | ASSET_STATUS |
| LEVEL 01 | | | | |
| AES-01A | DISCONNECT | ELECTR | CCA 01 4C 010 | DISCONNECTED |
| AES-01B | DISCONNECT | ELECTR | CCA 01 4C 010 | DISCONNECTED |
| AES-01C | DISCONNECT | ELECTR | CCA 01 4C 010 | DISCONNECTED |
| AES-01D | DISCONNECT | ELECTR | CCA 01 4C 010 | DISCONNECTED |
| LEVEL 02 | | | | |
| AES-02A | DISCONNECT | ELECTR | CCA 02 4C 040 | DISCONNECTED |
| AES-02B | DISCONNECT | ELECTR | CCA 02 4C 040 | DISCONNECTED |
| AES-02C | DISCONNECT | ELECTR | CCA 02 4C 040 | DISCONNECTED |
| AES-02D | DISCONNECT | ELECTR | CCA 02 4C 040 | DISCONNECTED |



**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENNA BLVD
DENVER, CO 80249



| ISSUE RECORD | | | |
|--------------|-----|---------------|------------|
| NO. | BY | PURPOSE | DATE |
| 1 | PKC | DC | 10/01/2020 |
| 2 | PKC | Continued/Iss | 04/01/21 |

SCALE: _____
 DATE: 06/01/2020
 DRAWN BY: PKC
 CHECKED BY: MC
 FAA AP NO: _____
 DESGN CONTRACT NO: _____
 CONST. CONTRACT NO: 202006014
 VOLUME NO: 01
 SHEET TITLE: SOUTH ASSETS

SHEET NO: E-701-S



DESIGNER OF RECORD



DENVER INTERNATIONAL AIRPORT CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD DENVER, CO 80249

KILLERBREW | KILLERBREW, INC. ENGINEER & ARCHITECTS 5611 FAIRMOUNT DRIVE WINDSOR, CO 80550

ISSUE RECORD table with columns: NO., PURPOSE, DATE, ODO, R, NO., R/C, DATE, ODO, R, NO., R/C, DATE, ODO

SCALE, DATE, DRAWN BY, CHECKED BY, DESIGN CONTRACT NO., VOLUME NO., SHEET TITLE, SHEET NO.

ABBREVIATIONS LEGEND table listing various abbreviations and their meanings.

FIRE SUPPRESSION SHEET LIST SOUTH table listing sheet numbers and drawing names.

FIRE SUPPRESSION LINE TYPE LEGEND table defining line styles for demolished, existing, and new construction.

SPRINKLER SCHEDULE SOUTH table listing symbols, types, manufacturers, and other specifications.

PROJECT SCOPE OF WORK - CCA. THE SCOPE OF THIS PROJECT IS TO REPLACE THE EXISTING (4) ESCALATORS AND ADD (4) NEW ESCALATORS AT THE END OF THE SOUTH SIDE OF CONCOURSE A...

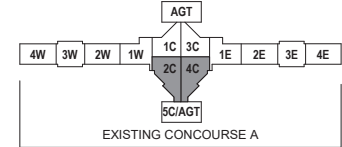
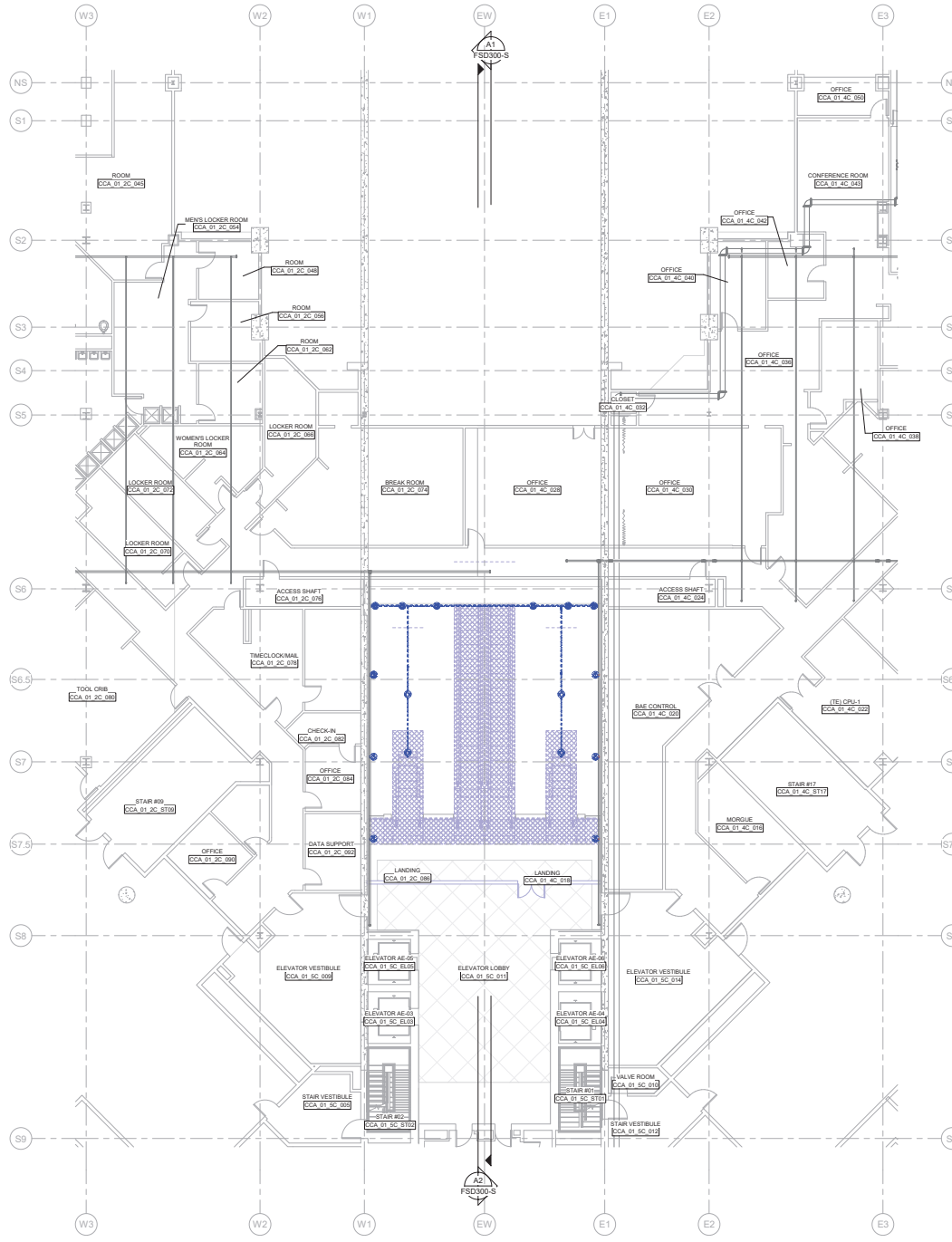
NOTICE OF COOPERATION. RELEASE OF THESE PLANS CONTEMPLATES FURTHER COOPERATION AMONG THE OWNER, HIS OR HER ARCHITECT, HIS OR HER CONTRACTOR AND THE ENGINEER...

- 1. KOB IS THE FIRE PROTECTION ENGINEER OF RECORD FOR THIS PROJECT.
2. THESE DOCUMENTS OUTLINE THE SCOPE OF THE PROJECT'S FIRE PROTECTION SYSTEMS.
3. CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR NECESSARY FOR THE INSTALLATION OF A NEW AUTOMATIC FIRE PROTECTION SYSTEM...

- 1. HIDEW/NEW LINE TYPE DENOTES EXISTING PIPING TO BE REMOVED. SOLID, HEAVY LINE TYPE DENOTES NEW PIPING TO BE PROVIDED.
2. ALL PIPE LENGTH DIMENSIONS INDICATED ARE APPROXIMATE AND ARE FROM CENTER LINE OF FITTING TO CENTER LINE OF FITTING.
3. PROVIDE SCHEDULE 40 STEEL PIPING FOR PIPE SIZES 2" AND SMALLER...

APPLICABLE CODES AND STANDARDS. COMPLY WITH THE REQUIREMENTS OF THE REFERENCED CODES AND STANDARDS, EXCEPT WHERE OTHERWISE INDICATED BY THE CONTRACT DOCUMENTS.

INSTALLING CONTRACTOR. TID



CITY & COUNTY OF DENVER
 DENVER INTERNATIONAL AIRPORT

 DESIGNER OF RECORD


DENVER INTERNATIONAL AIRPORT
 CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
 DENVER, CO 80249


 KILLEBREW | KILLEBREW, INC.
 ENGINEER/ARCHITECTS
 5011 FARMINGTON DRIVE
 WINDSOR, CO 80550

| ISSUE RECORD | NO. | BY | PURPOSE | DATE | ODD |
|--------------|-----|-------------|------------|------|-----|
| 0 | NO | FC | 12/29/2012 | NO | |
| 1 | NO | Checked/Rev | 12/29/2012 | NO | |

| | |
|---------------------|--|
| SCALE: | 1/8" = 1'-0" |
| DATE: | 12/29/2012 |
| DRAWN BY: | A.J.H. |
| CHECKED BY: | MCK |
| FAA AIR NO. | |
| DESIGN CONTRACT NO. | |
| CONST. CONTRACT NO. | 202056518 |
| VOLUME NO. | 01 |
| SHEET TITLE | LEVEL 01 - APRON - SOUTH DEMOLITION PLAN |
| SHEET NO. | FSD101-S |



DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

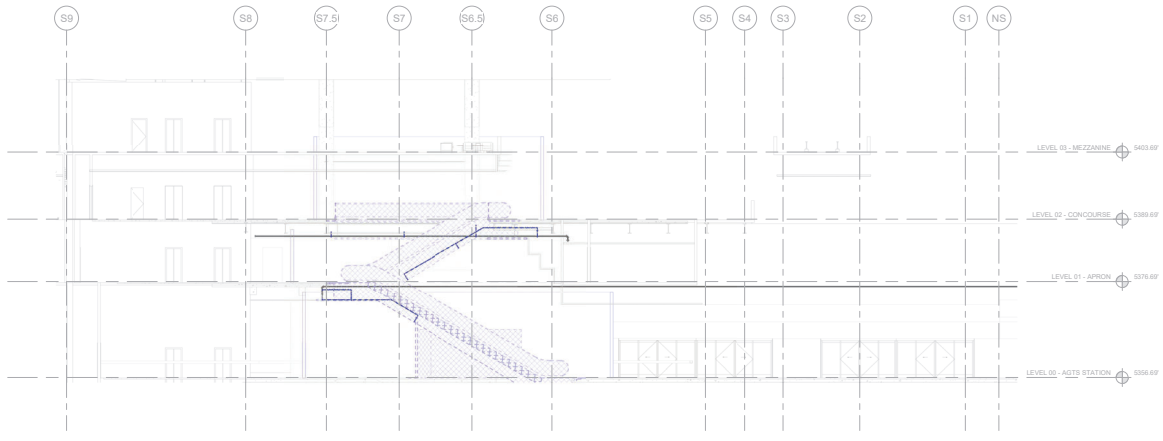


KILLEBREW | KILLEBREW, INC.
ENGINEERS/ARCHITECTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

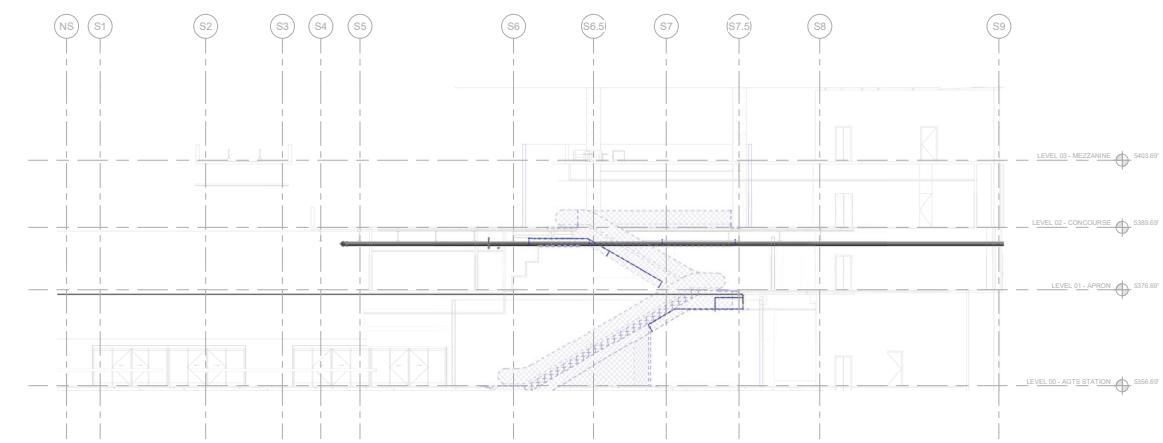
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| 1 | 00 | Contract Set | ISSUES AND | | |

SCALE: 1" = 10'-0"
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIR NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 51

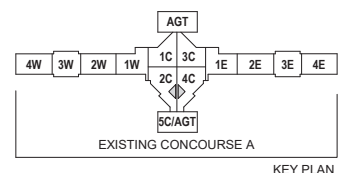
SHEET TITLE
SOUTH ESCALATOR
DEMOLITION
SECTIONS - WEST AND
EAST VIEWS
SHEET NO.
FSD300-S



A1
SECTION 2C - WEST ESCALATOR
DEMOLITION SECTION
1" = 10'-0"



A2
SECTION 4C - EAST ESCALATOR
DEMOLITION SECTION
1" = 10'-0"



GENERAL NOTES

1. PIPE LENGTHS INDICATED REFLECT THE OUT LENGTH OF PIPING. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
2. PIPE ELEVATIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE. ELEVATIONS HAVE BEEN COORDINATED WITH THE 2D MODEL. ALL ELEVATIONS SHALL BE FIELD VERIFIED AGAINST FIELD CONDITIONS.
3. THE MAXIMUM UNSUPPORTED PIPE LENGTH BETWEEN THE END FIRE SPRINKLER AND THE LAST HANGER ON THE LINE SHALL NOT EXCEED 12 INCHES.
4. THE MAXIMUM UNSUPPORTED ARM-OVER LENGTH SHALL BE 12 INCHES MAXIMUM.
5. SPRINGS 4 FEET OR LONGER SHALL BE PROVIDED WITH LATERAL RESTRAINT FOR OPERATING PRESSURES EXCEEDING 100 PSI. LATERAL RESTRAINT MAY BE ACCOMPLISHED WITH SWAY BRACING AS DETAILED OR OTHER MEANS AND METHODS. THIS REQUIREMENT IS DUE TO SYSTEM OPERATING PRESSURE AND IS NOT DUE TO SEISMIC REQUIREMENTS THEREFORE IS NOT REQUIRED.
6. THE LAST HANGER ON EACH BRANCHLINE OR MAIN SHALL BE PROVIDED WITH SURGE RESTRAINT. SEE DETAIL FOR FURTHER REQUIREMENTS.
7. SIDEWALL FIRE SPRINKLERS SHALL BE PROVIDED WITH LINSTRUT AND FIRE CLAMP AT WALL PENETRATION OR WITH WALL FRAMING TO PREVENT FIRE SPRINKLER MOVEMENT DURING OPERATION AT PRESSURES EXCEEDING 100 PSI. SEE DETAIL FOR FURTHER REQUIREMENTS.
8. LENGTH AND SIZE OF ALL 1" DIAMETER SPRINGS AND DROPS ARE NOT INDICATED FOR CLARITY. CONTRACTOR TO FIELD VERIFY THE REQUIRED LENGTH PRIOR TO FABRICATION.
9. THE MAJORITY OF THE BASEMENT, APRON AND MECHANICAL LEVELS DO NOT HAVE CEILING. THESE AREAS ARE CONSIDERED OBSTRUCTED CONSTRUCTION PER NFPA 13 WITH DEEP-BEAM CONSTRUCTION.

CITY & COUNTY OF DENVER

DENVER INTERNATIONAL AIRPORT



DESIGNER OF RECORD



**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

8700 PENA BLVD
DENVER, CO 80249



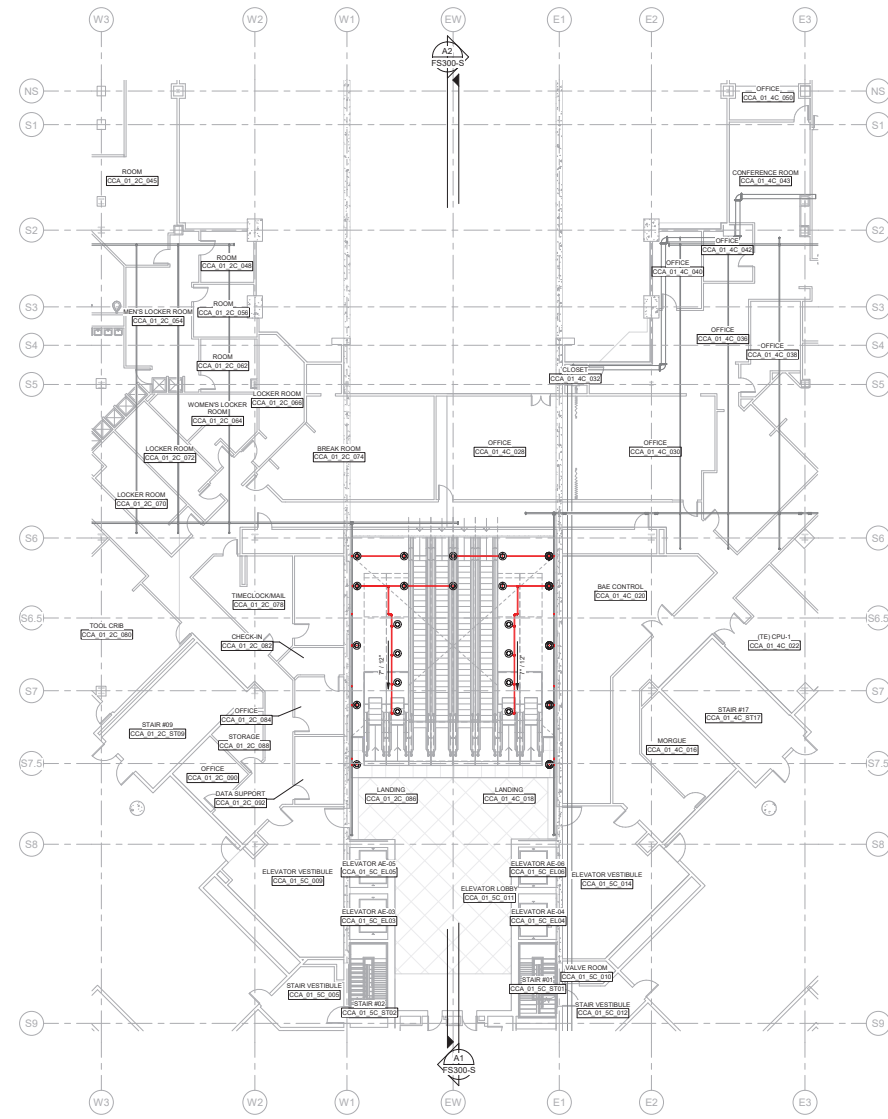
KILLEBREW | KILLEBREW, INC.
ENGINEERS & CONSULTANTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

ISSUE RECORD
NO. BY PURPOSE DATE O/D
0 00 0 12/20/20 000
1 00 000 0000 000

SCALE: As indicated
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA-AP NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01

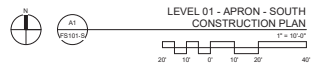
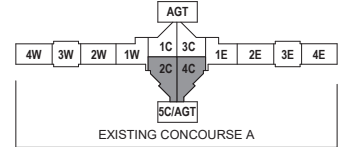
SHEET TITLE
LEVEL 01 - APRON - SOUTH
CONSTRUCTION PLAN

SHEET NO.
FS101-S



SPRINKLER SCHEDULE CCA - APRON LEVEL - SOUTH

| SYMBOL | MANUFACTURER | TYPE | -SIN- | TEMPERATURE RATING | K-FACTOR | RESPONSE | FINISH | COUNT | NOTES |
|----------------------|--------------|---------|-------|--------------------|----------|----------|--------|-------|---------------------------|
| ⊙ | WING | PENDENT | W462 | 155°F | 5.6 | Quick | WHITE | 24 | CONC. W/135 F COVER PLATE |
| TOTAL SPRINKLERS: 24 | | | | | | | | | |



GENERAL NOTES

1. PIPE LENGTHS INDICATED REFLECT THE CUT LENGTH OF PIPING. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
2. PIPE ELEVATIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE. ELEVATIONS HAVE BEEN COORDINATED WITH THE 2D MODEL. ALL ELEVATIONS SHALL BE FIELD VERIFIED AGAINST FIELD CONDITIONS.
3. THE MAXIMUM UNSUPPORTED PIPE LENGTH BETWEEN THE END FIRE SPRINKLER AND THE LAST HANGER ON THE LINE SHALL NOT EXCEED 12 INCHES.
4. THE MAXIMUM UNSUPPORTED ARMOROVER LENGTH SHALL BE 12 INCHES MAXIMUM.
5. SPRINGS 4 FEET OR LONGER SHALL BE PROVIDED WITH LATERAL RESTRAINT FOR OPERATING PRESSURES EXCEEDING 100 PSI. LATERAL RESTRAINT MAY BE ACCOMPLISHED WITH SWAY BRACING AS DETAILED OR OTHER MEANS AND METHODS. THIS REQUIREMENT IS DUE TO SYSTEM OPERATING PRESSURE AND IS NOT DUE TO SEISMIC REQUIREMENTS THEREFORE IS NOT REQUIRED.
6. THE LAST HANGER ON EACH BRANCHLINE OR MAIN SHALL BE PROVIDED WITH SURGE RESTRAINT. SEE DETAIL FOR FURTHER REQUIREMENTS.
7. SIDEWALL FIRE SPRINKLERS SHALL BE PROVIDED WITH LINSTRUT AND PRE CLAMP AT WALL PENETRATION OR WITH WALL FRAMING TO PREVENT FIRE SPRINKLER MOVEMENT DURING OPERATION AT PRESSURES EXCEEDING 100 PSI. SEE DETAIL FOR FURTHER REQUIREMENTS.
8. LENGTH AND SIZE OF ALL 1" DIAMETER SPRINGS AND DROPS ARE NOT INDICATED FOR CLARITY. CONTRACTOR TO FIELD VERIFY THE REQUIRED LENGTH PRIOR TO FABRICATION.
9. THE MAJORITY OF THE BASEMENT, APRON AND MECHANICAL LEVELS DO NOT HAVE CEILING. THESE AREAS ARE CONSIDERED OBSTRUCTED CONSTRUCTION PER NFPA 13 WITH DEEP I-BEAM CONSTRUCTION.

CITY & COUNTY of DENVER

DENVER INTERNATIONAL AIRPORT



DESIGNER OF RECORD



**DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT**

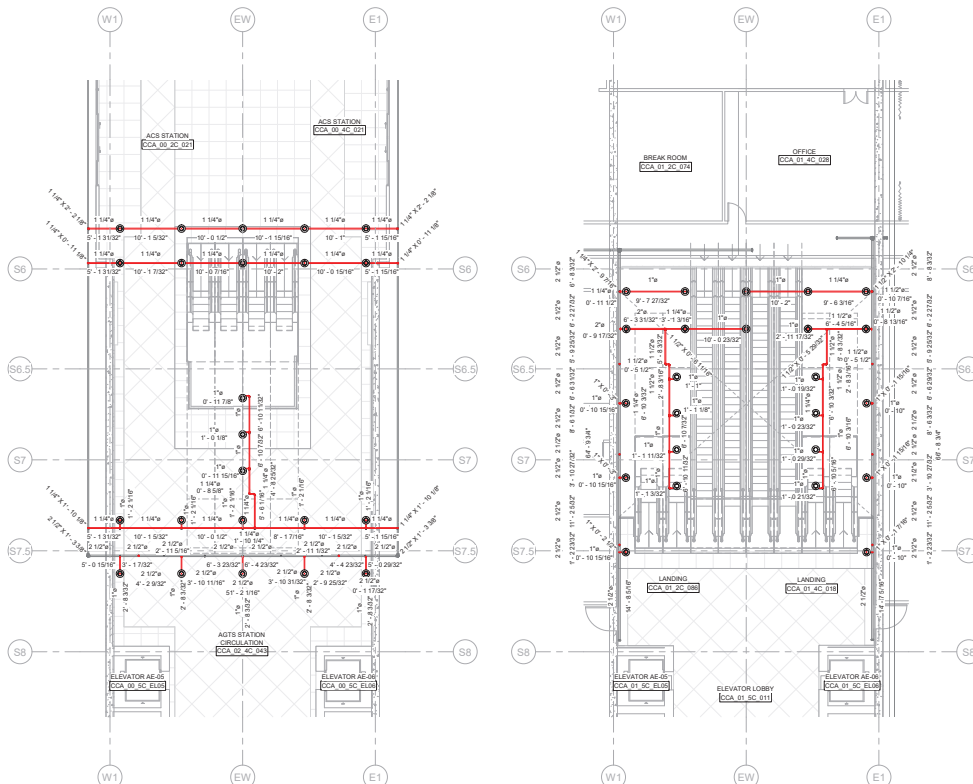
8700 PENNA BLVD
DENVER, CO 80249

KILLEBREW | KILLEBREW, INC.
PROFESSIONAL ENGINEERS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550
ISSUE RECORD:
NO. BY: PURPOSE: DATE: OAD
0 00 00 00 00 00 00 00
1 00 00 00 00 00 00 00

SCALE: As indicated
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIR NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01

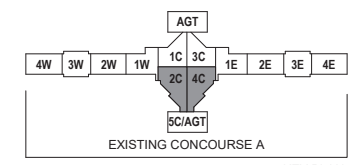
SHEET TITLE:
ENLARGED SOUTH
CONSTRUCTION
PLANS

SHEET NO.:
FS400-S

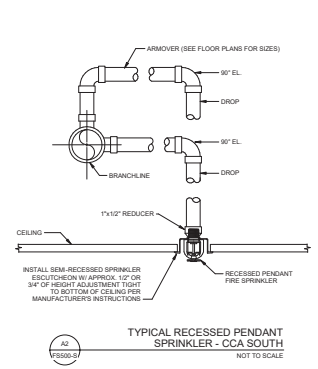
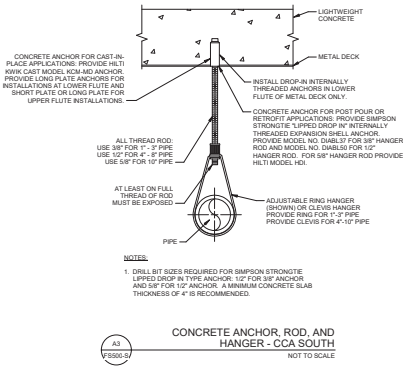
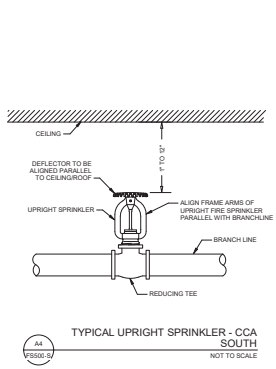


LEVEL 00 - AGS STATION - ENLARGED SOUTH CONSTRUCTION PLAN
A1
1/8" = 1'-0"

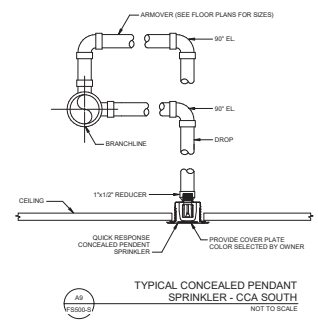
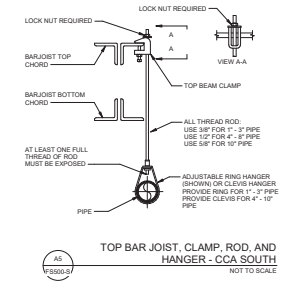
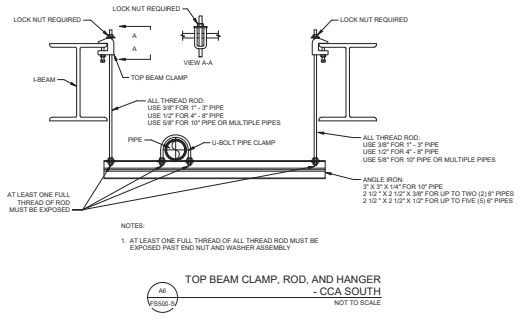
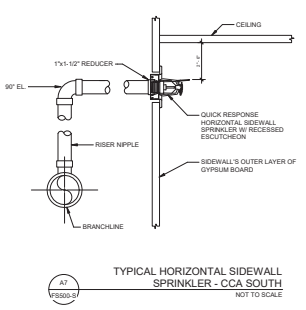
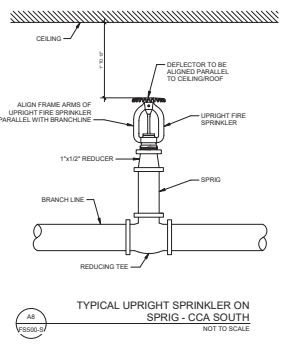
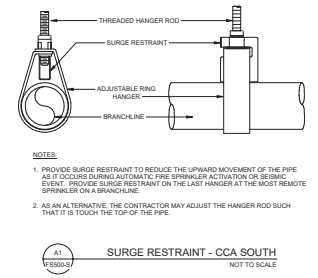
LEVEL 01 - APRON - ENLARGED SOUTH CONSTRUCTION PLAN
A2
1/8" = 1'-0"



KEY PLAN



| MAXIMUM DISTANCE BETWEEN HANGERS | | | | | | | | | | | |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| NOMINAL PIPE SIZE | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" | 3-1/2" | 4" | 5" | 6" | 8" |
| STEEL PIPE SCHEDULE 40 | 12'-0" | 12'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" |
| THREADED LIGHT WALL STEEL PIPE | 12'-0" | 12'-0" | 12'-0" | 12'-0" | 12'-0" | 12'-0" | NA | NA | NA | NA | NA |
| STEEL PIPE SCHEDULE 10 | NA | 12'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" | 15'-0" |



CITY & COUNTY OF DENVER
DENVER INTERNATIONAL AIRPORT

DESIGNER OF RECORD

DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

KILBREW | KILBREW, INC.
ENGINEERS ARCHITECTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550

ISSUE RECORD

| NO. | BY | PURPOSE | DATE | QTD |
|-----|----|--------------|----------|-----|
| 0 | AK | FC | 12/09/20 | AK |
| 1 | AK | Contract Set | 04/09/21 | AK |

SCALE: NOT TO SCALE
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIP NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 61
SHEET TITLE: FIRE SUPPRESSION DETAILS
SHEET NO.: FS500-S



DESIGNER OF RECORD

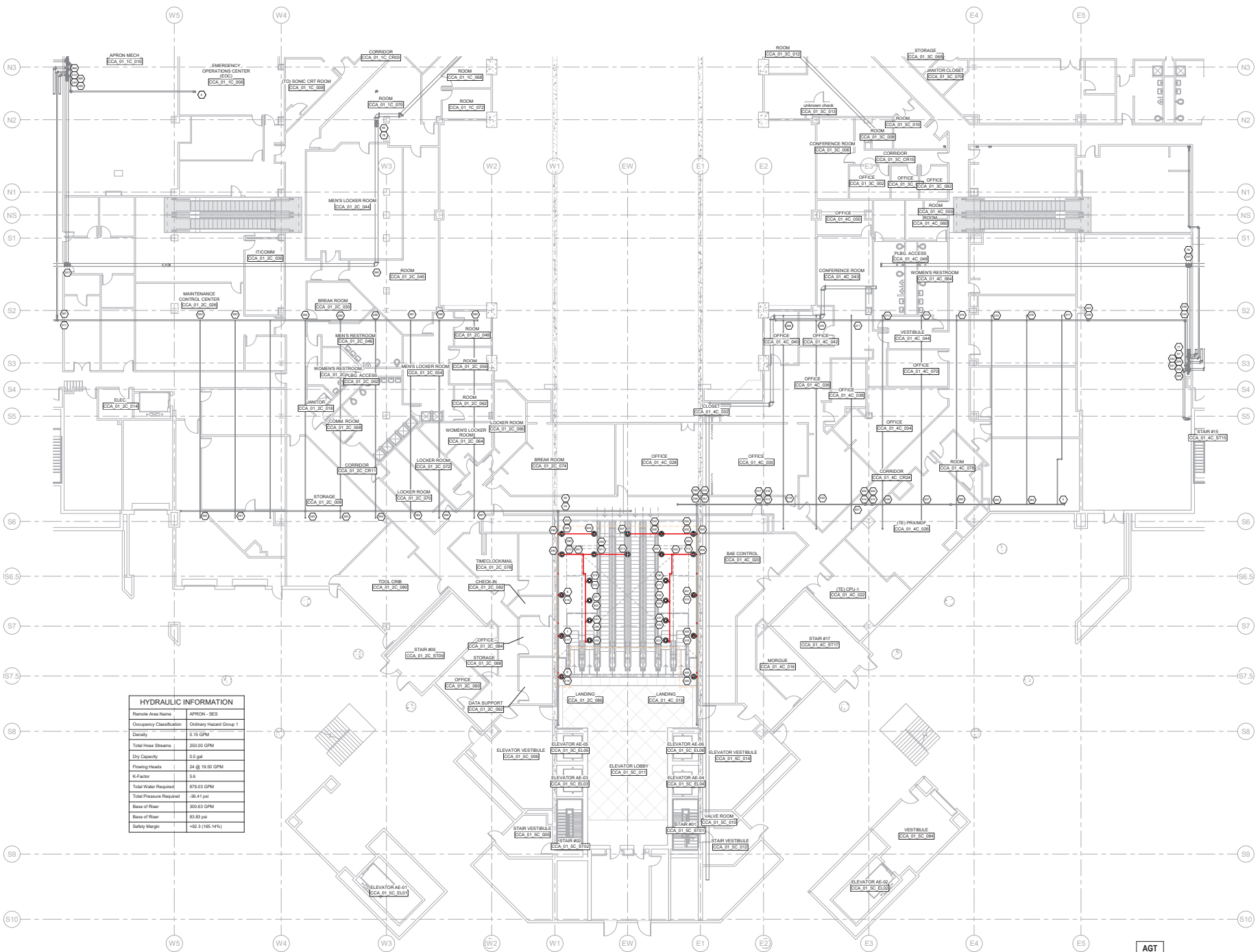


DENVER INTERNATIONAL AIRPORT
CONCOURSE A ESCALATOR REPLACEMENT

8700 PENNA BLVD
DENVER, CO 80249

KILLEBREW | KILLEBREW, INC.
POWERLINE CODE CONSULTANTS
5011 FAIRMOUNT DRIVE
WINDSOR, CO 80550
ISSUE RECORD
NO. BY PURPOSE DATE QAD
0 00 00 12/05/20 000
1 00 00 12/05/20 000

SCALE: 1" = 10'-0"
DATE: 12/09/20
DRAWN BY: AJH
CHECKED BY: MCK
FAA AIR NO.:
DESIGN CONTRACT NO.:
CONST. CONTRACT NO.: 202056518
VOLUME NO.: 01
SHEET TITLE: LEVEL 01 - APRON - SOUTH FIRE SUPPRESSION CALCS
SHEET NO.: FS645-S



HYDRAULIC INFORMATION

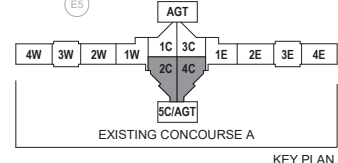
| | |
|--------------------------|-------------------------|
| Remode Area Name | APRON - SES |
| Occupancy Classification | Ordinary Hazard Group 1 |
| Density | 0.15 GPM |
| Total Hose Streams | 250.00 GPM |
| Dry Capacity | 0.0 gal |
| Flowing Heads | 24 @ 19.50 GPM |
| K-Factor | 5.6 |
| Total Water Required | 879.03 GPM |
| Total Pressure Required | 38.41 psi |
| Flow of Floor | 300.00 GPM |
| Flow of Floor | 80.00 psi |
| Safety Margin | +92.3 (105.14%) |

FIRE PUMP PERFORMANCE CURVE

| PRESSURE | FLOW RATE |
|-------------|-----------|
| 139.902 PSI | CHURN |
| 99.936 PSI | 2.000 GPM |
| 64.950 PSI | 3.750 GPM |

DENVER WATER SUPPLY INFORMATION

| FLOW TEST RESULTS | | HYDRAULIC CALCULATION WATER SUPPLY WITH 10% STATIC PRESSURE REDUCTION | |
|-------------------|-----------|---|-----------|
| STATIC PRESSURE | 65 PSI | STATIC PRESSURE | 56.50 PSI |
| RESIDUAL PRESSURE | 58 PSI | RESIDUAL PRESSURE | 51.00 PSI |
| FLOW RATE | 1.500 GPM | FLOW RATE | 1.500 GPM |



12/09/20 12:12 PM C:\Users\jphillips\OneDrive\Documents\301001001\CCA_A_1_F3_202056518_ISSUE_RECORD.dwg

EXHIBIT K

**INVITATION TO BID &
CONTRACTOR'S RESPONSE AND FORMS**



INVITATION FOR BID

CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT CONTRACT NO. 202056518

DECEMBER 2020

INVITATION FOR BID (IFB)

Airport Office Building (AOB)
Denver International Airport (DEN)
8500 Pena Boulevard, Room 8810
Denver, Colorado 80249-6340

Contract Administrator (CA): LaQuisha Shaw
E-Mail: contract.procurement@flydenver.com

Invitation for Bid #: 202056518

BIDS MUST BE RECEIVED BY: February 24, 2021 at 2:00 PM LOCAL DENVER TIME

Schedule of Activities

This projected schedule is an estimated timeline and is subject to change at the sole discretion of the City. All times listed in this document are understood to be Denver local time (Mountain Time Zone).

| Event | Date |
|---------------------------------------|--|
| IFB Advertisement | December 14, 2020 |
| Mandatory Pre-Bid Conference | January 12, 2021 at 2:00 PM |
| Optional – Site Visit | January 20, 2021 – Various Times Available |
| Last Date to Submit Written Questions | February 3, 2021 at 2:00 PM LOCAL DENVER TIME |
| Bid Due Date | February 24, 2021 at 2:00 PM LOCAL DENVER TIME |

Pre-Bid Conference –MANDATORY

A **MANDATORY** Pre-Proposal Conference will be held virtually via Microsoft Teams at 2:00 PM LOCAL TIME on January 12, 2021. All participants are required to sign up for the Pre-Proposal Conference via

<https://www.eventbrite.com/e/mandatory-pre-proposal-concourse-a-center-core-escalator-replacement-registration-132877358757>

Registration must be completed no later than 2:00 PM LOCAL TIME on January 8, 2021.

At this conference, DEN representatives will explain the opportunity and answer questions regarding this IFB, including any written questions submitted to DEN prior to the conference. A representative of your firm must attend this Pre-Proposal Conference. Failure to attend the mandatory Pre-Bid Conference will disallow proposer from submitting a proposal in response to this IFB.

Microsoft Teams link will be provided to all registered participants via email prior to the event.

Site Visit -

The **Mandatory** site visit is scheduled for January 20, 2021. **Pre-registration for a day and time slot is required.** All site visits will visit the same locations in the same order and participants will be provided the same information. Participants will meet on their scheduled day and time in front of the Airport

Office Building, located on the 6th floor of the Jeppesen Terminal at Denver International Airport, 8500 Pena Boulevard, Denver, CO 80249. Please arrive at least 15 minutes prior to the start of your scheduled site visit.

All participants are required to sign up for the Site Visit via

<https://www.eventbrite.com/e/optional-site-visit-concourse-a-center-core-escalator-replacement-tickets-132875818149>

IFB Questions

DEN will not answer any telephone inquiries about this IFB. Written questions are due by 2:00 PM LOCAL DENVER TIME on February 3, 2021 and shall be submitted electronically via the Rocky Mountain E-Purchasing System (BidNet) website. All questions and answers will be posted on the BidNet website at the link below following the deadline for submittal of questions.

<https://www.bidnetdirect.com/colorado/cityandcountyofdenverdepartmentofaviation>

Bid Submittal

The Bid shall be prepared in accordance with the Instructions to Bidders as described in Section IV of this IFB. Bidders shall submit their Bid and all required forms via DEN's Rocky Mountain E-Purchasing System's (BidNet's) website:

<https://www.bidnetdirect.com/colorado/cityandcountyofdenverdepartmentofaviation>.

Bids are due by 2:00 PM LOCAL DENVER TIME on February 24, 2021

Minority and Women-Owned Business Enterprise Participation

Article III, Division 3 of Chapter 28 of the D.R.M.C. states the Director of the Division of Small Business Opportunity has the authority to establish a project goal for expenditures contracted by the City and County of Denver. The specific goal for this project is:

13% Minority and Women-Owned Business Enterprise (MWBE) Participation

Project goals must be met with certified participants as set forth in Section 28-60, D.R.M.C. or through the demonstration of a sufficient good faith effort under Section 28-62 D.R.M.C.

General Statement of Work

Replacement of eight (8) existing escalators with sixteen (16) new escalators located in Concourse A Center Core. Scope of work includes installation of temporary walls and security plastic (fire rated), demolition and disposal of existing structures and equipment, procurement and installation of new escalators, escalator cladding, modifications to the existing electrical, fire protection, communications systems, installation of structural steel and handrails, fireproofing, terrazzo flooring, construction of soffits, painting, commissioning escalators, escalator permits and floor protection.

Prequalification

Each bidder must be prequalified in category **2(B), Buildings at or above the Fifteen Million Dollar (\$15,000,000.00)** monetary level in accordance with the City's Rules and Regulations Governing Prequalification of Contractors. Each bidder must have submitted a prequalification application a minimum of ten (10) calendar days prior to the response due date. Applications must be submitted via email to pw.prequal@denvergov.org. To view the Rules and Regulations and to obtain a prequalification application, please visit our website at www.denvergov.org/prequalification.

BID SUBMITTAL REQUIREMENTS

The following is a checklist for reference when compiling the Bid submission. The documents listed below are required:

- Bid Forms - all complete and signed
 - Bid Letter – filled out completely and acknowledge all addenda
 - Bid Data Forms – all forms completed and submitted
 - Disclosure of Legal & Administrative Proceedings & Financial Conditions
 - Form W-9
 - Certificate of Good Standing
 - Bid Bond – submitted electronically and original mailed

- DSBO Forms
 - Commitment to MWBE Participation
 - 1A - List of Proposed Subcontractors, Subconsultants, and/or Suppliers
 - Letter of Intent

- Diversity Survey
 - Diversity and Inclusiveness in City Solicitations (online survey – include the completed survey with your Bid submission)

- Financial Forms
 - Schedule of Prices/Values and Quantities

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I. CITY, AIRPORT AND PROJECT OVERVIEW

The values of equity, diversity, inclusivity, and sustainability are inherent to Denver's strategy to develop and maintain prosperous communities. Consequently, these values are imbedded into all of Denver's procurement processes to ensure competitive procurement that offers equitable opportunities for all potential bidders, including greater contracted participation for minority, women-owned, and small businesses to ensure Denver's long-term economic, social, and environmental health. It is the City's expectation that all successful bidders demonstrate their commitment to City values through their procurement responses and post contract and/or lease activities.

Each procurement opportunity is to be approached with ethical and honest behavior. The City will solicit, evaluate, and award contracts based upon the Bidder's approach, proven experience, ability to perform work, costs, and pricing.

The City's values may be demonstrated through but are not limited to: (a) workforce expansion; (b) utilization of minority, women-owned, and small business community separate from required certified goals; and (c) environmental sustainability.

In accordance with procedures described herein, you are hereby invited to submit a Bid for the subject project, which is described in the Technical Specifications and Drawings incorporated herein. The work under this Contract is anticipated to start on or about July 2021 and has a scheduled duration of approximately 1 year 2 months. The Bid must be prepared and submitted in accordance with the requirements and procedures contained in this IFB document and the City's, including DEN's, ordinances, rules, policies, and procedures. Compliance with these requirements by the Bidder is mandatory and is a condition of responsiveness. Any failure to satisfy these requirements will be a sufficient basis for the City and County of Denver's Department of Aviation, also known as Denver International Airport, (DEN or City) to disqualify the Bidder. The City shall not be liable for any of the Bidder's expenses associated with its preparation of the Bid or DEN's consideration of it. The Bidder, if selected, shall not include any such expenses as part of its fee for performing the Scope of Work.

II. TECHNICAL PROVISIONS AND CONSTRUCTION DRAWINGS

The following documents are published separately; they are not in this document but are available as separate attachments accessible either in the BidNet advertisement as indicated.

V-1 VOLUME 1: TECHNICAL SPECIFICATIONS

Please see attached file located in BidNet.

V-2 VOLUME 2: DRAWINGS

Please see attached file located in BidNet.

III. SPECIAL CONDITIONS

SC-1 CONSTRUCTION CONTRACT GENERAL CONDITIONS

The Construction Contract General Conditions which constitute a part of the Contract Documents are set forth in a separately published document, entitled "City and County of Denver, Department of Aviation and Department of Public Works, Standard Specifications for Construction, General Contract Conditions," 2011 Edition, the Table of Contents to which is bound herein (which may be informally referred to as the Yellow Book). The General Conditions book is available for purchase for \$12.00 per copy at the following locations during the business hours stated, Monday through Friday, excluding holidays:

Office of the Cashier
Wellington E. Webb Municipal Office Building, 2nd Floor
201 West Colfax Avenue
Denver, Colorado, USA 80202
7:30 a.m. to 4:30 p.m.

The General Conditions are also available on the City and County of Denver website at:

<https://www.denvergov.org/content/denvergov/en/contract-administration/contractor-resources/general-contract-conditions.html>

SC-2 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

Project Manual Volume 1 dated 12/9/2020
Contract Drawings dated December 9, 2020

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.

If Sensitive Security Information ("SSI") is provided to the Contractor, the Contractor shall be required to comply with Department of Aviation, Standard Policies and Procedures No. 6003, "Contractor Protection of Sensitive Security Information," or its successor, and 49 C.F.R. § 1520, or its successor.

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

SC-3 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 Airport Infrastructure Management Office under the supervision of the Senior Vice President for Maintenance and Airport Infrastructure Management."

SC-4 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 Operating Officer (EVP-COO) who reports to the CEO. Airport Infrastructure Management office, 9th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Senior Vice President - Airport Infrastructure Management (SVP-AIM) who reports to the COO. Airport Infrastructure Management office, 10th Floor, Airport Office Building, 8500 Peña Boulevard, Denver, CO 80249.

Director of Infrastructure and Quality Assurance reports to the SVP-AIM. The Project Manager reports to the Director of Infrastructure and Quality Assurance. Airport Infrastructure Management Division, 7th Floor, Airport Office Building, 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-AIM. 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: Bradley Frederick, Airport Infrastructure Management Concourse A Room 1172, 8500 Peña Boulevard, Denver, CO 80249, phone 303-342-2707.

The CEO may from time to time substitute a different City official as the designated “SVP-AIM” hereunder, and any such change will be effective upon the issuance of written notice to the Contractor which identifies the successor SVP-AIM. The SVP-AIM 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-5 CONTRACTOR PERFORMANCE; SUBCONTRACTING

With respect to General Condition 501, no more than ninety percent (90%) of the work may be subcontracted. If it is determined to be in the City’s best interest, this percentage may be modified throughout the course of the project by the SVP-AIM.

SC-6 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.

Without limiting the foregoing, the following contracts administered by the City involve or may involve work overlapping or adjoining the Work under this Contract and may be prosecuted concurrently with the Work performed under this Contract. There may also be other adjoining or overlapping contracts which are not listed.

| <u>Contract Number</u> | <u>Description</u> |
|------------------------|--------------------|
| None | |

SC-7 PROSECUTION AND COMPLETION OF THE WORK:

The Work to be performed under the Contract is described in the Technical Specifications and Contract Drawings. The Contractor shall complete the Work within 480 consecutive calendar days from Notice to Proceed.

The Work to be performed under the Contract may be divided into the Milestone Areas which are described in the Technical Specifications or Contract Drawings. The Contractor shall complete the work included within these areas within the number of days set forth by the Project Manager.

| | <u>Milestone</u> | <u>Date of Completion (or, days from NTP)</u> |
|----|------------------------------|---|
| 1. | South Escalators Replacement | 300 days from NTP |
| 2. | North Escalators Replacement | 480 days from NTP |

SC-8 LIQUIDATED DAMAGES

If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time, the Contractor shall be liable to the City for liquidated damages at the rate of Two Thousand Five Hundred dollars (\$2,500.00) per day until substantial completion is achieved.

Article IV of the Contract and General Condition 602 cover payment and withholding of liquidated damages.

SC-9 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 Access Services 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 **Total Contract BID Amount** 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.

The Contractor will provide contract security guard services to maintain supervision of these openings. The security services must provide coverage to allow for lunch breaks, comfort breaks and etc. The security services **must** be obtained from the following contract security guard company:

HSS
900 S. Broadway, Suite 100
Denver, Colorado 80209

DEN Contact: [Glenn Spies]
[(303) 342-4323]

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-10 CONSTRUCTION ACCESS

The work site is located at Denver International Airport – Concourse A Center Core. The Contractor shall have

access to the work site via the secure area screening and to the airfield via Gate 4 along the haul route shown in the drawings for equipment and material deliveries. 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 Total Contract Bid Amount or Contract Amount 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-11 VEHICLE PERMITTING

Vehicle access on the Airport Operation Area ("AOA") is controlled by and requires permission from the Airport Access Services Office. It is 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-12 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-13 COMMUNICATION DEVICES

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

SC-14 USE, POSSESSION OR SALE OF ALCOHOL OR DRUGS

The Contractor and its officers, agents, and employees shall cooperate and comply with the provisions of Executive Order No. 94 and Attachment A thereto concerning the use, possession, or sale of alcohol or drugs. Violation of these provisions or refusal to cooperate with implementation of the policy can result in the City's barring the Contractor from City facilities or participating in City operations.

SC-15 ATTORNEYS' FEES

Colorado Revised Statute 38-26-107 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 the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver 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. 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 per hour of City Attorney time.

SC-16 INSURANCE REQUIREMENTS

In accordance with the provisions of Title 16 of the General Conditions, the minimum insurance requirements for this contract are set forth in IV-14 of the Instructions to Bidders. The Contractor specifically agrees to comply with each condition, requirement or specification set forth in the attachment for each required coverage during all periods when the required coverages are in effect.

Contractor and sub-contractors shall procure and maintain until all of their obligations have been discharged, including any warranty periods under this Contract are satisfied, required insurance against claims for injury to persons or damage to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or sub-contractors.

The insurance requirements herein are minimum requirements for this Contract and in no way limit the indemnity covenants contained in this Contract.

The City and County of Denver in no way warrants that the minimum limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, his agents, representatives, employees or sub-contractors. The Contractor shall assess its own risks as it deems appropriate and/or prudent, maintain higher limits and/or broader coverages. The Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration or types.

Contractor shall furnish the City and County of Denver with certificates of insurance (ACORD form or equivalent approved by CCD) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf.

All certificates and any required endorsements are to be received and approved by the City before work commences. Each insurance policy required by this Contract must be in effect at or prior to commencement of work under this Contract and remain in effect for the duration of the project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of the Contract. All insurance coverages for sub-contractors shall be subject to the minimum requirements identified in the Exhibit. All sub-contractors' certificates and endorsements shall be received and approved by the Contractor before work commences. The City reserves the right to request copies of these certificates at any time.

All certificates required by this Contract shall be sent directly to ContractAdminInvoices@flydenver.com. The City project/contract number and project description shall be noted on the certificate of insurance. The City reserves the right to require complete, certified copies of all insurance policies required by this Contract at any time.

The parties hereto understand and agree that the City and County of Denver, its officers, officials and employees, are relying on, and do not waive or intend to waive by any provisions of this Contract, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, §§ 24-10-101 - 120, C.R.S., or otherwise available to the City and County of Denver, its officers, officials and employees.

SC-17 SUBCONTRACTOR RELEASES

The release form referred to in General Condition 907 is attached to this Contract. It is entitled "Denver International Airport Partial Release."

SC-18 ADDITIONAL AFFIRMATIVE ACTION REQUIREMENTS, FEDERAL PROVISIONS

This contract is subject and subordinate to the terms, reservations, restrictions, and conditions of any existing or future agreements 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 airport purposes. The "Federal Requirements" section attached hereto is made a part of this Contract.

SC-19 ESTIMATED QUANTITIES OF UNIT PRICED ITEMS

The "total estimated quantity" of each unit price item as stated on the bid schedules shall be the estimated quantity which is used to determine the percentage of change in such item for purposes of G.C. 1104.7.

SC-20 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-21 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-22 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-30. "Accessible" parking spaces and access aisles as used in this SC-30 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 Section 019990 of 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-23 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-24 PAYMENTS TO CONTRACTORS

The Contractor recognizes and agrees that applications for payment shall be submitted using the Textura® Payment Management System (PPM System), 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, 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, 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 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 Division Senior 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.

IV. ADMINISTRATIVE INFORMATION**IV-1 Issuing Office**

The City and County of Denver's Department of Aviation (City or DEN), by the Contract Services Department (DEN Contract Services). This IFB is governed by the City's ordinances and Procurement Rules in effect at the time of its issuance. DEN Contract Services is the sole point of contact concerning this IFB. All communication must be done through the Contract Services Department.

IV-2 Introduction and Acceptance of IFB Terms

The Bidder, by submitting its Bid, acknowledges that it understands and will agree to the Sample Contract and corresponding Exhibits and the Scope of Work, and that the Bidder shall be able to perform as required. Acknowledgement of this condition shall be indicated by the signature of the Bidder on the Bid Letter, which is attached hereto and incorporated here in as Attachment 1, or an officer of the Bidder legally authorized to execute contractual obligations. A submission in response to this IFB acknowledges acceptance by the Bidder of all terms and conditions as set forth herein. The Bidder shall identify clearly and thoroughly any variations between its Bid and this IFB. Failure to do so shall be deemed a waiver of any rights to subsequently modify the terms of performance, except as outlined or specified in this IFB.

IV-3 Means of Communication

During the solicitation process for this IFB, all communication between the Contract Services Department and Bidders will be via postings on DEN's Rocky Mountain E-Purchasing System's (BidNet's) website:

<https://www.bidnetdirect.com/colorado/cityandcountyofdenverdepartmentofaviation>

The Contract Services Department will post notices, which include, but are not limited to, any modifications to administrative or performance requirements, answers to inquiries received, clarifications to requirements, addenda, and the announcement of the apparent successful bidder. It is the responsibility of each potential Bidder to monitor the BidNet website regularly in order to be aware of changes, communications and/or addenda to bids.

DEN will not be held responsible for misinformation received from private plan holders. Please use the DEN BidNet website to obtain solicitation information for the airport.

IV-4 Interpretation of Bid Documents

The Bidder may request, in writing, a clarification or interpretation of any aspect of the IFB documents. Such requests must be made in writing in WORD format (no PDFs) or in the body of an email by the due date and time specified in the Schedule of Activities listed on page 2. DEN shall post all questions and answers on the DEN BidNet Website following the deadline for submittal of questions. DEN will not accept or respond to oral inquiries except for those made at the Pre-Bid Conference. The only 'official' responses are those that are posted to the DEN BidNet Website for this IFB.

IV-5 Addenda

DEN reserves the right to revise the IFB documents at any time up to the time set for submission of the Bids. Any such revision(s) shall be described in an addendum to the IFB and shall be posted on the DEN BidNet Website at the following link:

<https://www.bidnetdirect.com/colorado/cityandcountyofdenverdepartmentofaviation>

If DEN determines that the addendum may require significant changes to the Scope of Work, the deadline for submitting the Bids may be postponed by the number of days that DEN determines will allow Bidders

sufficient time to revise their Bids. Any new submittal deadline date for delivering Bids to DEN shall be included in the addendum.

Bidders must acknowledge in the Bid submission that they received all addenda to the Bid documents (see Attachment 2, Part 1). Failure to acknowledge receipt of addenda may disqualify the Bid.

IV-6 **DEN Website**

It shall be conclusively presumed that the Bidder did, before submitting a Bid, read all addenda, posted decisions and other information items relevant to the IFB which appeared on the DEN BidNet Website to see if addenda have been issued or may also contact the DEN Contract Administrator, LaQuisha Shaw by email at contract.procurement@flydenver.com.

Please visit the DEN BidNet Website at the following link which contains such services and information as:

<https://www.bidnetdirect.com/colorado/cityandcountyofdenverdepartmentofaviation>

- A. Advertisements for RFQs, RFPs and IFBs
- B. Status of RFQs, RFPs and IFBs
- C. Project addenda
- D. Incidental project information is available for viewing and printing, which includes:
 - a. Plan holder's list
 - b. Pre-Bid Conference attendance list
 - c. Questions and Answers

Incidental project information listed in item D., above, will only be available online at the DEN BidNet Website and will not be mailed.

IV-7 **Withdrawal of Bid**

A Bidder may withdraw its Bid by submitting to DEN a written request signed by the Bidder's authorized representative. The withdrawal of a Bid does not prejudice the right of the Bidder to submit future Bids.

IV-8 **Rights of DEN**

DEN reserves the right to waive any informality or irregularity in any proposal it receives and to be the sole judge of the merits of the proposals it receives. Minor informalities are matters of form rather than substance evident from the response or insignificant mistakes that can be waived or corrected without prejudice to other proposers; that is, the effect on price, quantity, quality, delivery, or contractual conditions is negligible." The Contract Administrator may waive such informalities or allow any proposer to correct them depending on which is in the best interest of DEN. If a proposer is allowed to correct an informality, the proposer will be notified of the allotted time to correct the minor informality by DEN's Contract Administrator. Failure to correct the minor informality by the Proposer may result in their proposal being deemed non-responsive.

IV-9 **Minority Business Enterprise and Women Business Enterprise Participation (or DBE, if applicable)**

Article III, Divisions 1 and 3 of Chapter 28, Denver Revised Municipal Code (D.R.M.C.), referred to in these Bid Documents as the "MWBE Ordinance" and any Rules or Regulations promulgated pursuant thereto apply to this Project and are incorporated into these Bid Documents by reference. Under the MWBE Ordinance, the Director of DSBO ("Director") has the authority to establish participation goals on contracts for construction, reconstruction, remodeling, professional and design work with the City and County of

Denver. The participation goal is stated in the Notice of Invitation for Bids found herein. In order to comply with the bid requirements of the MWBE Ordinance, or any additional requirements, a bidder shall either meet the established participation goal or, in the alternative, demonstrate that the bidder has demonstrated sufficient good faith efforts to meet the goal in accordance with the MWBE Ordinance. A bidder's failure to comply with the MWBE Ordinance, any Rules or Regulations promulgated pursuant thereto, or any additional requirement contained herein shall render the bid non-responsive and shall constitute cause for rejection. Failure by the contractor awarded the contract to comply with MWBE Ordinance requirements during the performance of the contract is a material breach of the contract, which may result in the imposition of sanctions on the Contractor, as deemed appropriate by DSBO. Copies of the MWBE Ordinance and its accompanying Rules and Regulations are available for the use and review of bidders from DSBO. As well as additional MWBE Guidance which can be found here: <https://www.denvergov.org/dsbo>.

Meeting Established Goal

1. All MWBEs listed for participation toward meeting the goal must be properly certified by the City on or before the date bids are opened. The MWBE(s) must be certified in the NAICS code(s) that coincide with the scope of work the identified firm will be performing to count towards the participation goal. DSBO maintains an MWBE Directory ("Directory"), which is a current list of MWBEs certified by the City. A copy of the Directory is located at the DSBO web site at <https://www.denvergov.org/dsbo>. Bidders are encouraged to use the Directory to assist in identifying MWBEs for the work and supplies required for the Project. Bidders are reminded that changes may be made to the Directory at any time in accordance with the City's MWBE Ordinance. Procedures established to administer this program and a current copy of the Directory must always be used in preparing a bid. MWBE certification or listing in the Directory is not a representation or warranty by the City regarding the qualifications of any listed MWBE.
2. If a bidder is participating in a joint venture with a certified MWBE firm, bidders must submit the Joint Venture Agreement to the DSBO **at least ten (10) business days prior to the bid opening**. The Joint Venture must be approved prior to the bid opening by the DSBO. Approval by the DSBO includes determining the amount the Joint Venture will count towards the participation goal.
3. Each bidder shall submit Bid Form pages entitled Commitment to MWBE Participation, 1A-List of Proposed Subcontractors, Subconsultants, and/or Suppliers, and Letter(s) of Intent for all tiers with the bid at the time of bid opening. DSBO will evaluate each bid to determine responsiveness of the bid with regard to MWBE Ordinance requirements. **An MWBE Prime Bidder must submit a Letter of Intent for itself for self-performed work.** The MWBE Letter of Intent evidences the Bidder's understanding that the Bidder has or will enter into a contractual relationship with the MWBE or that the Bidder's subcontractor(s), subconsultant(s), and/or supplier(s) will do so. Bidders are urged to carefully review these Letters of Intent before submission to the City to ensure the documents are properly completed and executed by the appropriate parties. **Only the MWBEs identified and the precise levels of participation listed for each, at the time of bid opening, will be considered in determining whether the bidder has met the designated participation goal. Additional, participation submitted after bid opening will not be considered in determining responsiveness.**

- a. In determining whether a bidder's committed level of participation meets the stated MWBE goal, DSBO shall base its calculation of applicable dollar amounts and percentages on the total base bid amount. If a bid contains alternates, participation contained in any alternate will not count towards satisfaction of the Participation goal at time of bid opening. However, should any designated alternate be selected by the City for inclusion in the contract ultimately awarded, the MWBE goal percentage level submitted at time of bid opening, on the base bid, will also apply to the selected alternates and must be maintained through the remaining term of the contract on the total contract amount, including any alternate work. Therefore, bidders are urged to consider participation in preparing bids for designated alternates.

- b. In utilizing the MWBE participation of a Supplier the following will count towards satisfaction of the goal:
 - i. If the materials or supplies are obtained from a MWBE manufacturer, count one hundred percent (100%) of the cost of the materials or supplies toward the participation goal.

 - ii. Only sixty percent (60%) of the value of the commercially useful function performed by MWBE Regular Dealers shall count toward satisfaction of the participation goal.

 - iii. Only the bona fide commissions earned by such Manufacturer Representatives or Brokers for its performance of a commercially useful function will count toward meeting the participation goals. The bidder must separate the bona fide brokerage commissions from the actual cost of the supplies or materials provided to determine the actual dollar amount of participation that can be counted towards meeting the goal.

- c. Any agreement between a bidder and an MWBE in which the bidder requires that the MWBE not provide subcontracting quotations to other bidders is prohibited and shall render a bidder's bid nonresponsive. D.R.M.C. 28-68(f)

Good Faith Effort

If the bidder has not fully met the participation goal as provided in D.R.M.C. Section 28-62, then it shall demonstrate that it has made good faith efforts to meet such goal. The bidder shall furnish to the Director, with the bid at time of bid opening by the City a detailed statement of its good faith efforts to meet the participation goal established by the Director. The statement of good faith efforts shall include a specific response to address each of the categories, as outlined in the MWBE Ordinance, D.R.M.C. Section 28-62, and any additional criteria that the Director may establish by rule or regulation consistent with the purposes of the MWBE Ordinance. A bidder may include any additional information it believes may be relevant. Good faith efforts must be demonstrated to be substantive and not merely for formalistic compliance with the MWBE Ordinance. The scope and adequacy of the efforts will be considered in determining whether the bidder has achieved a good faith effort. Failure of a bidder to show good faith efforts shall render its overall good faith effort showing insufficient and its bid nonresponsive.

IV-10 Certification of Independent Price and Work Determination

By submission of this Bid, each Bidder, and in the case of a joint Bid, each party thereto, certified, that, in connection with this procurement:

- a. Prices and specific work processes in this Bid have been arrived at independently, without consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor, or with any party contracted by DEN to design and/or manage all or part of the program or work of which this IFB is a part;
- b. Unless otherwise required by law, the prices quoted and specific work processes described in this Bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to opening, directly or indirectly to any other bidder or to any competitor or to any party contracted by DEN to design and/or manage all or part of the program or work of which this IFB is a part; and
- c. No attempt has been made or will be made by the Bidder to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition.

Further, each person signing Attachment 1, Part 1 Bid Letter, for this Bid certified that:

- d. He/She is the person in the Bidder's organization responsible for the decision as to the prices being offered herein and that he/she has not participated, and will not participate, in any action contrary to subsection (a) through (c) above; or
- e. He / She is not the person in the Bidder's organization responsible for the decision as to the prices being offered herein but that he/she has been authorized in writing to act as agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to subsections (a) through (c), above, and as their agent does hereby so certify; and he/she has not participated, and will not participate, in any action contrary to subsections (a) through (c), above.

A Bid will not be considered for award where subsections (a), (c), (d) or (e), above, have been deleted or modified. Where (b) above has been deleted or modified, the Bid will not be considered for award unless the Bidder furnishes with the Bid a signed statement which sets forth in detail the circumstances of the disclosure and the Chief Executive Officer (CEO), or its designee, determines that such disclosure was not made for the purpose of restricting competition.

IV-11 Designation of Subcontractors

The Bidder shall describe the qualifications of each subcontractor which it intends to use and the percentage and scope of the work which will be assigned to each of them. Resumes for the subcontractor's key personnel must be included.

Bidders who submit a Bid in response to this IFB are precluded from participation as a subcontractor with any other Bidders who submit a Bid for this IFB. However, subcontractors may be named on more than one (1) Bid.

IV-12 Payment

Appropriate clarifications and additions to the Scope of Work may be made during negotiations with the successful Bidder. It is the intent of DEN to enter into a Contract in which the Bidder will be paid pursuant to the terms of the Contract.

IV-13 Disclosure of Legal and Administrative Proceedings and Financial Condition

- A. The Bidder shall submit (at time of submittal) a statement which shall disclose all legal or administrative proceedings that involve a civil claim in excess of Fifty Thousand Dollars (\$50,000) in which the Bidder, its principals or key personnel were a party in the last five years. The Bidder shall include in the statement:
1. The caption of the action naming all parties;
 2. The case number, jurisdiction and the date the action was filed;
 3. A brief description of the action, the amount of the claim and whether the action involved performance under any public or private construction contract; and
 4. The outcome or disposition of the action.
- B. The Bidder shall submit (at time of submittal) a statement which shall disclose whether Bidder has filed for protection under the laws of the U. S. Bankruptcy Code within the last ten (10) years.
- C. The Bidder shall submit (at time of submittal) a statement as to whether the Bidder, its principals or key employees presently, or in the past, are or have been involved in any debarment or suspension proceedings. Please include a description of any proceedings which prohibited or limited the Bidder from bidding or entering into any contract with any federal, state or local government entity. Include a brief description of the reason(s) for such action having been taken, the effective dates thereof and the governmental agency.

If the Bidder is a partnership or joint venture, please include a statement disclosing the information listed in subparagraph A and B, above, for each partner or joint venturer. If the Bidder is fifty percent (50%) or greater owned by another entity or individual, please include a statement disclosing the above information for such entity or individual.

- D. The Bidder shall submit (at time of submittal) a statement as to whether the Bidder, its principals or key employees have been convicted of any crime related embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, receiving stolen property, fraud, unfair trade practices, violation of state or federal antitrust statutes, or other law indicating a lack of business integrity or business honesty or have been convicted of any other felony in any jurisdiction within the last five (5) years. Include the current status of any such principal or key employees.
- E. The Bidder shall submit (at time of submittal) its Dun & Bradstreet identification number if applicable. If the Bidder is a partnership or joint venture, it must submit the Dun & Bradstreet identification number for each partner of a joint venture.
- F. If the Bidder is a publicly held company, it shall submit (at the time of submittal) a list of any holders of ten percent (10%) or more of its stock.
- G. During contract negotiations, the Bidder may be asked to submit the following:
1. An audited statement of overhead rates, payroll taxes and operating (profit) margin used to calculate hourly billing rates for DEN and approval. If the Bidder does not have audited overhead rates, an Exhibit E, Submittal 2 shall be prepared for each entity without audited overhead rates.

This statement shall cover the Bidder's most recently completed fiscal year and shall be signed by a certified public accountant as a Certified Audited Statement in which the accountant expresses his or her opinion as to the fairness with which the statement represents the Bidder's financial position, results of operations and changes in financial position.

2. If the Bidder is a partnership or joint venture, a Certified Audited Statement is required for each partner or joint venture. If the Bidder does not have audited overhead rates, an Exhibit E, Submittal 2 shall be prepared for each entity without audit overhead rates. If any individual owns thirty-two percent (32%) or more of the Bidder, a Certified Audited Statement is required for each such individual or if a Certified Audited Statement is not available, then the individual must supply copies of his or her federal tax returns for the prior two (2) years.
3. If a Bidder is a small business as defined by the United States Small Business Administration, the Bidder may elect to submit copies of its Federal tax return for the prior two (2) years and prepare an Exhibit E, Submittal 2 in lieu of a Certified Audited Statement.
4. A signed statement certifying that no material or significant changes have occurred since the date of completion of the Certified Audited Statement, or the filing of the Federal tax return and the date of the Bid.

IV-14 **Insurance Requirements**

Bidder shall adhere to all insurance requirements stated in Attachment 4, which are attached hereto and incorporated herein by reference. ACORD FORM (or equivalent) must be emailed in pdf format to: contractadmininvoices@flydenver.com.

IV-15 **Governmental Immunity**

Bidders and subcontractors understand and agree that the City, its officers, officials and employees are relying on, and do not waive or intend to waive by any provisions of this Contract, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, §§ 24-10-101 - 120, C.R.S., or otherwise available to the City, its officers, officials and employees.

IV-16 **Security**

After receiving an executed contract, the Bidder shall be deemed a Contractor of DEN. The Contractor (or subcontractor) requiring access to the Controlled Area, Sterile Area or Secured Area shall become a "Participant" in the Airport Security Program and remain in good standing in order to retain Airport Security privileges.

Participant guidelines are outlined in Rules and Regulations Governing the Denver Municipal Airport System Rules and Regulations Part 20. A Contractor must be sponsored by an Air Carrier, Tenant or by the City. Once a Contractor company has been sponsored, they must designate an Authorized Signatory.

The sponsorship establishes that a Contractor (or subcontractor) has legitimate business at the Airport. All construction Contractors must submit a Participant Sponsorship form signed by their sponsor. A company sponsoring a Participant shall immediately notify Airport Security when any sponsorship is terminated.

A subcontractor company working under its own entity must be sponsored by a Contractor company. The subcontracting company must designate its own Authorized Signatory(ies).

Each Participant shall designate an Authorized Signatory to ensure the Participant's compliance with the Airport Security Program and act as the point of contact between the Participant and Airport Security. The Authorized Signatory shall be designated in writing to Airport Security by the Participant.

The Authorized Signatory is responsible for signing and verifying all information on the Denver International Airport Fingerprinting and Badging applications. All submitted applications must be an original. It is the Authorized Signatory's responsibility to ensure that Airport Security maintains valid contact information. The Authorized Signatory must maintain a current and valid Airport Identification Badge (ID Badge).

The security status of the Airport is subject to change without notice. Should the security status of the Airport change at any time during the term of the Contract, a written notice shall be issued to the Contractor, detailing all applicable security modifications. The Contractor must take immediate steps to comply with those security modifications.

The Contractor shall return to DEN, upon Contract completion or termination, or upon demand by DEN, all access keys and Airport ID Badges issued to it by DEN to Controlled Areas, Sterile Areas or Secured Areas of the Airport. If the Contractor fails to return any such Airport ID Badge(s) or Airport Security Key(s) at Contract completion or termination or upon demand by the DEN, the Contractor shall be liable to the DEN for all DEN's costs, including the DEN's labor costs for re-coring doors and any other work which is required to prevent compromise of any Airport Security system. In order to collect such costs hereunder, the DEN may withhold funds in such amount from any amounts due and payable to the Contractor under the Contract.

Airport Security must be immediately notified if an Airport ID badge or security key is lost or stolen and must be notified immediately upon the termination of an individual's employment. Pursuant to 49 CFR Part 1520.04-10(d) a fee shall be assessed against any employer who fails to return an Airport ID badge or security keys upon the termination of an individual's employment, transfer, or completion of a project or contract. An additional fee may be requested to cover the administrative cost of processing a lost badge or security key.

IV-17 Airport Identification (ID) Badge Requirements

All individuals employed at the Airport with Secured Area access, or working in the Terminal, Concourses or Parking and Ground Transportation facilities, must obtain an Airport ID Badge. Airport ID Badges will be issued by Airport Security. All Airport ID Badges shall be and remain the property of the Airport. The Airport ID Badge must be surrendered on demand to Airport Operations and/or a Contract Security Guard. An individual employed by more than one (1) company, or changing employers, must obtain an Airport ID Badge for each company. Badge color indicates general areas and levels of authorization in relationship with direct support of an individual's job function. Badge color does not determine access. The respective classes of Airport ID Badges, indicated by badge color and associated driving endorsement icon, describe driving privileges in direct correlation with job function.

The individual must complete an application, on a form prepared and currently approved by Airport Security. Two (2) valid forms of identification must be presented with the application, one of which must be a government-issued photo identification. The second form of identification must verify proof of citizenship (i.e., birth certificate or legal residency with work authorization). All information regarding the individual's name, age, gender and other vital statistics on both forms of identification must be consistent and verifiable.

A Denver International Airport Fingerprinting and Badge Application, Security Threat Assessment (STA) and Criminal History Record Check (CHRC) must be completed for everyone requesting an Airport ID Badge. Denver International Airport Fingerprinting and Badge Applications are available from the Airport Security Office. Allow adequate time for processing of the Security Threat Assessments (STA) and Criminal History Record Check (CHRC).

The individual must view a training film on Denver Municipal Airport System Rules and Regulations as they pertain to overall security and pass a corresponding test to assure understanding of the Rules and Regulations.

If the individual requests driver authorization, a valid driver's license must be presented, and the individual must view a training film on Denver Municipal Airport System Rules and Regulations as they pertain to overall Movement of Vehicles in the Secured Area and pass a corresponding test to assure understanding of the Rules and Regulations.

A construction orientation specific to the project must be conducted. A designated time for this session must be coordinated with Planning and Development and Airport Operations.

A lost or stolen Airport ID Badge must be immediately reported to Airport Security. For a replacement Airport ID Badge, a new Denver International Airport Fingerprinting and Badge Application must be completed and signed by the Company(s) Authorized Signatory. A non-refundable fee must be paid for a replacement Airport ID Badge.

If for any reason the Airport ID Badge becomes inoperable or damaged, the Airport ID Badge holder shall return that badge to Airport Security, and a replacement badge will be issued. A replacement fee may be assessed should the damage be attributable to the negligence of the employee who was issued the badge.

When an employee is terminated, the Contractor company shall immediately notify Airport Security. This notification must be followed by the return of the Airport ID Badge and written confirmation of this information. The Contractor company must recover Airport ID Badges from individuals whose employment at the Airport has been terminated. The Contractor company shall notify Airport Security in writing when a subcontractor is no longer under the Contractor company's sponsorship. All Airport ID Badges must be returned to Airport Security.

An employee possessing a valid Airport ID Badge may escort other individuals into the Secured Area(s) under the conditions listed in the Rules and Regulations Part 20. If the project is extended, DEN's Project Manager must submit a new Sponsorship Form with a new expiration date. This can be accomplished thirty (30) calendar days prior to expiration of the Airport ID Badge. An application revision must be completed for each employee still required on the project, if the badges have expired.

IV-18 **Background Checks**

Every individual requesting an Airport ID Badge must complete a Criminal History Record Check (CHRC) and a Security Threat Assessment (STA) for unescorted access to the Sterile and Secured Area(s).

If an applicant has been convicted of a crime or found guilty by reason of insanity or has been arrested for any of the disqualifying crimes or is awaiting judicial proceedings, he/she may be ineligible to obtain an Airport ID Badge. A list of the disqualifying crimes may be found in 49 C.F.R. 1542.209.

IV-19 Vehicles in the Secured Area

All Contractor employees who are required to drive in the Sterile and Secured Area(s) unescorted to perform their jobs are required to complete a training film on Denver Municipal Airport System Rules and Regulations as they pertain to overall movement of vehicles in the Sterile and Secured Area(s) and pass a corresponding test to assure understanding of the Rules and Regulations.

All unescorted vehicles must display a current Airport Contractor Vehicle Permit (Permit). Permits are available from Airport Security. An application form must be completed, signed by an Authorized Signatory, and all applicable permit fees must be paid for each Permit requested, and it must be signed by the Authorized Signatory. A Permit is required for each state licensed vehicle, and the vehicle Permit is not transferable.

The Contractor shall purchase and maintain in force a minimum of Ten Million Dollars (\$10,000,000.00) in combined, single-limit automobile insurance for bodily injury and property damage liability per accident or occurrence.

IV-20 Violations

Any Contractor employer not regulated under 49 C.F.R. Part 1544, Aircraft Operator, will be responsible for payment or reimbursement to DEN of any Civil Penalties imposed by the Transportation Security Administration (TSA) for individual security violations by their employees and/or subcontractor employees for violations under 49 C.F.R. Part 1542.

A Contractor employee may be personally subject to Civil Penalties imposed by the TSA for individual security violations committed by Contractor employees and/or subcontractor employees under 49 C.F.R. Part 1542.

Everyone who is issued an Airport ID Badge shall comply with all Security Advisories, Rules and Regulations Governing the Denver Municipal Airport System Rules and Regulations, the CEO Directives and the Denver International Airport Standard Policies and Procedures regarding Airport Safety, Security and Operations. The failure of any individual to comply with such Security Advisories, rules and directives, etc. will result in the issuance of a Violation Notice and may result in the assessment of a Federal Civil Penalty and/or the denial, suspension or revocation of their Airport ID Badges.

The security status of DEN is subject to change without prior notice. Should the security status of DEN change at any time during the term of the Contract, a written notice shall be issued to the Contractor, detailing all applicable security modifications. The Contractor must take immediate steps to comply with those security modifications.

IV-21 Diversity and Inclusivity in City Solicitations

Each Bidder shall, as a condition of responsiveness to this solicitation, complete and return the "Diversity and Inclusiveness in City Solicitations Information Request Form" with their Bid.

Using the "Diversity and Inclusiveness in City Solicitations Information Request Form," please state whether your firm has a diversity and inclusiveness program for employment and retention, procurement and supply chain activities, or customer service, and provide the additional information requested on the form. The information provided on the "Diversity and Inclusiveness in City Solicitations Information Request Form" will provide an opportunity for DEN contractors to describe their own diversity and inclusiveness practices. Bidders are not expected to conduct intrusive examinations of its employees,

managers, subcontractors or business partners in order to describe diversity and inclusiveness measures. Rather, DEN simply seeks a description of the Bidder's current practices, if any.

Diversity and Inclusiveness information provided by Bidders in response to DEN solicitations for services or goods will be collated, analyzed and made available in reports consistent with the Mayor's Executive Order No. 101. However, no personally identifiable information provided by or obtained from Bidders will be in such reports.

For DEN to consider a Bid, Bidders must complete the electronic version of the Diversity and Inclusiveness in City Solicitations Form – then **print the completed form and include the hard copy as part of its Bid. A Bid or response to a solicitation by a Bidder that does not include this completed form shall be deemed non-responsive.** The form is found at: <https://fs7.formsite.com/CCDenver/form161/index.html>

The Diversity and Inclusiveness Form is separate from the requirements established by the Division of Small Business Opportunity (DSBO) and must always be completed – regardless of whether there are any DSBO goals assigned to this project.

IV-22 **Wage Ordinances**

The services being requested in this IFB may involve services that are covered pursuant to Article IV of Chapter 20 of the Denver Revised Municipal Code (“D.R.M.C.”), which is designed to address the issue of wage equity and cost of living affordability in the City & County of Denver. Bidder agrees that any contract with DEN shall include a requirement that Bidder will comply with the provisions of D.R.M.C. relating to living, minimum and prevailing wages, including, but not limited to, paying all covered workers no less than the City Minimum Wage for all covered services rendered in connection with the resulting contract. Additionally, Bidder agrees that the contract shall require compliance with all current and future federal and state laws and City ordinances.

IV-23 **Taxes**

1. **General:** Bidders shall refer to the General Conditions, G.C. 323 regarding taxes to which Bidder may be subject in performing the Work under this Contract, including but not limited to, sales and use taxes and the Denver Occupational Privilege Tax. The following instructions are to be considered along with the General Conditions – and not in lieu of them.
2. **Sales and Use Tax:** Construction and building materials sold to contractors and subcontractors for use on structures, roads, streets, highways and other public works owned by the City at DEN are exempt from state, RTD and Cultural Facilities District sales and use taxes. However, such materials will be subject to sales and use taxes imposed by the City.
3. **Exemption Certificates – Sales and Use Tax:** Contractor and Contractor's subcontractors are responsible for applying to apply to the Colorado Department of Revenue (CDOR) for a certificate or certificates of exemption, indicating that their purchase of construction or building materials is for a public project, and to deliver to the City copies of such applications as soon as possible after approval by the CDOR. Bidders shall not include in their Bid amounts the State, RTD and Cultural Facilities District Sales and Use Taxes.
4. **Denver Occupational Privilege Tax:** Any employee working for a Contractor or a subcontractor who earns over Five Hundred Dollars (\$500.00) working in Denver during a calendar month is subject to

the payment of the Employee Occupational Privilege Tax. The Contractor and any subcontractor must pay the Business Occupational Privilege Tax for each of its employees who are subject to such tax.

IV-24 Conformed Technical Specifications and Contract Documents

If applicable, and when Technical Specifications are included and/or referenced herein, Bidder understands that the Technical Specifications and Contract Drawings included in this IFB have been conformed by the City. The conformed Technical Specifications and Contract Drawings were prepared by posting or otherwise incorporating the changes noted in any addendum(s) into the Technical Specifications and Contract Drawings to form a single set of construction documents.

IV-25 Site Inspection and Investigations

Prior to submitting its Bid, the Bidder shall inspect the work site and its surroundings. A site visit may be scheduled immediately following the Pre-Bid Conference as indicated herein. For purposes of a Contract, it shall be conclusively presumed that the Bidder has made a thorough inspection of the site and has waived the right to later claim extra payment or time extension(s) for conditions which would have been evident during an inspection or investigation.

Drawings and Specifications which define the Work to be done were prepared on the basis of interpretation by design professionals of information derived from investigations of the work site and site condition data provided by the City. Such information and data are subject to sampling errors, and the interpretation of the information and data depends to a degree on the judgement of the design professional. In view of this, the Bidder is invited to make additional investigations as the Bidder's judgement dictates the need for such investigations.

Because the Bid information cannot be guaranteed, the Contractor shall have assumed the risks attendant to successful performance of the Work, except for the risk of encountering differing site conditions which are defined in the General Conditions and shall never make claim for additional payments or time extensions on the grounds that the nature or amount of Work to be done was not understood by the Bidder at the time of Bid submission.

IV-26 Materials and Substitutions

It is often convenient and practical to specify materials and equipment to be incorporated into the Work by a proprietary name or by the name of its manufacturer. When so specified and further qualified by the phrases "or equal" or "or equivalent," it shall be understood that such specification is not intended to limit the material and equipment selection process. Rather, the specification is intended to indicate a standard of quality and capability which will be accepted. However, all Bidders desiring to use materials other than the specified materials must obtain the written approval of the Project Manager.

Bidders requesting substitutions will submit a Request for 'or Equal' Approval Form contained herein. All requests for approval of equal or equivalent material shall contain adequate technical data to clearly demonstrate equivalency. Requests containing inadequate or incomplete information will not be reviewed.

Any such Request for 'or Equal' Approval Form must be submitted via email to contract.procurement@flydenver.com, must include in the email Subject line: "Request for Substitution" and the IFB name, and the email must be received no later than ten (10) calendar days before the posted deadline for IFB submittals. All approvals of equal or equivalent materials will be posted to the Contract Procurement website as addendum(s) to ensure full and complete disclosure to all potential Bidders. All

requests for approval of equal or equivalent material shall contain adequate technical data in order to clearly demonstrate equivalency. Incomplete submittals will not be reviewed.

If the Bidder is awarded the Contract and elects to use an 'or equal' that has been added by addendum(s), the Bidder shall be deemed to have warranted that:

- (1) The use of the 'or equal' fulfills the specification requirements contained in this IFB.
- (2) The installation of the 'or equal' will not impact the spatial requirements for the Work or the scheduling of work performed by the City or other contractors.

Additionally, the Bidder agrees that it shall modify any building system(s) (i.e., HVAC, structural, electrical) impacted by the use of an 'or equal' at no cost to the City or any other contractors under contract with the City and shall make no claims for delay or disruption arising out of such 'or equal' modification.

IV-27 **Permit Fees**

For the construction of this project, the awarded Contractor agrees to pay the permit fees described in General Condition 317 and in the Special Conditions and Technical Specifications.

IV-28 **Construction Scheduling**

The Bidder should refer to the General Conditions, Special Conditions and Division 013210 of the Technical Specifications for scheduling requirements for this Contract.

IV-29 **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion**

The Bidder certifies, by submission of its Bid or acceptance of this Contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible or involuntarily excluded from participation in any government contract by any Federal, State or local government department or agency. It further agrees by submitting its Bid that it will include this clause without modification in all lower-tier transactions, solicitations, Bids, contracts and subcontracts. Where the Bidder or any lower-tier participant is unable to certify to this statement, it shall attach an explanation to its Bid.

IV-30 **Bid Guarantee, Bond**

As a guarantee of good faith on the part of the Bidder, each IFB must be accompanied by a Bid guarantee consisting of either a certified or cashier's check made payable without condition to the order of the City and County of Denver or a Bid bond written by an approved corporation surety in favor of the City and County of Denver. If the Bidder's IFB submission is responsive and Bidder is awarded a Contract but fails to either (1) execute a Contract in the form prescribed, (2) furnish the Payment & Performance Bonds described in Title 15 of the General Conditions, (3) furnish the required evidence of insurance described in Title 16 of the General Conditions or in the Special Conditions, or (4) satisfy any other condition precedent to Contract execution within its power within five (5) working days after such notice is made by the City, said Bid guarantee shall be forfeited to the City as liquidated damages and not as a penalty. The Bid guarantee shall be in the amount of five percent (5%) of the Maximum Contract Liability Amount.

A Bid Guarantee form for execution by the Bidder is supplied with each set of contract documents. IF A BID GUARANTEE IS USED, IT MUST BE THE FORM OF BID GUARANTEE SUPPLIED WITH THE CONTRACT DOCUMENTS.

Once the awarded Bidder executes a Contract and delivers to the City satisfactory Performance &

Payment Bonds and the required insurance documentation and, if applicable, City Council approval of the Contract, the Bid guarantees of non-awarded Bidders will be returned.

IV-31 Payment & Performance Bonds

The awarded Contractor will be required to submit Payment & Performance Bonds which guarantees it will fulfill its contractual obligations under this project and guarantees it will pay its subcontractors, material suppliers and/or laborers for any work and materials provided. The amount of the Bonds will be 100% of the Maximum Contract Liability Amount (the full amount of the bid). Should the awarded Contractor default on its obligations and fails to complete the project, a claims process may be initiated. If Contractor is found to be in breach of the Contract, it must compensate the City up to the full amount of the Bonds.

IV-32 Project Controls Requirements

Bidder will be required to use the designated Project Management Information System (PMIS) as set forth in the Technical Specifications. The PMIS is Airport Infrastructure Management's (AIM's) tool for project and information management, data analysis and document control. DEN will be responsible for providing the licensing and training for PMIS.

IV-33 Equal Employment Opportunity

1. Article III, Division 2 of Chapter 28 applies to this contract. It is the policy of the City to provide equal opportunity in employment without regard to race, color, creed, sex, national origin, religion, marital status, or political opinion or affiliation. It is hereby deemed and declared to be for the public welfare and in the best interest of the City to require bidders, contractors and subcontractors soliciting and receiving, directly or indirectly, compensation from or through the City, for the performance of such contracts, to meet certain affirmative action and equal employment opportunity requirements. Additionally, contractors and subcontractors that hold any contracts which are federally-assisted shall be required to adhere to the Department of Labor's Contract Compliance program under Executive Order 11246 as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60-4.
2. After the Notice to Apparent Low Bidder has been issued, the Apparent Low Bidder shall submit the following to the Division of Small Business Opportunity:
 - (a) A statement that the bidder shall implement the affirmative action steps set forth in the Rules and Regulations and Bid Conditions of the Manager of Public Works pertaining to Equal Employment Opportunity, attached hereto, or the bidder's affirmative action plan which meets these requirements, and
 - (b) A projection of its anticipated workforce for this contract on the attached "EEO Questionnaire." Both of these submittals are required before the Division of Small Business Opportunity will approve the Notice to Proceed.
2. The bidder which is awarded this contract shall comply with the provisions and requirements, including the goals of minority and female participation and specific affirmative action steps, set forth in the Rules and Regulations and Bid Conditions of the Manager of Public Works pertaining to Equal Employment Opportunity, as said rules and regulations may be amended or readopted from time to time by the Manager of Public Works or the Director of the Division of Small Business Opportunity.

IV-34 Conflicts of Interest

An organizational conflict of interest occurs when, because of the relationship between two organizations or one organization (including its subsidiaries or related organizations) performing or proposing for multiple scopes of work, there is or could be in the future a lack of impartiality, impaired objectivity, an unfair advantage over one or more firms competing for the work, or a financial or other interest in other scopes of work.

If the Submitter currently has existing contracts with the City for work at DEN, including any contracts held by Submitter's parent, affiliates or subsidiary corporations, this could pose a conflict of interest and could place your Statement of Qualifications in jeopardy of being rejected for conflict of interest. If Submitter believes a conflict of interest may exist but can be mitigated, please describe the steps it proposes that it will take to mitigate the conflict.

If the City identifies a conflict of interest that is not identified by the Submitter in its response, the City may find the Submitter to be non-responsive. If the City identifies a conflict during the course of the contract and the Submitter failed to disclose such conflict, the City may terminate the contract for cause or convenience at the discretion of the City.

END OF INSTRUCTIONS TO BIDDERS

V. PREPARATION OF BID**V-1 Preparation of Bid**

The Bid shall be submitted in accordance with and meet all requirements set forth in the Bid Forms, which are attached hereto. The Bidder shall fill in all blank spaces in the applicable Bid Forms and initial all interlineations, alterations or erasures in its Bid. The Bidder shall not delete, modify or supplement the printed matter on the forms which are included in "Attachment 1, Bid Forms" or make substitutions thereon. The Bidder's completed Bid Forms shall constitute its Bid. It shall be conclusively presumed that the Bidder did, before submitting a Bid, read all addenda, posted decisions and other information items relevant to the IFB that appeared on the DEN BidNet Website.

An authorized representative of the Bidder shall execute Attachment 1 of its Bid Forms – the "Bid Letter."

1. If the Bidder is a corporation, it shall upon execution of the Contract provide a certificate from the Secretary of State, showing that it is qualified to do business in the State of Colorado. Please call the Secretary of State for Colorado at (303) 894-2200 for information on obtaining such certification.
2. If the Bidder is a partnership, the Bidder must include with its Bid evidence satisfactory to DEN that the partner signing the Bid has the authority to do so.
3. If the Bidder is a joint venture, the Bidder shall submit with its Bid a notarized copy of the joint venture agreement. That agreement must describe the scope and amount of work each participant will perform and contain a provision that each participant will be jointly and severally liable to DEN for completing all the work and to third parties for all duties, obligations and liabilities which arise out of the joint venture's performance of the work.

V-2 Completing and Signing Bid Forms

Each bidder shall submit the following, completed and executed in accordance with the Contract Documents:

- (1) the Bid Forms, including any additional forms required by any addendum;
- (2) the Bidder's Bid Bond or Bid Guarantee in conformance with II-30; and
- (3) the Diversity and Inclusivity in City Solicitations

The bidder must complete the Bid Forms by legibly writing or printing in ink, words or figures, or both if required all the bidder's offered prices for performing the work. All blank spaces which require a response of the bidder must be properly filled in. In filling out the Bid Forms, the bidder should avoid making changes to the extent possible, but, if changes are necessary, any interlineation, white outs, or erasures should be initialed.

For any contracts containing unit prices, the bidder shall specify in the Bid Forms a unit price for each item for which a quantity is given and shall write in figures the products of the respective unit prices and quantities in the "Amount" column provided for that purpose.

Each bidder must sign the Bid Forms and give the bidder's current business address and contact information as noted. If an individual, the signature must be of the individual offering the bid; if a partnership, the signature must be that of a general partner; and if a joint venture, by each joint venture

participant in their individual capacity as a corporation, partnership, or individual; if a corporation, both the president or a vice president and the secretary must sign and the seal of the corporation must be affixed. Signatures of other persons may be acceptable if the Bid contains evidence satisfactory to the CEO to prove that the other persons are authorized to bind the bidder.

Bidder shall submit its Bid Data Information in accordance with the format shown on each of the Bid Data Forms. Bidder shall prepare and use as many sheets as are necessary to provide the information required. Bidder shall ensure that each page of its Bid Data is completed and properly identified with the Bid Data form name, Bidder's name, and page number.

VI. EVALUATION OF BIDS**VI-1 BASIS FOR SELECTING THE APPARENT LOW BIDDER**

The selection of the Apparent Low Bidder will be made on the basis of the lowest responsive bid by a qualified bidder whose bid complies with all of the requirements prescribed herein. The lowest bidder shall be determined by the Total Base Bid Amount. This selection shall be subject to the approval of such resulting contract in accordance with the Charter and ordinances of the City and County of Denver.

VI-2 Bid Rejection and/or Disqualification

Bids are non-responsive and will be excluded, rejected or disqualified if the Bidder fails to comply with the requirements of this IFB, or with any applicable City ordinances, rules, or policies, including but not limited to for the following reasons:

1. Bidder's failure to meet the Pre-Qualification Requirements;
2. Bidder's failure to provide complete documentation, Required Forms and provide bid bond;
3. Improper communications and/or collusion among bidders or between the Bidder and any DEN contractor, including any project managers or others providing supplemental staff to DEN, with oversight of the project of which the IFB is a part;
4. Default or termination for cause of other contracts with any public or private entity within the past five (5) years;
5. Improper contact as described in Section IV-3, above;
6. Omissions and/or fraudulent statements of any fact that is significant or essential to the subject matter of this IFB;
7. Bidder's delinquent arrearages or debts presently owed under any agreement with DEN, or any other creditor; or
8. Bidder's failure to disclose all trademark, copyright, licensing, franchise, and other contractual or property rights bidder has with third parties, bidder intends to use at DEN, which may restrict current business operators in any way, or may have an unfavorable impact on future bidders for opportunities at DEN.

In addition, the CEO reserves the right to reject any and all Bids, to waive irregularities and technicalities, to re-advertise, to provide the services, or to otherwise proceed in the best interest of DEN.

VI-3 OPENING OF BIDS (or SUBMITTAL OF BIDS if electronic)

There will be no live bid opening for this project. Bids shall be submitted electronically via the Rocky Mountain E-Purchasing System (BidNet) website at:

<https://www.bidnetdirect.com/colorado/cityandcountyofdenverdepartmentofaviation>

Following electronic submittal of bid (including a scan of the bid bond), the original bid bond must be received by mail within seven (7) calendar days of bid opening date to be considered part of a responsive bid. Bid bonds shall be mailed to Denver International Airport, 8500 Peña Blvd., Denver, CO 80249-6340, Attention: LaQuisha Shaw.

At this time, bid bonds cannot be hand-delivered in person.

VI-4 UNACCEPTABLE BIDS

The City will not accept Bids from bidders in arrears to the City upon debt or contract, or which are defaulters (as surety or otherwise) upon any obligation to the City, or that are deemed irresponsible or unreliable by the CEO. A history or pattern of litigation against the City and County of Denver by any bidder, proposed subcontractor, interested party, or any person, firm, or corporation affiliated with any bidder, among other items, will be considered by the CEO in determining the responsibility and reliability of bidders. Bidders may be required to submit satisfactory evidence that they have a practical knowledge of the particular work bid upon and that they have the necessary financial resources to complete the proposed work.

VI-5 ONLY ONE BID ACCEPTED

The City will accept only one Bid for the same work from any one bidder. This includes Bids that may be submitted under different names by one firm or corporation. Evidence of collusion among bidders shall be grounds for exclusion of any bidder who is a participant in any such collusion.

VI-6 CONSIDERATION OF BIDS

After the Bids are opened and read and any discrepancies have been reviewed, bids will be compared based on the Total Contract Bid Amount written the Bid Letter.

If a discrepancy exists between a price or amount written in words and the price or amount written in figures, the price or amount written in words shall govern, except that in the case where a price or amount shown in figures has been crossed out and replaced with a new, legible, initialed figure, the initialed figure shall govern.

Any bid discrepancies which the City corrects in accordance with the general rules described above shall be corrected with the understanding that the Apparent Low Bidder waives any claims against the City because of the bidder's mistakes in its bid.

The City reserves the right to waive informalities, to reject any and all bids, and to advertise for new bids where it is in the best interest of the City. The City also reserves the right to negotiate terms of the contract.

VI-7 INFORMAL AND UNBALANCED BIDS

Bids shall be considered informal and may be rejected for the following reasons:

- (a) If the bid is on a form other than the Bid Forms furnished by the City, or if the form is altered or any part thereof is detached.
- (b) If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the bid incomplete, indefinite, or ambiguous.
- (c) If the bidder fails to acknowledge in the bid receipt of any or all addenda current on the date of opening of bids.

- (d) If the bid does not contain a unit price or lump sum amount for each item listed except in the case of authorized alternative items.
- (e) If there is an interlineation, white out, or erasure in the Bid Forms.
- (f) If the bid is unbalanced so that (1) each pay item does not reasonably carry its own proportion of cost, or (2) any pay item contains an inadequate or unreasonable price.

VI-8 NOTICE TO APPARENT LOW BIDDER – EXECUTION OF CONTRACT

The Apparent Low Bidder will be given written notice of such status on the form included in the Bid Documents within ninety (90) days from the date of opening of bids.

The Apparent Low Bidder should execute the contract and return it to the City along with the required bonds and insurance forms within ten (10) business days from and including the date of the Notice to Apparent Low Bidder. When the executed contract and the required bonds and insurance certificates are received, approval for the City to contract with the Apparent Low Bidder shall be sought in accordance with the Charter of the City and County of Denver. Such notice shall not create any rights in the Apparent Low Bidder to any contract with the City.

END OF INSTRUCTIONS TO BIDDERS



January 22, 2021

CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

CONTRACT NO. 202056518

ADDENDUM NUMBER ONE

This Addendum Number One supersedes and/or supplements all portions of the Contract Documents with which it conflicts. Bidders must acknowledge receipt of this addendum on Attachment One of the Bid Forms.

LaQuisha Shaw
Contract Administrator
DEN Contract Services - Finance



CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

CONTRACT NO. 202056518

ADDENDUM NUMBER ONE

SCOPE OF THIS ADDENDUM

Addendum Number One includes modifications to the following Bid Documents issued December 14, 2020. These modifications are deemed necessary by the City and County of Denver.

QUESTION AND ANSWERS

Addendum Two provides responses for questions received on BidNet regarding this project in the attached Q & A Document 1.

PART ONE, CONTRACT DOCUMENTS

City, Airport and Project Overview is revised to read as follows:

The values of equity, diversity, inclusivity, accessibility and sustainability are inherent to Denver's strategy to develop and maintain prosperous communities. Consequently, these values are imbedded into all of Denver's procurement processes to ensure competitive procurement that offers equitable opportunities for all potential proposers, including greater contracted and significant participation for minority, women-owned, and small businesses to ensure Denver's long-term economic, social, and environmental health. It is the City's expectation that all successful proposers demonstrate their commitment to City values through their procurement responses and post contract and/or lease activities.

Each procurement opportunity is to be approached with ethical and honest behavior. The City will solicit, evaluate, and award contracts based upon the Proposer's approach, proven experience, ability to perform work, costs, and pricing. DEN is looking for Proposers that demonstrate a history of integrity, stewardship, innovation and humanity. We are looking for firms that share these values with us and will approach this contract with them at the forefront.

The City's values may be demonstrated through but are not limited to: (a) workforce expansion; (b) utilization of minority, women-owned, and small business community separate from required certified goals; and (c) environmental sustainability.

The total number of pages (including cover sheet) contained in this Addendum Number One is Five (5).

* * * * *

End of Addendum Number One.

Questions & Answers - 1

Solicitation 202056518 - Concourse A Center Core Escalator Replacement
Buying Organization City and County of Denver Department of Aviation

| No | Question/Answer | Question Date |
|----|---|---------------|
| Q1 | <p>Question: Escalator Manufacturer - Open Bid</p> <p>Specification Section 143100 - Conveying Equipment provides for the escalators to be provided by one of the following: KONE, Inc.; Otis Elevator Co.; Schindler Elevator Corp.; or ThyssenKrupp Elevator. Recent information at DEN indicates that there may have been a selection for the Ongoing Conveyance Maintenance and Operation RFP for one of these vendors. Will the specification remain open to the four manufactures listed?</p> <p>Answer: The specification will remain open to the four manufacturer's listed.</p> | 12/28/2020 |
| Q2 | <p>Question: Escalator Manufacturer - Preference</p> <p>Specification Section 143100 - Conveying Equipment provides for the escalators to be provided by one of the following: KONE, Inc.; Otis Elevator Co.; Schindler Elevator Corp.; or ThyssenKrupp Elevator. Recent information at DEN indicates that there may have been a selection for the Ongoing Conveyance Maintenance and Operation RFP for one of these vendors. Is there a preference by DEN to align the manufacturer on this project to the selected Conveyance Maintenance and Operation vendor?</p> <p>Answer: No, there is no preference by DEN to align the manufacturer on this project.</p> | 12/28/2020 |
| Q3 | <p>Question: Contractor Schedule for Bid Evaluation</p> <p>Under IFB section SC-7 – Prosecution and Completion of the Work, the days for completion from NTP are listed at 300 days for the South Escalator Replacement, and 480 days for the North Escalator Replacement. The IFB section VI. Evaluation of Bids indicates that selection will be made to the Apparent Low Bidder, irrespective of schedule or planned logistics. As this project impacts the flow of passengers through the Concourse A Center Core and the passenger experience, a thoughtful project approach and schedule provided by the contractor may assist DEN in improving the customer experience during the project. To provide DEN with the overall best value, will DEN consider adding the submission of a contractor schedule with the bid documents, and that the schedule would become part of the bid evaluation for award?</p> <p>Answer: Selection will be to the Apparent Low Bidder and will be made on the basis of the lowest responsive bid by a qualified bidder whose bid complies with all of the requirements prescribed in the bid documents. Therefore, it is not irrespective of schedule and logistics as noted in the question. The schedule and logistical requirements are specified in the IFB Documents. Bidders are required to meet the milestone dates set for each escalator package and meet the logistical requirements defined in the bid documents.</p> | 12/28/2020 |

| No | Question/Answer | Question Date |
|----|--|---------------|
| Q4 | <p>Question: Contractor Logistics Plan for Bid Evaluation</p> <p>Under IFB section SC-7 – Prosecution and Completion of the Work, the days for completion from NTP are listed at 300 days for the South Escalator Replacement, and 480 days for the North Escalator Replacement. The IFB section VI. Evaluation of Bids indicates that selection will be made to the Apparent Low Bidder, irrespective of schedule or planned logistics. As this project impacts the flow of passengers through the Concourse A Center Core and the passenger experience, a thoughtful project approach and planned logistics provided by the contractor may assist DEN in improving the customer experience during the project. To provide DEN with the overall best value, will DEN consider adding the submission of a contractor logistics plan with the bid documents, and that the logistics plan would become part of the bid evaluation for award?</p> <p>Answer: Selection will be to the Apparent Low Bidder and will be made on the basis of the lowest responsive bid by a qualified bidder whose bid complies with all of the requirements prescribed in the bid documents. Therefore, it is not irrespective of schedule and logistics as noted in the question. The schedule and logistical requirements are specified in the IFB Documents. Bidders are required to meet the milestone dates set for each escalator package and meet the logistical requirements defined in the bid documents.</p> | 12/28/2020 |
| Q5 | <p>Question: Schedule Duration</p> <p>The City, Airport and Project Overview on page 4 of the Invitation to Bid states the schedule duration is approximately 1 year and 2 months. However, SC-7 on page 8 states the North Escalators Replacement schedule duration to be 480 days from NTP, or 1 year and 4 months. Please clarify which schedule duration is correct.</p> <p>Answer: The scheduled duration of the project is 480 days from NTP as noted in SC-7. Revised City, Airport and Project Overview is provided in Addendum One.</p> | 01/05/2021 |
| Q6 | <p>Question: Material Testing & Inspections</p> <p>Please clarify who is responsible for 3rd party material testing and inspections. Please also identify the scope of work that will require 3rd party material testing and inspections.</p> <p>Answer: Section 014525 of the Project Manual states: "The Contractor shall employ the services of a Material Testing Agency; hereafter referred to as the Contractor Testing Agency (CTA). This Section identifies the requirements for the Contractor to employ a Material Testing Agency and identifies the required activities of the Material Testing Agency. Laboratory and field-testing requirements to be conducted by the CTA for materials and construction methods used on this project are included in the appropriate technical specifications." Bidders are to check the technical specifications for the scope of work that will require 3rd party material testing and inspections.</p> | 01/05/2021 |
| Q7 | <p>Question: Building Permit & Plan Check Fees</p> <p>Please clarify who is responsible for paying for the Building Permit. Please also clarify who is responsible for paying for the Plan Check fees.</p> <p>Answer: IFB Section IV-27 Permit Fees refers to General Conditions Section 317 - Permits and Licenses. The Building Permit falls under this section and is to be paid for by the Contractor and is included as a line item on the bid form. The plan review fees are paid by DEN.</p> | 01/05/2021 |
| Q8 | <p>Question: Safety Manager</p> <p>Please clarify whether a full-time safety professional will be required on the project to comply with the requirements of the ROCIP manual.</p> <p>Answer: Yes, a full-time safety professional will be required per the ROCIP III Manual.</p> | 01/05/2021 |

| No | Question/Answer | Question Date |
|----|--|---------------|
| Q9 | <p>Question: Fire Alarm Who is the fire alarm contractor at the airport? Thanks,</p> <p>Answer: The fire alarm contractor is Johnson Controls.</p> | 01/12/2021 |



January 29, 2021

CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

CONTRACT NO. 202056518

ADDENDUM NUMBER TWO

This Addendum Number Two supersedes and/or supplements all portions of the Contract Documents with which it conflicts. Bidders must acknowledge receipt of this addendum on Attachment One of the Bid Forms.

LaQuisha Shaw
Contract Administrator
DEN Contract Services - Finance



CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

CONTRACT NO. 202056518

ADDENDUM NUMBER TWO

SCOPE OF THIS ADDENDUM

Addendum Number Two includes modifications to the following Bid Documents issued December 14, 2020. These modifications are deemed necessary by the City and County of Denver.

QUESTION AND ANSWERS

Addendum Two provides responses for questions received on BidNet regarding this project in the attached Q & A Document 2.

The total number of pages (including cover sheet) contained in this Addendum Number Two is Six (6).

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End of Addendum Number Two.

Questions & Answers - 2

Solicitation 202056518 - Concourse A Center Core Escalator Replacement
Buying Organization City and County of Denver Department of Aviation

| No | Question/Answer | Question Date |
|-----|--|---------------|
| Q10 | <p>Question: Onsite Storage of Escalators Please clarify if onsite storage of escalators will be accommodated by DEN.</p> <p>Answer: Onsite storage of escalators will not be provided by DEN.</p> | 01/22/2021 |
| Q11 | <p>Question: Shoring of Deck Please clarify the maximum load that the existing Concourse level deck can accommodate as the escalators and new steel trusses/beams are brought in from the opening in Gate 41 and transported to the work area. Will any temporary post-shores be required under the deck?</p> <p>Answer: The structure was evaluated for an escalator weight of 24,000 lbs and dolly assembly per the attached detail "Elevation of Dolly Assembly". The structure will handle this load with this dolly assembly without any shoring.</p> | 01/22/2021 |
| Q12 | <p>Question: Fireproofing of New Steel The drawings seem to only call out patch and repair of fireproofing on existing steel that may be damaged during construction. Please clarify if the new structural steel being installed also needs to receive fireproofing.</p> <p>Answer: New structural steel to receive fireproofing per Table 601 Fire-resistance rating requirements for Building Elements on drawing G-003.</p> | 01/22/2021 |
| Q13 | <p>Question: Fireproofing of Escalator Truss Please confirm the escalator truss does not need to receive fireproofing.</p> <p>Answer: The escalator truss does not require fireproofing.</p> | 01/22/2021 |
| Q14 | <p>Question: State Inspection of Escalator Please clarify who is responsible for paying for the State Inspection of the escalators.</p> <p>Answer: The Contractor is to pay for the State Inspection of the escalators.</p> | 01/22/2021 |
| Q15 | <p>Question: Turnover of Escalators to DEN Boneyard The drawings state the existing escalators are to be delivered to the DEN boneyard after removal. Please confirm DEN does not expect these escalators to be delivered in a manner that can accommodate their re-assembly and use, as the demolition will require the escalators to be cut into multiple pieces.</p> <p>Answer: Confirmed.</p> | 01/22/2021 |
| Q16 | <p>Question: Discrepancy in Escalator Pit Depth On S-301, the escalator pit depth is shown to be 4'-5". However, A-301-N and A-301-S both show the escalator pit depth to be 4'-0". Please clarify which dimension is accurate.</p> <p>Answer: 4'-5" pit depth is accurate as shown on S-301.</p> | 01/22/2021 |

| No | Question/Answer | Question Date |
|-----|--|---------------|
| Q17 | <p>Question: Intermediate Support at Escalator</p> <p>Please confirm there is not intended on being any intermediate structural support buried within the wall framing clad with the Phenolic Panels on the AGTS level (A2/A-502) to allow for a reduced clear span for the escalator trusses to span.</p> <p>Answer: The escalators are intended to clear span from the AGTS level to the Apron level.</p> | 01/22/2021 |
| Q18 | <p>Question: Waterproofing at Escalator Pits</p> <p>Please confirm no repair or modifications to any existing waterproofing is required within the escalator pits that are getting enlarged via demo of existing beams. It is not clear if the waterproofing of the escalator pits is on the positive or negative side of the pit.</p> <p>Answer: The existing pits at the station level are suspended above grade and do not require waterproofing.</p> | 01/22/2021 |



February 16, 2021

CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

CONTRACT NO. 202056518

ADDENDUM NUMBER THREE

This Addendum Number Three supersedes and/or supplements all portions of the Contract Documents with which it conflicts. Bidders must acknowledge receipt of this addendum on Attachment One of the Bid Forms.

LaQuisha Shaw
Contract Administrator
DEN Contract Services - Finance



CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

CONTRACT NO. 202056518

ADDENDUM NUMBER THREE

SCOPE OF THIS ADDENDUM

Addendum Number Three includes modifications to the following Bid Documents issued December 14, 2020. These modifications are deemed necessary by the City and County of Denver.

QUESTION AND ANSWERS

Addendum Three provides responses for questions received on BidNet regarding this project in the attached Q & A Document 3.

The total number of pages (including cover sheet) contained in this Addendum Number Three is Eight (8).

* * * * *

End of Addendum Number Three.

Questions & Answers - 3

Solicitation 202056518 - Concourse A Center Core Escalator Replacement
Buying Organization City and County of Denver Department of Aviation

| No | Question/Answer | Question Date |
|-----|--|---------------|
| Q19 | <p>Question: As Built Drawings Will the Architectural and Structural as built drawings for these escalators be made available?</p> <p>Answer: The construction documents were developed by the Designer of Record utilizing as-built drawings and through field investigations. Therefore, as-built drawings will not be made available. Bidders to base their bids on the construction documents in the IFB package.</p> | 01/26/2021 |
| Q20 | <p>Question: Anticipated Start Date Addendum 1 removes reference to a July 2021 anticipated start date within the 'City, Airport, and Project Overview' by deleting that paragraph from the Invitation to Bid. Please confirm the anticipated start date is still July 2021.</p> <p>Answer: The anticipated start date is still July 2021 but the actual start date is dependent on receiving several internal approvals.</p> | 01/27/2021 |
| Q21 | <p>Question: Escalators Please confirm that the high traffic escalator definition contained in specification 143100 means that escalator steps shall be designed with a minimum step rating of 265 lbs. per step and be designed for 20-24 hours of operation per day.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q22 | <p>Question: Escalators Please confirm that the high traffic interior escalator definition contained in Specification 143100.1.2.A means that all driving components (motor, gear box and chains) are to be specifically designed for a minimum loading of 265 lbs. per step with the escalator unit running.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q23 | <p>Question: Escalators Please confirm that the high traffic escalator definition contained in Specification section 143100.1.2.A means that the escalator drive motor size is to be upgraded a minimum of 33% greater than the motor size provided in the manufacturers standard commercial grade escalator product.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q24 | <p>Question: Escalators Please confirm that the high traffic escalator definition provided in Specification Section 143100.1.2.A means that the escalator tension carriage device is to be upgraded over the commercial unit standard design (fixed rail version) to a sprocket type tension carriage system that can spin in the same direction as the driving sprocket to eliminate chain jerk and improve ride quality.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |

| No | Question/Answer | Question Date |
|-----|---|---------------|
| Q25 | <p>Question: Escalators</p> <p>Please confirm that the high traffic escalator definition contained within Specification section 143100.1.2A means that the drive chain breaking strength must be a minimum of 33% greater than the drive chain breaking strength used in the manufacturers standard commercial model.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q26 | <p>Question: Escalators</p> <p>Please confirm that the high traffic escalator definition listed in Specification section 143100.1.2.A requires that the escalator duty cycles and usage factors must exceed the escalator code requirements by a minimum of 33% over the listed standard requirements.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q27 | <p>Question: Escalators</p> <p>Please confirm that the high traffic escalator definition contained with Specification Section 143100.1.2A means that the escalator motor, gear box, drive must be upgraded by a minimum of 30% over the similar escalator components used in the manufacturers standard commercial models.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q28 | <p>Question: Escalators</p> <p>Please confirm that the high traffic escalator definition contained within Specification Section 143100.1.2.A means that the escalator handrail drive pressure system must be upgraded to a roller cluster handrail drive system) that provides constant pressure over the handrail) in lieu of using a conventional V pressure handrail belt drive system.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q29 | <p>Question: Escalators</p> <p>Please confirm that the use of ANZI-97.1 clear tempered glass at a 3/8" thickness dimension is acceptable to be provided. 3/8" dimension will meet all balustrade load requirements.</p> <p>Answer: Acceptable.</p> | 02/01/2021 |
| Q30 | <p>Question: Escalators</p> <p>Please confirm that the use of aluminum ribbed floor plates will be acceptable for compliance with Specification section 143100.2.4.O.</p> <p>Answer: Acceptable.</p> | 02/01/2021 |
| Q31 | <p>Question: Escalators</p> <p>Please identify the specific seismic zone criteria that in effect for this project. The seismic zone associated with Denver area is seismic zone 0.</p> <p>Answer: Seismic Design Category B</p> | 02/01/2021 |
| Q32 | <p>Question: Escalators</p> <p>Please confirm that the use of a code compliant braking system that utilizes constant braking torque is an acceptable design per Specification section 143100.2.2.C.</p> <p>Answer: Acceptable.</p> | 02/01/2021 |

| No | Question/Answer | Question Date |
|-----|---|---------------|
| Q33 | <p>Question: Escalators</p> <p>Please confirm that a Step Skirt Performance Index (SSPI) of .25 (per A17.1 code) with skirt deflector devices (skirt brushes) is acceptable to meet Specification Section 143100.2.2.D design requirements.</p> <p>Answer: Acceptable.</p> | 02/01/2021 |
| Q34 | <p>Question: Escalators</p> <p>Please confirm that compliance with Specification Section 143100.2.5.F can be achieved with no retardation or coasting to a stop required.</p> <p>Answer: Confirmed.</p> | 02/01/2021 |
| Q35 | <p>Question: Escalator Model Name</p> <p>Specification section 143100.2.1.A lists four approved equipment manufacturers, however, it does not identify the approved escalator model for each manufacturer. Each of the four companies named fabricate several different models ranging from commercial duty, heavy duty, and APTA duty units. The term "high traffic" does not provide clear indication as to which model of escalator to provide as "high traffic" is not a common term used to identify a level of quality for escalators. Additionally, the limited performance requirements in the spec does not eliminate the lowest standard escalator from being provided, which we do not believe will meet DEN's expectations of use but may meet the spec.</p> <p>Please specifically identify the escalator model for each of the 4 approved manufacturers to establish the minimum level of quality required.</p> <p>Answer: Further to the additional requirements of the specification, the following escalator models may be considered acceptable. Kone Transimaster 220, Otis NCE512, Schindler 9300-20-30-80K, Thyssenkrupp Tugela.</p> | 02/02/2021 |
| Q36 | <p>Question: Escalator enclosure bracket</p> <p>Plan sheet A-501 Detail #A5- Please confirm that the two items called out as "057500.F - Escalator Enclosure Bracket" will need to be cold-formed framing (due to weight limitations provided by the Escalator Manufacturer) and engineered by the subcontractor installing that scope.</p> <p>Answer: The enclosure bracket will be part of a deferred submittal for the escalator enclosure. It would be small angles or cold formed framing. Refer to Specification 057500.</p> | 02/03/2021 |
| Q37 | <p>Question: Work hours</p> <p>Please provide any limitations regarding work hours. Please confirm DEN will require large deliveries to be coordinated and performed at night.</p> <p>Answer: Night shift hours for actual work activities are 10 p.m. to 5 a.m. Crews can mobilize at 9 p.m. and get ready for the start of work but work activities cannot start until 10 p.m. Work activities to stop at 5 p.m. to allow for cleanup prior to the end of shift at 5:30 a.m. Yes, large deliveries to be coordinated and performed at night. Escalators cannot be moved in or out of the concourse until 11 p.m. and need to be completed by 4 a.m. Equipment necessary to move the escalators into and out of the concourse will be able to stage and setup prior to 11 p.m. For bid purposes assume night time work hours of 9 p.m. to 5 a.m. for escalator removal out of the building and delivery into the building. There are no limitations to daytime work hours but refer to Specification Section 011440 - Work Sequence and Constraints for limitations on the work that can be undertaken during the day due to noise. All demolition to be at night.</p> | 02/03/2021 |

| No | Question/Answer | Question Date |
|-----|---|---------------|
| Q38 | <p>Question: Contractor Staging Please confirm the General Contractor can provide a staging area near the dumpster locations at Concourse A for material laydown and storage.</p> <p>Answer: The General Contractor can provide a staging area near the dumpster locations at Concourse A for the offloading of materials into the building but not as a storage area. As noted in the specifications a storage area will be provided in the Concourse A basement.</p> | 02/03/2021 |
| Q39 | <p>Question: Special Inspections Reference Sheet S-001, Special Inspection Notes. Note A. states, "SPECIAL INSPECTIONS ARE TO BE PROVIDED BY AN AGENCY APPROVED BY THE LOCAL BUILDING OFFICIALS AND HIRED BY THE OWNER." Please confirm that all Special Inspections will be carried by DEN.</p> <p>Answer: All Special Inspections will be carried by DEN. Specification Section 014545 - Special Inspection Agency and Owner Testing Agencies: Refer to 1.2 Summary for requirements for the Contractor to coordinate, facilitate, and support DEN and its agents and consultants to fulfill the requirements of Special Inspections.</p> | 02/03/2021 |
| Q40 | <p>Question: Detail C5/A-501 Please provide clarification due to the detail notes overlapping each other on this detail.</p> <p>Answer: Detail notes will be fixed. See sketch attached. (SK-001)</p> | 02/03/2021 |
| Q41 | <p>Question: Interim Life Safety Please confirm if any interim life safety systems such as interim Fire Suppression, interim Fire Alarm and/or interim ECS are required during construction.</p> <p>Answer: No interim life safety systems will be required at this time.</p> | 02/03/2021 |
| Q42 | <p>Question: Video Display Board Please clarify if the video display board currently located above the escalators from basement level to apron level will be required to remain in place for emergency notification during construction or if it can be removed during construction.</p> <p>Answer: The video display board will be removed and reinstalled by DEN.</p> | 02/03/2021 |
| Q43 | <p>Question: Construction Safety Reference Specification Section 013520 – Construction Safety – Airside, Paragraph F., Section 6 Haul Routes Crossing Active Aircraft Operation Areas. Please confirm if one (1) broom truck to continuously clean the surface of the active taxiway is required for hauling activities such as the delivery or transporting of escalators.</p> <p>Answer: Confirmed.</p> | 02/03/2021 |

| No | Question/Answer | Question Date |
|-----|---|---------------|
| Q44 | <p>Question: Steel Angle A5/A-501</p> <p>Reference Detail A5/A-501. The detail shows what appears to be a structural steel angle labeled "057500.F – Escalator Enclosure Bracket". However, the detail does not show how the steel angle attaches to the Stainless Steel Escalator Enclosure or Escalator Bracket Enclosure. Please confirm if the steel angle is required or if it can be eliminated. If required, please clarify how the steel angle attaches to the Stainless Steel Escalator Enclosure or Escalator Enclosure Bracket.</p> <p>Answer: The angles and brackets are bolted to the escalator truss. The enclosure is then bolted to the angles and brackets. The entire enclosure structure is delegated design. If the design engineer does not require steel angles it is not required. If the design engineer does require steel angles it is required. It will be up to the design engineer to provide a delegated design. The DOR has only provided the intent of the design.</p> | 02/03/2021 |
| Q45 | <p>Question: X-ray vs GPR</p> <p>Are we allowed to X-ray the existing slab prior to cutting into it or do we have to use GPR due to close proximity to the public?</p> <p>Answer: X-ray is acceptable at night. GPR can be scheduled anytime.</p> | 02/03/2021 |



CONSTRUCTION

**DENVER INTERNATIONAL AIRPORT
CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518**

TOGETHER WE BUILD SUCCESS

TAB ONE ▶

Bid Forms

- **Bid Letter** – filled out completely and acknowledge all addenda
- **Bid Data Forms** – all forms completed and submitted
- **Disclosure of Legal & Administrative Proceedings & Financial Conditions**
- **Form W-9**
- **Certificate of Good Standing**
- **Bid Bond** – submitted electronically and original mailed

CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518



TOGETHER WE BUILD SUCCESS.

The undersigned agrees that this bid is a firm offer to the City to perform and complete the Contract described above which cannot be withdrawn for one hundred twenty (120) calendar days after the bids are opened or until after a contract for the work described in these bid documents is fully executed by the City, whichever date is earlier.

The undersigned Bidder hereby agrees to appear at Denver International Airport, Business Management Services Office, Room 8810, Airport Office Building, at any time within ten (10) business days from the date of a written notice from the CEO to do so, mailed, emailed, or faxed to the business address of Bidder and at that time the Bidder shall: (1) deliver an executed Contract which conforms with this bid; (2) furnish the required performance and payment bonds in the sum of the Total Contract Bid Amount shown above, executed by a surety company acceptable to the CEO; and (3) furnish the required insurance documents.

Enclosed herewith is a bid guarantee, as defined in the Instructions to Bidders, in the amount of which bid guarantee the undersigned Bidder agrees is to be paid to and become the property of the City as liquidated damages should the bid be considered to be the best by the City and the undersigned Bidder notified that it is the apparent low bidder and it fails to enter into contract in the form prescribed and to furnish the required performance and payment bonds and evidences of insurance within ten (10) business days as stipulated above.

Attached and incorporated herein are the proposed Schedule of Prices and Quantities and Bid Data Forms. All of the forms must be completed. Bidder acknowledges that the City may incorporate, at its option, any or all of the data submitted by the Bidder into a contract arising out of this Bid.

The undersigned Bidder acknowledges the right of the City to waive informalities in the bids, to reject any or all bids submitted, and to re-advertise for bids.

The undersigned certifies that it has examined and is fully familiar with all of the provisions of the Contract Documents and is satisfied that they are accurate; that it has carefully checked all words and figures and all statements made in these Bid forms; and that it has satisfied itself with respect to the actual site conditions and the nature and location of the Work, the general and local conditions which may be encountered in the performance of the Work, and other matters which in any way affect the Work or the cost thereof.

[CERTIFICATION AND SIGNATURE ON FOLLOWING PAGES]

This bid is submitted upon the declaration that neither, I (we), nor, to the best of my (our) knowledge, none of the members of my (our) firm or company have either directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this bid.

Dated this 24th day of February, 2021

BUSINESS ADDRESS OF BIDDER: 2000 S Colorado Blvd, Suite 2-500

City, State, Zip Code: Denver, CO 80222

Telephone Number of Bidder: (303) 365-6598

Fax Number of Bidder: () N/A

Social Security or Employer Id. No. of Bidder: 84-0957552, DB: 130856909

Email Address: rpschmidt@pcl.com

SIGNATURE OF BIDDER:

PRINT NAME OF BIDDER:

PCL Construction

Attest:

(Corporate Seal)

Ryan Schmidt

Secretary

By:

President District Manager



Attachment 1, Part 2 Disclosure of Legal and Administrative Proceedings and Financial Condition

**City and County of Denver
Denver International Airport
(Please use this form)**

If no disclosure required in accordance with IV-13, please sign affirmation statement.

The undersign affirms that _____(Bidder) has not been involved in any legal or administrative proceedings which involve a claim in excess of Fifty Thousand Dollars (\$50,000.00); has not filed bankruptcy within the last ten (10) years; has not been debarred or suspended from bidding/proposing on any Federal, State or local government procurements; and neither the Bidder nor its key employees have been convicted of a bid/Bid-related crime, violation or felony in the last five (5) years.

Signature N/A Title _____

Print Name _____

Date _____

If disclosure is required in accordance with IV-13, please use the following space to provide information. If additional space is needed, please attach additional pages.

The litigation history for the Denver District of PCL Construction Services, Inc. is attached hereto. PCL Construction

Services, Inc., can affirm that it has not filed bankruptcy within the last ten (10) years; has not been debarred or

suspended from bidding/proposing on any Federal, State or local government procurements; and neither the proposer

nor its key employees have been convicted of a bid/proposal related crime, violation or felony in the last five (5) years.

LITIGATION HISTORY
Denver District, PCL Construction Services, Inc. (5 year)

| Type of Action | Date of Action | Docket/Case No. | Name of Court/Forum | Names of Parties | Matter Type | Statement of Matter | Status/Outcome |
|----------------|----------------|-----------------------|---|---|-----------------------|---|-------------------------------|
| Arbitration | 7/21/2016 | NA | District Court, Larimer County, Colorado | Tripp Construction, Inc. vs. PCL Construction Services, Inc. | Subcontractor Dispute | Arbitration | Award against PCL (Satisfied) |
| Litigation | 10/24/2016 | 2016CV32557 | State of Colorado District Court, Arapahoe County | EIGHTH DISTRICT ELECTRICAL PENSION FUND vs. PCL CONSTRUCTION SERVICES, INC. | Other | Second tier subcontractor on project for PCL failed to pay its fringe benefit contributions in accordance with labor agreements. Plaintiff seeks payment based on bond claim. | Other |
| Litigation | 4/18/2017 | 2017CV30518 | DISTRICT COURT, COUNTY OF DENVER, STATE OF COLORADO | HighHorn Plastering of Colorado, Inc. v. PCL Construction Services, Inc. | Subcontractor Dispute | Counterclaim from claim by subrogee of PCL | Settled |
| Litigation | 8/23/2017 | Case# 2017CV30303 | Eagle County Court, CO | LUDWIK ELECTRIC CO., etc., Plff. vs. LION VAIL LLC, etc., et al., Dfs | Subcontractor Dispute | Subcontractor dispute | Settled |
| Litigation | 9/12/2017 | Case # 2017CV30090 | Pitkin County Court, CO | SAGHA HINDERBERGER, Plff. vs. PCL CONSTRUCTION SERVICES, INC., Dfs | Personal Injury Claim | Personal injury claim | Settled |
| Claim/REA | 3/8/2018 | Claim #9260157029-001 | NA | 250 Columbine Street v. PCL Construction Services, Inc. | Client/Owner Dispute | 250 Columbine Project - Construction installation/design requiring reconstruction/repair to several balconies. | Settled |
| Litigation | 7/23/2018 | Case # 2018CV30622 | Boulder County District Court, CO | CP/MA SEVENTY-OWNER LLC, ETC., PLTF. vs. PCL CONSTRUCTION SERVICES, INC., ETC., ET AL., DFTS | Client/Owner Dispute | Construction defect claim | Pending |
| Litigation | 9/12/2018 | Case # 2018CV32962 | Denver County District Court, CO | Denver Transit Constructors, LLC v. PCL Construction Services, Inc. v. Alliance Glazing Technologies, Inc. | Client/Owner Dispute | Construction Defect: RTD FastTracks - Eagle Project: Pedestrian Bridges and Elevator Shafts | Settled |
| Litigation | 8/30/2019 | Case # 2019CV35358 | Denver County District Court, CO | PCL Construction Services, Inc. v. Monarch Growth Inc, Monarch Casino & Resort, Inc., and Monarch Black Hawk, Inc. | Client/Owner Dispute | Owner nonpayment and interference. | Pending |
| Litigation | 10/21/2019 | Case # 2019CV30018 | Pitkin County District Court, CO | WJM 308 LLC v. COOPER STREET DEVELOPMENT, LLC, BILL POSS AND ASSOCIATES, ARCHITECTURE AND PLANNING, P.C. d/b/a POSS ARCHITECTURE + PLANNING, IRE KUGERMAN BARKLEY ARCHITECTS, PCL CONSTRUCTION SERVICES, INC., CLIMATE CONTROL COMPANY OF GLENWOOD SPRINGS, and ARCHITECTURAL ENGINEERING CONSULTANTS, INC. | Client/Owner Dispute | Construction Defect Claim | Pending |

Attachment 1, Part 3 Contract Information

1. Name of Bidder/Contractor: PCL Construction Services, Inc.

2. Type of business entity: Prime Contractor

NOTE: If bidder is a partnership or joint venture, give full names of all partners or joint venturers. Bid must be signed by all joint venturers. If bidder is a limited liability company, bid must be signed by authorized manager (may be signed by member-manager if LLC is organized to allow management by members).

3. Prequalified by City and County of Denver as Construction Contractor: _____ Categories: 1A, 2A, 2B

Monetary Limit: \$50M

4. Address of Contractor: 2000 S Colorado Blvd, Suite 2-500

Denver, CO 80222

Telephone: 303.365.6598

Fax: N/A

Email Address: rpschmidt@pcl.com

5. Established where and when: Colorado, 1984

6. Contractor's Banks: UMB Bank Colorado, n.a.

7. Principal Officers of Contractor (managers and members if LLC):

Name: Ryan Schmidt

Name: David Clarke

Title: District Manager

Title: Manager of Finance & Administration
Assistant Secretary/ Treasurer

Name: Jack Sample

Name: _____

Title: President – PCL Construction Services, Inc

Title: _____

Attachment 1, Part 3 Contract Information

8. Bidder's/Contractor's City and County of Denver Contractor License if it has obtained one:

License No.: 10664

Class: Class A

A contractor license is required prior to start of construction but not prior to bid submittal.

9. Bidder's/Contractor's state of incorporation (state of organization if an LLC or partnership): Colorado

10. Bidder's Surety: PCL has a joint and serval cop-surety facility, See below for list.

11. Surety's State of Incorporation: See Below

12. Address of Contractor in other areas (if different from No. 4): N/A

13. Name and address of person to receive payments: David Clarke, 2000 S Colorado Blvd, Suite 2-500, Denver, CO 80222

14. If the Bidder/Contractor is a joint venture, it shall attach a certified copy of the joint venture agreement. The joint venture agreement will not be included as a Contract Document.

15. The Bidder/Contractor shall identify all applicable labor agreements (if any) to be used in the performance of the Work: N/A

Sureties are as follows:

- Fidelity and Deposit Company of Maryland (A Zurich American Insurance Company – LEED cosurety partner) - Incorporated in Illinois
- Travelers Casualty and Surety Company of America - Incorporated in Connecticut
- Federal Insurance Company- Incorporated in Indiana

Attachment 1, Part 4 List of Proposed Non-M/WBEBidder Company Name: PCL Construction Services, Inc.IFB Name: CONCOURSE A CENTER CORE ESCALATOR REPLACEMENT

IFB No.: 202056518

Bidder shall list below the name, business address, work assignment and dollar value of each subcontractor that is **not** a DBE subcontractor that will perform work or labor or provide services to the Bidder relating to this Contract in an amount greater than one and one-half percent (1.5%) of the Bidder's total bid. Only one (1) subcontractor for each portion of the work shall be listed. Any proposed subcontractors to be utilized by the Bidder that are certified as a Small Business Enterprise (SBE) shall also be listed on the "List of Proposed Subcontractors" attached to this IFB.

If the Bidder does not identify a subcontractor to perform portions of the work which could be subcontracted on this form or the List of Proposed DBE Subcontractors, the Bidder, if it is awarded the Contract, agrees not to subcontract such portions that exceed one and one-half percent (1.5%) of the total bid amount until the Contractor has advised the SVP of AIM in writing of the reasons why the subcontractor was not listed in the Bid submission and complied with the requirements of General Condition 502.

If the Bidder is awarded the Contract and does not enter into a subcontract with a subcontractor listed below or on the List of Proposed M/WBE Subcontractors, the Bidder agrees not to subcontract any of the work assignment identified for that subcontractor until the Bidder has advised the SVP of AIM in writing of the reasons why a different subcontractor is being used and has obtained approval.

| Subcontractor Information | Work Assignment | Subcontract Dollar Value |
|---|------------------------|---------------------------------|
| Name: <u>Veltri Steel</u> Address: <u>4535 Goodnight Ave.</u> <u>Pueblo, CO 81005</u> Phone: <u>(719) 250-0503</u> | Structural Steel | \$102,204 |
| Name: <u>Colorado Design Tile & Terrazzo</u> Address: <u>7230 Gilpin Way, Suite 220</u> <u>Denver, CO 80229</u> Phone: <u>(303) 288-9688</u> | Terrazzo Flooring | \$102,131 |

Attachment 1, Part 4 List of Proposed Non-DBE Subcontractors

| | | |
|---|----------------------|-------------|
| Name: <u>Kone Elevators & Escalators</u> Address: <u>8585 Concord Center Drive</u> <u>Englewood, CO 80112</u> Phone: <u>(303) 792-3423</u> | Escalators | \$3,561,000 |
| Name: <u>Duffy Crane & Hauling, Inc.</u> Address: <u>10180 Brighton Rd.</u> <u>Henderson, CO 80640</u> Phone: <u>(303) 778-8484</u> | Rigging & Hoisting | \$647,650 |
| Name: <u>Metropolitan Glass Inc.</u> Address: <u>6400 Franklin Street</u> <u>Denver, CO 80229</u> Phone: <u>(303) 853-4527</u> | Escalator Enclosures | \$491,337 |
| Name: <u>Frontier Fire Protection</u> Address: <u>9430 E. 40th Ave.</u> <u>Denver, CO 80238</u> Phone: <u>(303) 629-0221</u> | Fire Suppression | \$72,851 |

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Attachment 1, Part 4 List of Proposed Non-DBE Subcontractors

| | | |
|---|-------------|-----------|
| Name: <u>BrandSafway Solutions</u> Address: <u>6435 Colorado Blvd.</u> <u>Commerce City, CO 80022</u> Phone: <u>(303) 286-8422</u> | Scaffolding | \$122,998 |
| Name: _____ Address: _____ Phone: _____ | | |
| Name: _____ Address: _____ Phone: _____ | | |
| Name: _____ Address: _____ Phone: _____ | | |

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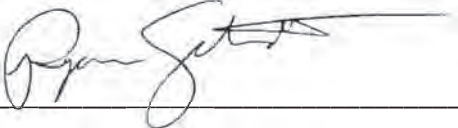
Attachment 1, Part 5 Certification of Non-Segregated Facilities

The Bidder must certify that it does not maintain or provide for its employees any segregated facilities at any of its establishments and that it does not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Bidder certifies further that it will not maintain or provide for its employees segregated facilities at any of its establishments and that it will not permit its employees to perform their services at any location under its control, where segregated facilities are maintained. The Bidder agrees that a breach of this certification is a violation of the equal opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion or national origin because of habit, local custom or any other reason. The Bidder agrees that (except where it has obtained identical certification from proposed subcontractors for specific time period) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding Ten Thousand Dollars (\$10,000) which are not exempt from the provisions of the equal opportunity clause and that it will retain such certification in its files.

Dated: 2-24-2021

PCL Construction Services, Inc.

Bidder Company Name: _____

By:  _____

Title: District Manager

Attachment 1, Part 6 Equal Opportunity Report Statement

The Bidder shall review, complete, sign and submit with its Bid this Equal Opportunity Report Statement (Statement). A Bid may be considered unresponsive and may be rejected, in the City's sole discretion, if the Bidder fails to provide the fully executed Statement or fails to furnish required data. The Bidder shall also, prior to award, furnish such other pertinent information regarding its own employment policies and practices as well as those of its proposed subcontractors as the FAA, the Owner or the Executive Vice Chairman of the President's Committee may require.

The Bidder shall furnish similar Statements executed by each of its first tier and second-tier subcontractors and shall obtain similar compliance by such subcontractors before awarding subcontracts. No subcontract shall be awarded to any non-complying subcontractor.

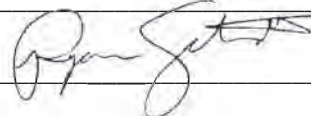
Equal Opportunity Report Statement as Required in 41 CFR 60-1.7(b)

The Bidder shall complete the following statements by checking the appropriate blanks. Failure to complete these blanks may be grounds for rejection of Bid:

1. The Bidder has has not developed and has on file at each establishment affirmative action programs pursuant to 41 CFR 60-1.40 and 41 CFR 60-2.
2. The Bidder has has not participated in any previous contract or subcontract subject to the equal opportunity clause prescribed by Executive Order 11246, as amended.
3. The Bidder has has not filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).
4. The Bidder does does not employ fifty (50) or more employees.

Dated: 2-24-2021

Bidder Company: PCL Construction Services, Inc.

By: 

Title: District Manager

Attachment 1, Part 9 Conflict of Interest

**City and County of Denver
Denver International Airport
(Please use this form)**

If no conflict of interest exists in accordance with IV-34, please sign affirmation statement.

The undersign affirms that PCL Construction Services, Inc. (Proposer) does not currently have existing contracts with the City for work at DEN, including any contracts held by Proposer's parent, affiliates or subsidiary corporations, that might create a conflict of interest if this contract is awarded to Proposer.

Signature 

District Manager

Title _____

Print Name Ryan Schmidt

Date 2/24/2021

If disclosure of potential conflict(s) of interest is required in accordance with IV-34, please use the following space to provide information. If Proposer believes a conflict of interest may exist but can be mitigated, please describe the steps it proposes that it or others could take to mitigate the conflict. If additional space is needed, please attach additional pages.

Contract No. _____ Contract Name: _____

Description of conflict: _____

Proposed mitigation: _____

Contract No. _____ Contract Name: _____

Description of conflict: _____

Proposed mitigation: _____

CURRENT CCD AND DEN CONTRACTS

PCL CONSTRUCTION SERVICES, INC.

Current contractual relationships with the City are disclosed below. There are no conflicts of interest.

| PROJECT NAME | OWNER | PROJECT / CONTRACT NUMBER |
|--------------------------------------|---------------------------|---|
| DEN PC Air | DEN | 201951778 |
| DEN CBRA | DEN | 201631740-00 (PCL is a Subcontractor to Ludvik) |
| DEN On-Call FS35 Landscape | DEN | 201738901 |
| DEN On-Call R-22 | DEN | 201738901 |
| DEN On-Call Frontier Pond Liner | DEN | 201738901 |
| DEN On-Call ARFF #1 Roof Replacement | DEN | 201738901 |
| DEN On-Call Pump Room | DEN | 201738901 |
| DEN Concourse B&C Sewer Repair | DEN | 20190765 |
| DEN Tunnel Sewer Repairs | DEN | Received Notice of Apparent Low Bidder on 2/17/2021, in progress of contract negotiations |
| On-Call Civil Construction Services | City and County of Denver | 202055392 |
| Parks & Recreation On-Call | City and County of Denver | 202055326 |
| Paco Sanchez - Reimagine Play | City and County of Denver | PWADM-201735349-00 |

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

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

▶ Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type.
See Specific Instructions on page 3.

| | |
|--|---|
| 1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank. PCL Construction Services, Inc. | |
| 2 Business name/disregarded entity name, if different from above | |
| 3 Check appropriate box for federal tax classification of the person whose name is entered on line 1; Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input checked="" type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ <small>Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.</small> <input type="checkbox"/> Other (see instructions) ▶ _____ | 4 Exemptions (codes apply only to certain entities; not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <small>(Applies to accounts maintained outside the U.S.)</small> |
| 5 Address (number, street, and apt. or suite no.) See instructions. 2000 S. Colorado Blvd., Suite 2-500 | Requester's name and address (optional) |
| 6 City, state, and ZIP code Denver, CO 80222 | |
| 7 List account number(s) here (optional) | |

Part I Taxpayer Identification Number (TIN)

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

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|--|--|--|--|--|
| Social security number | | | | | | | | | | | | | | | | | | | | | |
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| or | | | | | | | | | | | | | | | | | | | | | |
| Employer identification number | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 10%; text-align: center;">8</td> <td style="width: 10%; text-align: center;">4</td> <td style="width: 10%; text-align: center;">-</td> <td style="width: 10%; text-align: center;">0</td> <td style="width: 10%; text-align: center;">9</td> <td style="width: 10%; text-align: center;">5</td> <td style="width: 10%; text-align: center;">7</td> <td style="width: 10%; text-align: center;">5</td> <td style="width: 10%; text-align: center;">5</td> <td style="width: 10%; text-align: center;">2</td> </tr> </table> | 8 | 4 | - | 0 | 9 | 5 | 7 | 5 | 5 | 2 | | | | | | | | | | | |
| 8 | 4 | - | 0 | 9 | 5 | 7 | 5 | 5 | 2 | | | | | | | | | | | | |

Part II Certification

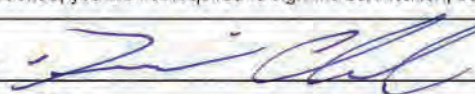
Under penalties of perjury, I certify that:

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

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

Sign Here

Signature of U.S. person ▶



Date ▶

February 3, 2021

General Instructions

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

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

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

- Form 1099-INT (interest earned or paid)

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

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

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

OFFICE OF THE SECRETARY OF STATE
OF THE STATE OF COLORADO

CERTIFICATE OF FACT OF GOOD STANDING

I, Jena Griswold, as the Secretary of State of the State of Colorado, hereby certify that, according to the records of this office,

PCL Construction, Inc.

is a

Corporation

formed or registered on 09/20/2005 under the law of Colorado, has complied with all applicable requirements of this office, and is in good standing with this office. This entity has been assigned entity identification number 20051354674 .

This certificate reflects facts established or disclosed by documents delivered to this office on paper through 02/08/2021 that have been posted, and by documents delivered to this office electronically through 02/09/2021 @ 15:42:52 .

I have affixed hereto the Great Seal of the State of Colorado and duly generated, executed, and issued this official certificate at Denver, Colorado on 02/09/2021 @ 15:42:52 in accordance with applicable law. This certificate is assigned Confirmation Number 12930915 .



A handwritten signature in blue ink that reads "Jena Griswold".

Secretary of State of the State of Colorado

*****End of Certificate*****

Notice: A certificate issued electronically from the Colorado Secretary of State's Web site is fully and immediately valid and effective. However, as an option, the issuance and validity of a certificate obtained electronically may be established by visiting the Validate a Certificate page of the Secretary of State's Web site, <http://www.sos.state.co.us/biz/CertificateSearchCriteria.do> entering the certificate's confirmation number displayed on the certificate, and following the instructions displayed. Confirming the issuance of a certificate is merely optional and is not necessary to the valid and effective issuance of a certificate. For more information, visit our Web site, <http://www.sos.state.co.us/> click "Businesses, trademarks, trade names" and select "Frequently Asked Questions."

City and County of Denver
Community Planning and Development
www.denvergov.org/contractor_licensing

License/Registration Number: LIC10664
Expiration Date: 05/31/2021
License Type: General Contractor - Class A

Issued To:

PCL CONSTRUCTION SERVICES INC
2000 S COLORADO BLVD TOWER 2
DENVER, CO 80222

By Authority of the Executive Director of
Community Planning and Development

Amount Fund/Org/Revenue Code
\$250.00 R351800--01010-0141200

Payment Date Trans # Status
05/04/2018 4329656 Paid

Wallet Contractor ID Card: **MUST BE KEPT IN YOUR POSSESSION AT ALL TIMES.**

Cut on outside of line, then fold in half.

City and County of Denver

IDENTIFICATION CARD

License/Registration No.: LIC10664

This is to certify that PCL CONSTRUCTION SERVICES INC has been issued a General Contractor - Class A license in the City and County of Denver, beginning on 04 May 2018 and ending on 31 May 2021, unless license is revoked.

By Authority of the Executive Director of
Community Planning and Development

City and County of Denver
Community Planning and Development
201 W COLFAX AVE DEPT 205
DENVER, COLORADO 80202



Licenses & Certificates: 720.865.2770
Permit Counter: 720.865.2705
Inspection Administration: 720.865.2505
Automated Inspection Request: 720.865.2501

LIC. 100 (4/100) CPDA
LIC. 100 (4/100) CPDA

Attachment 1, Part 7 Bid BondBidder PCL Construction Services, Inc.DENVER INTERNATIONAL AIRPORT
Concourse A Center Core Escalator Replacement
Contract No. 202056518

Bid Bond

KNOW ALL MEN BY THESE PRESENTS

THAT PCL Construction Services, Inc., as Principal, and Fidelity and Deposit Company of Maryland, a corporation organized and existing under and by virtue of the laws of the State of IL, and authorized to do business within the State of Colorado as Surety, are held and firmly bound unto the City and County of Denver, Colorado, as Obligee, in the full and just sum of Five Percent of Amount Bid _____ Dollars and _____ Cents (\$ 5% of Amount Bid _____) lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, the said Principal is herewith submitting its Bid, dated on February 24, 2021, for the construction of Contract No. 202056518, Concourse A Center Core Escalator Replacement, Denver International Airport, as set forth in detail in the contract documents for the City and County of Denver, Colorado, and said Obligee has required as a condition for receiving said Bid that the Principal deposit specified bid security in the amount of not less than five percent (5%) of the amount of said Bid, as it relates to work to be performed for the City, conditioned that in event of failure of the Principal to execute the Contract for such construction and furnish required Performance and Payment Bond if the Contract is offered him, that said sum be paid immediately to the Obligee as liquidated damages, and not as a Penalty, for the Principal's failure to perform.

The condition of this obligation is such that if the aforesaid Principal shall, within the period specified therefor, on the prescribed form presented to him for signature, enter into a written Contract with the Obligee in accordance with his bid as accepted, and give Performance and Payment Bond with good and sufficient surety or sureties, upon the form prescribed by the Obligee, for the faithful performance and the proper fulfillment of said Contract, or in the event of withdrawal of said bid within the time specified, or upon the payment to the Obligee of the sum determined upon herein, as liquidated damages and not as a Penalty, in the event the Principal fails to enter into said Contract and give such Performance and Payment Bond within the time specified, then this Obligation shall be null and void, otherwise to remain in full force and effect.

[END OF PAGE]

Signed, sealed and delivered this 26th day of January, 2021.

Attest:

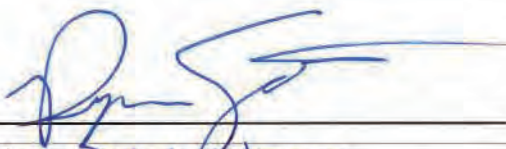


Secretary

[SEAL if bidder a corporation]

PCL Construction Services, Inc. _____

PRINCIPAL


By: 

President *District Manager*



Fidelity and Deposit Company of Maryland _____

SURETY

By: 

Attorney-in-Fact
Sandra M. Winsted

(ATTACH POWER OF ATTORNEY)

Power of Attorney shall be certified as to the date of bid.

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Sandra M. WINSTED, Diane M. O'LEARY, Susan A. WELSH, Judith A. LUCKY-EFTIMOV, James B. MCTAGGART, Debra J. DOYLE, Sandra M. NOWAK, Jessica B. DEMPSEY, Christina L. SANDOVAL, Kristin L HANNIGAN and Samantha CHERICI, all of Chicago, Illinois**, EACH, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: any and all bonds and undertakings, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland, and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland, in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 8th day of April, A.D. 2020.



**ATTEST:
ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 8th day of April, A.D. 2020, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, depose and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2023

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Secretary of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 26 day of January 2001



Brian M. Hodges

By: Brian M. Hodges
Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfclaims@zurichna.com
800-626-4577

TAB TWO ▶

DSBO Forms

- **Commitment to MWBE Participation**
- **1A - List of Proposed Subcontractors, Subconsultants, and/or Suppliers**
- **Letter of Intent**

CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518



TOGETHER WE BUILD SUCCESS.



DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO) COMMITMENT TO MWBE PARTICIPATION

This page must be completed by all Bidders/Proposers to indicate their commitment towards satisfying the MWBE participation goal. The commitment will be incorporated into the contract and thereby the selected Bidder/Proposer's will be held to that commitment. (Please check the appropriate box):

COMPLETE IF YOU ARE A NON MWBE PRIME:

The City and County of Denver has specified a 13 % MWBE Participation goal on this project. The Bidder/Proposer is committed to meeting 13 % MWBE Participation on the contract.

COMPLETE IF YOU ARE A MWBE PRIME:

The City and County of Denver has specified a _____% MWBE Participation goal on this project. The Bidder/Proposer is a certified MWBE with the City and County of Denver and is committed to meeting _____% MWBE Participation on the contract.

COMPLETE IF YOU ARE UNABLE TO MEET PROJECT GOAL:

The City and County of Denver has specified a _____% MWBE Participation goal on this project. The Bidder/Proposer is unable to meet this project goal but is committed to a _____% MWBE Participation on the contract. The Bidder/Proposer must make adequate good faith efforts to meet this goal in order to be deemed responsive. The Bidder/Proposer must submit a detailed statement and documentation of their good faith efforts. Award of the contract will be conditioned on meeting the requirements of this section, in accordance of Chapter 28 of the D.R.M.C. to the Division of Small Business Opportunity.

The undersigned Bidder/Proposer hereby agrees and understands that they must comply with their MWBE commitments in this project in conformity with the Requirements, Terms, and Conditions of this MWBE Procurement/Contract Language.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 2/24/2021

Address: 2000 S. Colorado Blvd, Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303.365.6598

Email: rpschmidt@pcl.com



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: Hillen Demolition, LLC

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Scott Heldt

Title: Director of Field Operations

Signature:

Date: 2/19/21

Address: 7600 Dahlia Street

City: Commerce City

State: CO

Zip: 80022

Phone: 303-548-3672

Email: sheldt@hillencorp.com

Scope of Work: Demolition

NAICS Code(s):

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 345,464⁰⁰

4.52%

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm:

Firm's Representative:

Title:

Signature:

Date:

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: Affordable Concrete LLC

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Daragh Goode

Title: Project Manager/Estimator

Signature:

Date: 2/18/2021

Address: 6996 Hwy 2

City: Commerce City

State: CO

Zip: 80022

Phone: 720-727-3921

Email: daragh@affordableconcretellc.com

Scope of Work: Concrete

NAICS Code(s): 236220, 237310, 238110

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 26,178

0.34 %

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm:

Firm's Representative:

Title:

Signature:

Date:

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN - Concourse A Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: J.A. Hall Industries, Inc.

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Audrey Etta Hall

Title: President/CEO

Signature: AUDREY ETTA HALL

Digitally signed by AUDREY ETTA HALL
DN: c=US, E=AUDREY@JAHALLINDUSTRIES.COM, O=J.A. HALL INDUSTRIES, INC.,
OU=AUDREY ETTA HALL,
Date: 2021.02.16 17:22:34-0700

Date: 02/16/2021

Address: 6007 Nelson St

City: Arvada

State: CO

Zip: 80004

Phone: 928-271-0809

Email: audrey@jahallindustries.com

Scope of Work: Steel Supply

NAICS Code(s): 423510

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 15,000.00

0.20 %

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm: Veltri Steel, LLC.

Firm's Representative: Stephen A. Cordts

Title: Vice President

Signature: Stephen A. Cordts

Digitally signed by Stephen A. Cordts
DN: c=US, E=scordts@veltristeel.com,
O=Veltri Steel, LLC., CN=Stephen A.
Cordts
Date: 2021.02.17 08:01:10-0700

Date: 02/17/2021

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: Independent Construction LLP

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Fernando Corrales

Title: President

Signature: Fernando Corrales

Date: 2/22/2021

Address: 3136 E 112th Place

City: Thornton

State: CO

Zip: 80233

Phone: 303-434-6961

Email: fernando@independentconstruction.net

Scope of Work: Gypsum Wallboard

NAICS Code(s): 238310

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 41,486

0.54%

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm:

Firm's Representative:

Title:

Signature:

Date:

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: Quality Linings and Painting Inc.

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Anton Barlow

Title: Estimator

Signature:

Date: 02/19/2021

Address: 8250 E 40th Ave.

City: Denver

State: Colorado

Zip: 80207

Phone: 303-307-1313

Email: Anton@qlapi.com

Scope of Work: Paint

NAICS Code(s): 238320

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 32,157

0.42%

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm:

Firm's Representative:

Title:

Signature:

Date:

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: St. Andrews Construction Services Corp.

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Steve Wren

Title: Vice President

Signature:

Date: 2/19/2021

Address: 12520 First St.

City: Eastlake

State: CO

Zip: 80614

Phone: 303-439-7999

Email: steve@sacscolorado.com

Scope of Work: Electrical installation

NAICS Code(s): 238210

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 324,900

4.25 %

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm:

Firm's Representative:

Title:

Signature:

Date:

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: VIVA RAILINGS, LLC

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: ASHISH KACHAKAYALA

Title: ESTIMATOR

Signature:

Date: 02/20/2021

Address: 151 W. VISTA RIDGE MALL DR

City: LEWISVILLE

State: TX

Zip: 75067

Phone: 972.353.8482-83

Email: ashish@vivarailings.com

Scope of Work: 05 73 00 - DECORATIVE METAL RAILINGS

NAICS Code(s): #332323 - Ornamental and Architectural Metal Work Manufacturing

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 144,090

1.89 %

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm:

Firm's Representative:

Title:

Signature:

Date:

*If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.*



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
LETTER OF INTENT (LOI)**

Contract No.: 202056518

Project Name: DEN Concourse A Center Core Escalator Replacement

A. The undersigned Bidder/Proposer intends to engage the undersigned MWBE, SBE, EBE or DBE to perform work if awarded the contract. This Letter of Intent must be Signed by the Bidder/Proposer and MWBE, SBE, EBE or DBE. Certified self-performing Prime must complete both sections A and B. If the MWBE, SBE, EBE or DBE is a lower tier, section C must be completed and signed by the firm directly utilizing the certified firm.

Bidder/Proposer (Name of Firm): PCL Construction Services, Inc.

Self-Performing:

 Yes No

Firm's Representative: Ryan Schmidt

Title: District Manager

Signature (Firm's Representative):

Date: 12/22/20

Address: 2000 S. Colorado Blvd. Suite 2-500

City: Denver

State: CO

Zip: 80222

Phone: 303-365-6598

Email: rpschmidt@pcl.com

B. The Following Section is To Be Completed by the MWBE, SBE, EBE or DBE, at any tier. Identify the scope of the work and NAICS code(s) to be performed and/or supply item that will be provided by the MWBE, SBE, EBE or DBE.

Name of Firm: Architectural Aluminum Fabrication, Inc.

 MWBE(v) SBE(v) EBE(v) DBE(v)

Firm's Representative: Alishia Garcia

Title: President

Signature:

Date: 2/24/2021

Address: 1963 Jasper Street, Unit A

City: Aurora

State: CO

Zip: 80011

Phone: 720-532-0793

Email: agarcia@aafusa.net

Scope of Work: Fabrication and Materials

NAICS Code(s): 332322

The Bidder/Proposer intends to utilize the aforementioned MWBE, SBE, EBE or DBE for the Work/Supply described above. The cost of the work and percentage of the total subcontractor MWBE, SBE, EBE or DBE bid amount is:

\$ 246,408

3.23 %

C. Lower Tier Utilization: If the certified firm is not a direct first tier subcontractor, subconsultant, and/or supplier to the Bidder/Proposer, please indicate the name of the firm that is utilizing the certified firm:

Name of Firm: Metropolitan Glass Inc.

Digitally signed by Christian Wangaard

DN: C=US, E=christian@metroglass.com,

Firm's Representative: Christian Wangaard

O=MGI, OU=Metropolitan Glass,

CN=Christian Wangaard

Title: Estimator

Signature:

Date: 2021.02.24 11:11:48-07'00'

Date: 02/23/21

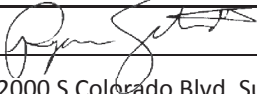
If the above-named Bidder/Proposer is not determined to be the successful Bidder/Proposer, this **Letter of Intent** shall be null and void.



**DIVISION OF SMALL BUSINESS OPPORTUNITY (DSBO)
1A - LIST OF PROPOSED SUBCONTRACTORS,
SUBCONSULTANTS, AND/OR SUPPLIERS**

City & County of Denver Contract No.: 202056518 - DEN Concourse A Center Core Escalator Replacement

The undersigned proposes to utilize all listed firms. Any certified firm listed must be certified by the City and County of Denver and a **Letter of Intent (LOI)** submitted for each. If additional pages are required, please copy and attach the second page. This form must be updated and submitted to DSBO when subcontractors, subconsultants, and/or suppliers are added throughout the contract duration.

| Contractor/Consultant | | |
|--|--------------------------|--|
| Name of Firm: PCL Construction Services, Inc. | | <input type="checkbox"/> MWBE (v) <input type="checkbox"/> SBE (v) <input type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) |
| Firm's Representative: Ryan Schmidt | | |
| Signature:  | | Date: 02/24/2021 |
| Address: 2000 S Colorado Blvd, Suite 2-500 | | |
| City: Denver | State: CO | Zip: 80202 |
| Phone: 303-365-6598 | Email: rpschmidt@pcl.com | |
| Total Contract Value \$: 7,638,966 | | Self-Performing Contract Value \$: 648,725 |

| Subcontractors, Subconsultants, and/or Suppliers | | |
|--|---|---|
| Name of Firm: Hillen Demolition, LLC | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) |
| Firm's Representative: Scott Heldt | | |
| Phone: 303-548-3672 | Email: sheldt@hillencorp.com | |
| Type of Service: Demolition | Contract Value \$: 345,564 | |
| Anticipated Start Date: July 2021 | Anticipated Completion Date: October 2022 | |

| | | |
|---------------------------------------|---|---|
| Name of Firm: Affordable Concrete LLC | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) |
| Firm's Representative: Daragh Goode | | |
| Phone: 720-727-3921 | Email: daragh@affordableconcretellc.com | |
| Type of Service: Concrete | Contract Value \$: 26,178 | |
| Anticipated Start Date: July 2021 | Anticipated Completion Date: October 2022 | |

| | | |
|--|---|--|
| Name of Firm: J.A. Hall Industries, Inc. | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input checked="" type="checkbox"/> EBE (v) |
| Firm's Representative: Audrey Etta Hall | | |
| Phone: 928-271-0809 | Email: audrey@jahallindustries.com | |
| Type of Service: Steel Supply | Contract Value \$: 15,000 | |
| Anticipated Start Date: July 2021 | Anticipated Completion Date: October 2022 | |



| | | | |
|--|--|--|--|
| Name of Firm: Independent Construction | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input checked="" type="checkbox"/> EBE (v) | |
| Firm's Representative: Fernando Corrales | | | |
| Phone: 303-434-6961 | | Email:fernando@independentconstruction.net | |
| Type of Service: Framing and Drywall | | Contract Value \$: 41,486 | |
| Anticipated Start Date: July 2021 | | Anticipated Completion Date: October 2022 | |

| | | | |
|--|--|---|--|
| Name of Firm: Quality Linings and Painting, Inc. | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) | |
| Firm's Representative: Anton Barlow | | | |
| Phone: 303-307-1313 | | Email:anton@qlapi.com | |
| Type of Service: Painting | | Contract Value \$: 32,157 | |
| Anticipated Start Date: July 2021 | | Anticipated Completion Date: October 2022 | |

| | | | |
|---|--|---|--|
| Name of Firm: St. Andrews Construction Services Corp. | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) | |
| Firm's Representative: Steve Wren | | | |
| Phone: 303-439-7999 | | Email:steve@sacscolorado.com | |
| Type of Service: Electrical | | Contract Value \$: 324,900 | |
| Anticipated Start Date: July 2021 | | Anticipated Completion Date: October 2022 | |

| | | | |
|---|--|---|--|
| Name of Firm: Viva Railings, LLC | | <input checked="" type="checkbox"/> MWBE (v) <input type="checkbox"/> SBE (v) <input type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) | |
| Firm's Representative: Ashish Kachakayala | | | |
| Phone: 972-353-8482 | | Email:ashish@vivarailings.com | |
| Type of Service: Glass Railing | | Contract Value \$: 144,090 | |
| Anticipated Start Date: July 2021 | | Anticipated Completion Date: October 2022 | |

| | | | |
|---------------------------------------|--|--|--|
| Name of Firm: AAF | | <input checked="" type="checkbox"/> MWBE (v) <input checked="" type="checkbox"/> SBE (v) <input checked="" type="checkbox"/> DBE (v) <input checked="" type="checkbox"/> EBE (v) | |
| Firm's Representative: Alishia Garcia | | | |
| Phone: 972-353-8482 | | Email:agarcia@aafusa.com | |
| Type of Service: Escalator Enclosure | | Contract Value \$: 246, 408 | |
| Anticipated Start Date: July 2021 | | Anticipated Completion Date: October 2022 | |

| | | | |
|-------------------------|--|--|--|
| Name of Firm: | | <input type="checkbox"/> MWBE (v) <input type="checkbox"/> SBE (v) <input type="checkbox"/> DBE (v) <input type="checkbox"/> EBE (v) | |
| Firm's Representative: | | | |
| Phone: | | Email: | |
| Type of Service: | | Contract Value \$: | |
| Anticipated Start Date: | | Anticipated Completion Date: | |

TAB THREE ▶

Diversity Survey

- ***Diversity and Inclusiveness in City Solicitations
(online survey – include the completed survey with your Bid submission)***

CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518



TOGETHER WE BUILD SUCCESS.

| | |
|---|--|
| Reference # | 13551177 |
| Status | Complete |
| Business Email Address | RPSchmidt@PCL.com |
| Enter Email Address of City and County of Denver contact person facilitating this solicitation. | contract.procurement@flydenver.com |
| Please provide the City Agency that is facilitating this solicitation: | Denver International Airport |
| Project Name | Concourse A Center Core Escalator Replacement |
| Solicitation No. (Check Below if Not Applicable) | 202056518 |
| Name of Your Company | PCL Construction Services, Inc. |
| What Industry is Your Business? | Construction/Landscape/Maintenance Services |
| Address | 2000 S Colorado Blvd., Suite 2-500 |
| City | Denver |
| State | Colorado |
| Zip Code | 80222 |
| Business Phone Number | 3033656500 |
| 1. How many employees does your company employ? | Over 100 |
| Number of Full Time: | 119 |
| Number of Part Time: | 0 |
| 2. Do you have a Diversity and Inclusiveness Program? | Yes |
| 2.1. Employment and retention? | Yes |
| 2.2. Procurement and supply chain activities? | Yes |
| 2.3. Customer Service? | Yes |
| 3. Provide a detailed narrative of your company's diversity and inclusiveness principles and programs. This may include, for example, (i) diversity and inclusiveness employee training programs, equal opportunity policies, and the budget amount spent on an annual basis for workplace diversity; or (ii) diversity and inclusiveness training and information to improve customer service. (If Not Applicable, please type N/A below) | <p>PCL values diversity in our clients, projects, workforce, and business partners. We integrate inclusivity into every level of our company. We recognize that inclusive practices within our workforce and business partnerships position PCL to advance and sustain our position as a world-class builder by leveraging diverse talent and expertise, backgrounds, and perspectives. Across our organization, our business units employ best practices to meet the diversity, equity, and inclusion objectives of PCL, as well as of the clients and communities we serve.</p> <p>Diversity, equity, and Inclusion practices align with the core values and guiding principles of our company and have been</p> |

underway for a number of years. Our Diversity, equity and inclusion efforts go beyond occasional training and are always instead integrated throughout the entire company. We have established sector-wide DE&I councils championed by our executive leadership and our U.S. Director of Diversity, Equity and Inclusion, that are supported by district-level chapters and committees. This way we can achieve our goals faster and more efficiently through hands-on and localized dialogue, collaboration and action.

Corporate Diversity, Equity & Inclusion Statement:

We've always known that people are our greatest asset. Construction is a complicated business, and our success requires the skills and efforts of a diverse group of people, engaged in a wide variety of activities. Our 100- plus-year tradition of construction excellence is attributable to the efforts of people from different cultures and backgrounds and with different beliefs. PCL values the additional perspectives, solutions, and ideas that come from a diverse workforce and business partners. We recognize that these factors allow us to better achieve company objectives and meet the needs of our customers.

We value diversity and are intentionally inclusive in the areas of:

-Talent

PCL recognizes diversity as a competitive advantage and is focused on attracting and retaining the industry's best talent. A diverse company starts with the people we hire. People from a variety of backgrounds bring something unique to our company, and we are stronger for choosing to include everyone. We strive to attract and retain the industry's best talent through recruitment, engagement and career development practices.

-Workplace

PCL aspires to be a workplace that represents the diverse communities in which we work, promoting a culture that fosters a sense of belonging, equity, mutual respect, and ownership through our people, processes, and programs.

-Industry

Beyond our own offices, we partner with diverse clients and subcontractors. We deliver value to our communities by leveraging diverse, industry-leading talent charged with providing solutions through diversity of thought, innovative thinking, partnerships and collaboration. PCL provides Supplier Diversity Resources, guidance and support to identify potential Diverse, Women and Minority Business Enterprises partners.

-Community

PCL is actively invested in the communities we serve. We support an array of community-based organizations that provide education, training and career assistance to diverse groups of people in the spirit of stewardship and volunteerism.

PCL is an equal opportunity employer and will not discriminate against any applicant, employee, vendor or business partner

because of race, religion, color, gender, sexual orientation, physical or mental disability, age, ancestry, place of origin, national origin, marital status, family status, or veteran status.

What binds us all together, regardless of jobs or personal characteristics, is a shared set of core values: honesty, integrity, respect, passion, and the development of a dynamic culture where everyone can learn, teach, improve, and add value for our customers, and our business and community partners.

At PCL, We Choose to Include.

Corporate Employee Diversity Programs

Our employee diversity programs address recruitment, engagement, advancement, and retention of diverse individuals, as well as veterans and service members. Under our executive leadership, we continue to advance our strategies and efforts to promote workplace diversity to meet industry and organizational demands. Our current efforts include:

Unconscious Bias Training and Discussion Sessions

Executing training and establishing dialogue to increase awareness and to expand more inclusive cultures throughout our company. Unconscious Bias training provides an avenue to focus on and impact our recruiting, hiring, coaching, mentoring and general workplace practices to grow inclusive leaders as diversity champions.

Recruitment

- Partnering and sponsoring diverse student and professional industry organizations to engage diverse potential candidates
- Targeting and attending diversity-focused career fairs to increase pool of qualified diverse candidates
- Leveraging our social media presence (LinkedIn, Twitter, Facebook, etc.) to share events and key messages that reflect our diversity and inclusion objectives
- Encouraging women and diverse employees to provide referrals of other qualified candidates interested in pursuing a career at PCL
- Supporting organizations focused on providing STEM and construction education and career opportunities to girls and historically under-represented youth

Internal Engagement

- Targeted programming designed to promote and increase diverse representation at all levels of the company (Women's Leadership Summit, AGC's Culture of Care to build a more inclusive industry partnership, Veteran Engagement Programs
- Development of a central internal webpage providing access to diversity-focused education, awareness, and resource materials
- Conducting internal campaigns such as Women in Construction Week (Aligned with the National Association of Women in Construction's March celebration) to spotlight the contributions and career achievements made by women of PCL
- Promotion of employee involvement in volunteer opportunities in community organizations and events focused on education, training, and support of women, diverse individuals, and veterans/service members

Advancement/Retention

- Modification of the company's internal professional/leadership development program to a more inclusive model. The PCL Leadership Academy has recently transitioned into a self-nominating program that is accessible to all eligible employees interested in participating (and not limited only to those nominated by management).
- Ongoing development of employee mentoring and sponsorship programming to increase visibility, access, and advancement opportunities to women, diverse individuals, and veterans/service members employed by PCL
- Consistent assessment of corporate climate and employee engagement through periodic formal companywide engagement surveys
- Integration of diversity and inclusion themes into new and existing training and leadership development curriculum

PCL's targeted budget for 2021 for diversity, equity and inclusion programs, education, industry organization memberships, and contributions is \$85,000.

4. Does your company regularly communicate its diversity and inclusiveness policies to employees?

Yes

If you answered Yes to Question 4, how does your company regularly communicate its diversity and inclusiveness policies to employees? (Select all that apply)

- Employee Training
- Pamphlets
- Public EEO Postings
- Other (Corporate email, intranet, initiatives and campaigns)

5. How often do you provide training and diversity and inclusiveness principles?

Other (Upon hire, and as part of a rotating corporate training/professional development schedule)

5.1 What percentage of the total number of employees generally participate?

51-75%

6. State how you achieve diversity and inclusiveness in supply and procurement activities. This may include, for example, narratives of training programs, equal opportunity policies, diversity or inclusiveness partnership programs, mentoring and outreach programs, and the amount and description of budget spent on an annual basis for procurement and supplier diversity and inclusiveness. (If Not Applicable, please type N/A below)

PCL values diversity in our clients, workforce, and partners. We consistently seek relationships with suppliers and subcontractors that advance our efforts to deliver exceptional services and performance to our clients. In addition, we strive to form strong bonds within the communities where we work and live.

PCL staff involved in purchasing and subcontracting are encouraged to identify and include diverse suppliers and subcontractors in the procurement process. Our goal is to promote inclusive practices that provide maximum opportunity to all companies that meet our purchasing and contracting standards, while:

- Increasing our pool of small, minority, and woman owned business partners, while maintaining current standards of safety, quality, competitive pricing, and project delivery
- Ensuring that small, minority, and woman-owned businesses are treated fairly during the procurement process
- Helping small and diverse businesses understand PCL's supplier/subcontractor related policies and procedures

- Encouraging small and diverse businesses to become certified through the appropriate regional, national, and industry organizations

Supplier diversity classifications include:

Small/Disadvantaged, Small, Minority, Women, Veteran, Service-Disabled Veteran, Historically Underutilized Business Zone, Nonprofits, Alaskan Native Corporations/Indian Tribes, LGBT, physically challenged or disabled, and other protected groups.

Supplier Diversity Activities

Our supplier diversity engagement efforts include outreach, subcontractor mentorship and development, and procurement processes designed to maximize small/diverse company participation. As a company, we are committed to supporting diverse, historically underutilized, and disadvantaged business enterprises. In addition, we support community-based organizations that provide education, training and assistance to diverse individuals and businesses.

Outreach/Engagement

PCL understands the importance of providing access to opportunities through outreach to small and diverse businesses. Our outreach efforts include:

- Frequent communications via multiple channels to provide businesses with information on outreach activities and subcontracting opportunities
- Large- and small-scale outreach events to build relationships with local small/diverse businesses and provide guidance on PCL prequalification and solicitation processes
- Vendor Database - Small and diverse businesses are encouraged to register in our Supplier Database to alert us of their interest in pursuing business/opportunities with PCL and provide basic information that assists us in soliciting bids.
- Membership/participation in local small and diverse business organizations
- Subcontractor mentorship and development: We are committed to the success of our small/diverse business partners and seek opportunities to provide mentoring and guidance on industry best practices in safety, quality, and project execution.

Procurement processes to maximize small/diverse company participation:

- Packaging break-down to identify opportunities that match capabilities within the community
 - Maintaining a directory of resources to serve as a reference point for firms seeking assistance and support services
 - Facilitating relationships and opportunities between subcontractors and for small businesses through networking and referrals
 - Pre-bid screening to identify insurance, liability claims, safety histories, and financial issues that have the potential of impacting bid participation and performance
- In addition to our external engagement efforts, we employ a number of streamlined processes designed to

- ensure small business success, including:
- Subcontractor Default Insurance
 - Electronic payment system for expedited payments
 - Periodic check-ins with small/diverse business partners to ensure early identification and resolution of issues that may arise

Annual budget expenditures for procurement and supplier diversity and inclusiveness are based on project and pursuit load, but average approximately \$25,000 per year. Supplier diversity budgets are allocated based on anticipated expenditures for large and small scale outreach events, diverse business organization membership dues, and other engagement activities (such as sponsored workshops).

| | |
|---|--|
| 7. Do you have a diversity and inclusiveness committee? | Yes |
| 7.1 If Yes, how often does it meet? | Monthly |
| 8. Do you have a budget for diversity and inclusiveness efforts? | Yes |
| 9. Does your company integrate diversity and inclusion competencies into executive/manager performance evaluation plans? | No |
| I attest that the information represented herein is true, correct and complete, to the best of my knowledge. | Check Here if the Above Statement is True. |
| Name of Person Completing Form | Michelle Curry |
| Today's Date | 01-22-2021 |
| Last Update | 2021-01-22 14:36:59 |
| Start Time | 2021-01-22 10:44:32 |
| Finish Time | 2021-01-22 14:36:59 |
| IP | 4.14.118.194 |
| Browser | IE |
| Device | Desktop |
| Referrer | https://fs7.formsite.com/CCDenver/form161/index.html |

TAB FOUR ▶

Financial Forms

- **Schedule of Prices/Values and Quantities**
- **Scope Clarifications**

CONCOURSE A CENTER CORE
ESCALATOR REPLACEMENT
CONTRACT NO. 202056518



TOGETHER WE BUILD SUCCESS.

Bid Form
Denver International Airport
Concourse A Center Core Escalator Replacement
Contract 202056518

Contractor Name: PCL Construction Services, Inc.

CONTRACT DOCUMENTS:

1. Having examined the Contract Documents, and having examined the premises and circumstances affecting the proper execution of the Work, the bid costs are as follows:

TOTAL LUMP SUM PRICE:

2. To furnish all management, labor, supervision, materials, equipment, tools, testing, commissioning, and incidentals for the complete construction of the Concourse A Center Core Escalator Replacement at the lump sum price of:

| DESCRIPTION OF COSTS | Lump Sum (\$) |
|---|---------------|
| Division 01 - General Requirements | \$1,474,823 |
| Division 02 - Existing Conditions | \$360,764 |
| Division 03 - Concrete | \$26,178 |
| Division 05 - Metals | \$737,631 |
| Division 06 - Wood, Plastics and Composites | \$36,495 |
| Division 07 - Thermal and Moisture Protection | \$18,940 |
| Division 09 - Finishes | \$177,365 |
| Division 14 - Conveying Systems | \$4,208,650 |
| Division 21 - Fire Suppression | \$72,851 |
| Division 26 - Electrical | \$309,900 |
| Division 27 - Communications | \$15,000 |
| Permit Fees | \$29,617 |
| Bonds | \$79,701 |
| Insurance(s) | \$78,831 |
| Textura fees | \$12,220 |

Total Lump Sum Bid

\$7,638,966

Total Lump Sum Bid in Words:

Seven million, six hundred thirty eight thousand, nine hundred and

sixty six dollars.



DEN Concourse A Center Core Escalator Replacement

Scope Clarifications

DEN Contract Number 202056518

February 24, 2021

General Clarifications

1. Our proposal is based on a (480) calendar day schedule with PCL receiving a Notice to Proceed and full authorization to expend costs on or before July 15, 2021.
2. Pricing is based on DEN continuing to provide PCL with office space under Concourse B and onsite parking access for our Superintendents at no cost to PCL.
3. All temporary utility consumption charges (i.e. gas, electric, water, etc.) for construction operations are by DEN.

Scope Clarifications

1. The 265 lbs. step loading requirement detailed in Addendum No. 3 is applicable for a 40" wide step. Since this project calls for a 32" wide step, our proposal is based on an enhanced step loading of 220 lbs. This is consistent with all escalator manufacturers for a 32" wide step.
2. 1-year warranty and maintenance period for each set of escalators starts upon turn-over of the escalators to DEN for public use. A single warranty start date will not be used on both the North and South sets of escalators due to the phased turn-over of each area.
3. New escalators to tie into the existing Lift Net Management System. The interface for the monitoring system shall take place at the escalator controller.
4. DEN to register the new escalators with the State of Colorado prior to installation and provide notification of the decommissioned units.
5. Pricing is based on the existing beam smoke detectors on the AGTS level being taken off-line for the duration of work onsite and verified to be functional at completion of the project. Pricing assumes existing beam smoke detectors are in good working condition and do not need to be replaced.

Exclusions

1. Buy American or Buy America procurement requirements
2. Interim smoke/fire detection or notification, interim fire sprinkler, fire watch, or emergency communication systems during construction
3. Code remediation of any existing code violations
4. Hazardous material removal or remediation

Contract & Insurance Clarifications

1. Delays due to permitting, hazardous material abatement, unforeseen conditions, or other factors beyond the control of PCL will initiate granting of an extension of schedule and associated costs to accommodate the lost time.
2. Proposal does not include any potential impacts, costs, charges, delays, or other schedule changes that might arise due to Coronavirus Disease 2019 (COVID-19) or any similar epidemic/pandemic.



DEN Concourse A Center Core Escalator Replacement Scope Clarifications

DEN Contract Number 202056518

February 24, 2021

3. Proposal does not include any potential escalation in the prices of any materials, equipment, or services used in the performance of the Work caused directly or indirectly by the imposition of Canadian, US, or other tariffs. In the event of a change in the prices of any materials, equipment, or services used in the performance of the Work (measured as the difference between the price assumed or incorporated in this Proposal and the price paid by Contractor for the materials or equipment) caused directly or indirectly by the imposition of Canadian, US, or other tariffs, a Change Order shall be issued changing the Contract Price to account for the difference.