



DULUTH INTERNATIONAL AIRPORT

Closer to everywhere.

**DULUTH INTERNATIONAL AIRPORT
NEW PASSENGER TERMINAL
BID PACKAGE 2 B
ISSUE FOR BID**

RS&H PROJ. No. – 214.1882.091
CITY OF DULUTH BID No. 11-4403

**PROJECT MANUAL
VOLUME 2 OF 3**

Date: AUGUST 23, 2011



Architects and Civil Engineers:
**REYNOLDS SMITH AND HILLS,
INC.**

4525 Airport Approach Road
Duluth, MN 55811
TEL: (218) 722-1227 /
FAX: (218) 722-1052

M/E/P/FP Engineers:
COSENTINI ASSOCIATES INC.
1 South Wacker Drive, 37th Floor,
Chicago IL 60606
TEL: (312) 201-7408 /
FAX: (312) 201-0031

Structural Engineers:
MBJ CONSULTING ENG.

501 Lake Avenue South, Suite 300,
Duluth MN 55802
TEL: (218) 722-1056 /
FAX: (218) 722-9306

Baggage Handling Systems Consultants:
BNP ASSOCIATES INC.

101 East Ridge Office Park, Suite 103,
Danbury CT 06810
TEL: (203) 792-3000 /
FAX: (203) 792-4900



Interior Architects:
SJA ARCHITECTS

11 E Superior Street Suite 340, Duluth
MN 55802
TEL: (218) 724-8578 /
FAX: (218) 724-8717

Public Address Consultants:
SHEN, MILSOM, & WILKE, LLC

2 N. Riverside Plaza #1460
Chicago, IL 60606
TEL: (312) 559-4585
FAX: (312) 559-5393

TABLE OF CONTENTS
VOLUME 1 of 3

INDEX OF PAGES

PART 1 – TITLE

Title Page	
Table of Contents.....	TOC 1-6
Certification Page.....	1

PART 2 - BID INFORMATION AND PROPOSAL FORMS

Invitation to Bid	INV 1-4
Notice to Bidders.....	1
City of Duluth Instructions to Bidders	IB 1-6
00100 Kraus-Anderson Construction Company Instructions to Bidders	6
00305 Bid Form	7
General Specifications	1
00500 List of Contract Documents	1
Bid Bond	1
Contract	7
Payment Bond	3
Performance Bond	3
Lien Release	1
Non-Collusion Affidavit.....	1
Data for Labor Cost Bidding	1
00829 Project Labor Agreement	13
00830 Wage Determination Schedule.....	1
Prevailing Wage Statement.....	1
Prevailing Wage Rates, Highway, Heavy, Building Commercial and State.....	30
01014 Work Scope Descriptions	61
Bid Certifications	CERT 1-8
Department of Transportation DBE Program (49 CFE Part 26)	1-25
Minnesota Department of Revenue Requirements IC134	1-2
Surety Deposits for Non-Minnesota Construction Contractors.....	1-4
Request to Sublet	1-2
Notice of Certification of Truck Rental Rates.....	3
Notice of Determination of Truck Rental Rates.....	3
Disbarred Contractor List	2
Locate Utilities Requirement	1

PART 3 - MANDATORY CONTRACT PROVISIONS

Special Instruction to Bidders Regarding EEO	MCP 1-3
Buy American Certification	MCP 4-9
Certification to Bidder Regarding EEO	MCP 10-11
Section A-Wage, Labor, EEO, Safety and General Requirements	MCP 12-13
Section B-Davis-Bacon Act Requirement.....	MCP 14-18
Section C-Contract Work hours and Safety Standards Act Requirements.....	MCP 19
Section D-Clean Air and Water Pollution Control Requirements	MCP 20

PART 3 - MANDATORY CONTRACT PROVISIONS – continued

Section E-Contractor Contractual Requirements Pursuant to Civil Rights Act of 1964, Title VI (49 CFR Part 21)	MCP 21-22
Section F-Termination of Contract (49 CFR Part 18).....	MCP 23
Section G-Buy American - Steel and Manufactured Products for Construction Contracts.....	MCP 24
Section H-Equal Employment Opportunity (41 CFR Part 60-1.4(b))	MCP 25
Section I-Standard Federal Equal Employment Opportunity Construction Contract Specifications (41 CFR 60-4.3)	MCP 26-30
Section J-Mandatory Requirement for all AIP Funded Construction Projects Involving Electrical Energy or Other Hazardous Energy Sources	MCP 31
Section K-Disadvantaged Business Enterprise Contract Provisions (49 CFR Part 26)	MCP 32-33
Section L-Energy Conservation Requirements (49 CFR Part 18.36(i)(13)).....	MCP 34
Section M-Lobbying and Influencing Federal Employees (49 CFR Part 20, Appendix A).....	MCP -35

PART 4 - GENERAL PROVISIONS

Section 10	Definition of Terms	GP 10-1-5
Section 20	Proposal Requirements & Conditions	GP-20-6-9
Section 30	Award and Execution of Contract	GP-30-10-11
Section 40	Scope of Work	GP-40-12-14
Section 50	Control of Work	GP-50-15-22
Section 60	Control of Materials	GP-60-23-26
Section 70	Legal Relations and Responsibility to Public	GP-70-27-33
Section 80	Prosecution and Progress	GP-80-34-40
Section 90	Measurement and Payment	GP-90-41-48
Section 100	Contractor Quality Control Program	GP-100-49-55
Section 110	Method of Estimating Percentage of Material	GP-110-56-63
Section 120	Nuclear Gages	GP-120-64-65

PART 5 – SUPPLEMENTARY GENERAL CONDITIONS

City of Duluth - Part II - Supplementary General Conditions	1-18
Insurance and Indemnification Requirements	1-2
EEO Compliance Certificate.....	1-3

PART 6 - SAFETY & SECURITY

Construction Safety & Security Compliance for Aircraft Operations Area.....	1-51
FAA Advisory Circular 150/5370-2E-Operational Safety on Airports During Construction	1-16
Appendices to 150/5370-2E	A1-7

PART 7 - SPECIAL CONDITIONS

Section	1	Project Information	SC 1-10
Section	2	(Deleted)
Section	3	Miscellaneous	SC 12-16
Section	4	Listing of Duties, Responsibilities and Limitations of Authority of the Resident Project Representative	SC 17-20
Section	5	Shop Drawing Submittal Summary	SC 21

PART 8 – SPECIAL PROVISIONS

SP-1	Note to Engineers	SP-1
SP-2	Forms and Regulations.....	SP-2
SP-3	Certification Page	SP-3

**END VOLUME 1 of 3
TABLE OF CONTENTS**

TABLE OF CONTENTS
VOLUME 2 of 3

PART 10 – DIVISIONS 1-16 TECHNICAL SPECIFICATIONS

<u>DIVISION 01 – GENERAL REQUIREMENTS</u>		Pages
01010	Summary of Work	3
01027	Applications for Payment	6
01035	Modification Procedures	4
01040	Coordination	5
01041	Schedules	3
01045	Cutting and Patching	2
01200	Project Meetings	3
01210	Allowances	4
01230	Alternates	3
01270	Unit Prices	1
01300	Submittals	4
01361	Sustainable Design Requirements	29
01400	Quality Control Testing Services	3
01421	Standards and Definitions	4
01500	Construction Facilities and Temporary Controls	5
01631	Products and Substitutions	4
01700	Contract Closeout	6
01710	Cleaning Up	2
01720	Project Record Documents	4
01740	Warranties	3
01742	Construction Waste Management	11
<u>DIVISION 05 – METALS</u>		
05500	Metal Fabrications	6
05700	Ornamental Metal	9
05721	Ornamental Handrails and Railings	8
<u>DIVISION 06 – CARPENTRY, WOODS AND PLASTICS</u>		
06100	Rough Carpentry	5
06402	Interior Architectural Woodwork	9
06422	Flush Wood Paneling	8
06424	Solid Phenolic Wall Paneling	6
06611	Solid Polymer Fabrications	4
<u>DIVISION 07 – THERMAL AND MOISTURE PROTECTION</u>		
07841	Through-Penetration Firestop Systems	9
07920	Joint Sealants	12
<u>DIVISION 08 – DOORS AND WINDOWS</u>		
08110	Steel Doors and Frames	12
08411	Aluminum-Framed Entrances and Storefronts	8

DIVISION 08 – DOORS AND WINDOWS-continued

08460	Automatic Entrance Doors	14
08801	Interior Glazing	14

DIVISION 09 – FINISHES

09130	Acoustical Suspension System.....	5
09310	Tile	6
09402	Resinous Matrix Terrazzo Flooring	9
09511	Acoustical Panel Ceilings.....	4
09514	Acoustical Metal Pan Ceilings.....	8
09522	Wood Grille Ceilings.....	8
09650	Resilient Tile Flooring	5
09672	Acrylic Flake Floor Coatings	7
09678	Resilient Base and Accessories.....	3
09680	Sheet Carpet	4
09685	Carpet Tile	5
09720	Wall Coverings.....	5
09900	Painting	11

DIVISION 10 – SPECIALTIES

10110	Display Cases.....	5
10155	Toilet Compartments	4
10262	Wall Protection.....	5
10270	Access Flooring.....	7
10430	Panel Signage	10
10505	Metal Lockers	5
10811	Commercial Toilet Accessories.....	3

DIVISION 11 – EQUIPMENT

11132	Projection Screens.....	5
-------	-------------------------	---

DIVISION 12 – FURNISHINGS

12360	Quartz Surfacing Countertops.....	7
12484	Entrance Floor Mats and Frames.....	4
12491	Horizontal Louver Blinds	4
12493	Blackout Shades.....	5
12494	Motorized Roller Shades.....	9
12500	Public Area Furniture	9
12520	Gate Seating.....	6

DIVISION 13 –SPECIAL CONSTRUCTION

13700	Part 1542 Computer Controlled Access System (CCAS)	84
13742	Multi-User Flight Information Display System (MUFIDS).....	17

DIVISION 14 –CONVEYING EQUIPMENT

14240	Hydraulic Elevators.....	13
14310	Escalators.....	7

**END VOLUME 2 of 3
TABLE OF CONTENTS**

TABLE OF CONTENTS
VOLUME 3 of 3

DIVISION 15 – MECHANICAL

15051	Basic Plumbing Materials and Methods	37
15410	Plumbing Fixtures	15
15412	Plumbing Emergency Fixtures	10
15413	Plumbing Security Fixtures	6
15426	Drinking Fountains	3
15430	Plumbing Specialties	19

DIVISION 16 – ELECTRICAL

16050	Basic Electrical Materials and Methods	21
16060	Grounding and Bonding	9
16075	Electrical Identification	8
16080	Electrical Testing	2
16120	Conductors and Cables	8
16231	Packaged Engine Generators	20
16714	Communications Equipment Room Fittings	6
16715	Communications Network Equipment	6
16722	Intercommunications Systems	9
16726	Integrated Paging Systems and Equipment	41
16730	Security Telephones	2
16801	Administrative Workstation	3

END VOLUME 3 of 3
TABLE OF CONTENTS

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01010 - SUMMARY OF WORK

1. GENERAL

- A. All work furnished under this Project Manual shall be installed at the following location in accordance with the Contract Documents:
 - 1. At: Duluth International Airport
New Passenger Terminal
Bid Package 2B
Duluth, Minnesota
 - 2. For: Duluth Airport Authority
4701 Grinden Drive
Duluth, MN 55811
- B. The provisions of Part 2 through 6, Part 9 and 10 of the specifications, and Division 1, General Requirements, shall apply to all work of the Contract.
- C. The Scope of Work for the Duluth International Airport, New Passenger Terminal, Bid Package 2B includes all work required for complete construction in accordance with the Contract Documents.
- D. Construction Contract: Construction will be accomplished under Multiple Prime Contracts as described in Section 01014 – Work Scope Descriptions.
- E. Coordination: Project will require close cooperation and coordination with Owner, Owner's Construction Manager (CM) and Contractor and Subcontractors. Contractor shall: consider such coordination in his work; schedule the Work with subcontractors and the Owner and Construction Manager, particularly near the end of the Project, keep the Owner and Construction Manager advised of his schedule to complete the Work.
- F. Examination of Site and Documents: In submitting a bid and in accepting a Contract award, the Contractor represents he has examined the site, existing conditions as well as the entire set of documents, in accordance with the General Conditions and agrees to be bound by all conditions of the site, existing conditions and all documents, without additional cost.
 - 1. Contractor's questions regarding this project must be directed to the Architect of record submitted through the Construction Manager. The Owner's employees are not authorized to make decisions or give direction regarding any aspect of this project.
- G. Construction Limits: Except as specifically indicated or as may be necessary to complete the work under the contract, activities of the contract shall be limited to within the limits designated on the drawings.

2. USE OF BUILDING BY OWNER

- A. Owner reserves the right to let other contracts in connection with this Project or in connection with existing buildings. Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and execution of their work, and shall properly connect and coordinate his work with theirs.
- B. Owner reserves the right to jointly occupy the premises with the Contractor in the performance of his duties and functions. The Owner also reserves the right to: enter into the Project and premises at all times; make installations of materials and equipment at appropriate times as the Work progresses; install equipment, furniture and furnishings when spaces are at appropriate stages of completion. Contractor shall coordinate work with the Owner and cooperate with the Owner to minimize undue interferences. Any activities required by the Contractor that may interfere with the Owner's occupation of the premises or Project during the work must be coordinated with the Owner and Construction Manager and may be required to be completed during alternate time periods.
- C. If any part, unit, phase, or the entire Project is substantially complete or ready for occupancy, the Owner may, upon notice to the Contractor, enter into and make use of the Work that is substantially complete.

3. CONTRACTOR'S USE OF PREMISES

- A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.
 - 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
 - 2. Keep driveways and entrances serving the premises clear and available to the Owner at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
- B. Site Storage Areas: As determined by Construction Manager. The Construction Manager shall establish and govern the use of available space.
- C. Site Protection: Protect existing trees and other plantings which are not to be removed and all features of adjacent buildings, paved surfaces which are to remain and are susceptible to damage from ordinary operations of the Contractor, trucking or other activity.
- D. Restoration: All improvements on or about the site and adjacent property which are not shown to be altered, removed or otherwise changed, and which have been damaged or disturbed by any work or operations under this contract, shall be restored to the conditions which existed previous to starting work. All existing buildings, structures, or other features shall be protected from damage by any operation in connection with the Project. The Contractor shall replace or repair, at

his own expense (and to the satisfaction of the Owner), all damage to existing buildings, sidewalks, curbs, drives, fencing, lawns, plants, trees, shrubbery and other property resulting from work of this Contract, from whatever cause.

4. CONSTRUCTION SCHEDULE

A. Refer to Section 01041 – Schedules.

END OF SECTION 01010

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01027 - APPLICATIONS
FOR PAYMENT**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
 - 1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 1 Section 01300 - SUBMITTALS.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's Construction Schedule.
 - b. Application for Payment forms, including Continuation Sheets.
 - c. List of subcontractors.
 - d. Schedule of allowances.
 - e. Schedule of alternates.
 - f. Schedule of submittals.
 - 2. Submit 3 copies of the Schedule of Values to the Construction Manager for approval at the earliest possible date but no later than 21 days before the date scheduled for submittal of the initial Applications for Payment.
 - 3. Subschedules: Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the Architect.
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of Work / generic name of the item.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - h. Percentage of Contract Sum to nearest one hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in sufficient detail, acceptable to the Architect, to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.
6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by the Owner.
 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment Application Times: Payment applications are due to the Construction Manager on the 1st day of each month. The period of construction work covered by each payment request is the period indicated in the Owner-Contractor agreement or, if none is indicated therein, starting the day following the end of the preceding period. Pay application meetings, which all Prime Contractors are required to attend, occur on the 3rd Thursday of each month. Refer to General Conditions and other Contract Documents for other dates related to payment application times.

- C. Payment Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.
- D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- E. Report of DBE Activity: With each Application for Payment, submit a Report of DBE Activity for the construction period covered by the application for payment.
- F. Transmittal: Submit five (5) signed and notarized original copies of each Application for Payment to the Construction Manager by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of lien and similar attachments, when required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Construction Manager.
 - 2. Each Application for Payment must be submitted directly to the Construction Manager's office at 8625 Rendova Street N.E., P.O. Box 158, Circle Pines, MN 55014 for processing. Do not submit to jobsites or branch offices.
- G. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from every entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, including but not limited to subcontractors, and suppliers, for the construction period covered by the previous application.
 - 1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.
 - a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application that is lawfully entitled to a lien.
 - 5. Waiver Forms: Submit waivers of lien on forms and executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:
 - 1. List of subcontractors.
 - 2. List of principal suppliers and fabricators.
 - 3. Schedule of Values.
 - 4. Contractor's Construction Schedule (preliminary if not final).
 - 5. Schedule of principal products.

6. Schedule of unit prices.
 7. Submittal Schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from governing authorities for performance of the Work.
 12. Certificates of insurance and insurance policies.
 13. Performance and payment bonds.
 14. Data needed to acquire the Owner's insurance.
 15. Initial settlement survey and damage report, if required.
- I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
1. This application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 2. Administrative actions and submittals that shall precede or coincide with this application include:
 - a. Occupancy permits and similar approvals or certifications by governing authorities, assuring Owners full access and use of the completed work.
 - b. Warranties (guarantees) and maintenance agreements.
 - c. Test / adjust / balance records.
 - d. Maintenance instructions.
 - e. Meter readings.
 - f. Start-up performance reports.
 - g. Change-over information related to Owner's occupancy, use, operation, and maintenance.
 - h. Final cleaning.
 - i. Application for reduction of retainage and consent of surety.
 - j. Advice on shifting insurance coverages, including proof of extended coverages as required.
 - k. Final progress photographs.
 - l. List of incomplete Work recognized to be completed by the Contractor, as exceptions to Architect's Certificate of Substantial Completion.
- J. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
1. Completion of Project closeout requirements.
 2. Completion of items specified for payment application at time of Substantial Completion (regardless of whether such application was made).
 3. Assurance, satisfactory to Owner, that unsettled claims will be settled and that work not actually completed or accepted will be completed without undue delay.
 4. Transmittal of required Project construction records to the Owner.
 5. Certified property survey.
 6. Proof, satisfactory to Owner, that taxes, fees, and similar obligations of the Contractor have been paid.
 7. Removal of temporary facilities and services.
 8. Removal of surplus materials, rubbish, and similar elements.
 9. Change of door locks and other Contractor access to Owner's property.
 10. Consent of Surety for Final Payment.

1.5 RETAINAGE

A. The amount that will be retained will be as follows:

1. Refer to GP 90-06 Partial Payments specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01027

**CONTRACTOR / DESIGN BUILDER'S
REPORT OF DBE ACTIVITY**

(Required with each Pay Application)

Duluth International Airport - New Passenger Terminal

FAA AIP Project Number:

Mn/DOT SP Project Numbers

KACC Project Number 20225 / Reynolds, Smith & Hills Project Number 213-1882-091

Accompanies Application for Payment No. **Covering period ending** _____

Contractor

Name:

Address:

Telephone No.: _____ **E-mail Address:** _____

The Original Contract Amount was _____

The net Amount of Change Orders to date is _____

The Current Contract Amount is _____

The DBE Goal has been established as _____ **percent of original contract amount**

The current DBE Goal is therefore calculated as (amount) _____

The DBE Subcontractors who worked on this project during this pay period and the value of the work performed by each is as listed below:

<u>NAME</u>	<u>DESCRIPTION OF WORK</u>	<u>AMOUNT</u>
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____

The total value of work performed by DBEs during this pay period is _____

The accumulative value of work performed by DBEs prior to this period is \$ _____ -

The current total value of work performed by DBEs, including this period, is \$ _____ -

(The current total value of work performed by DBEs) + (The current Contract Amount) = _____

Contractor's strategy for meeting DBE Goal (when applicable) _____

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01035 - MODIFICATION
PROCEDURES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing contract supplements and modifications.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1, Section 01027 "Applications For Payment" for administrative procedures governing Applications for Payment.
 - 2. Division 1, Section 01300 "Submittals" for requirements for the Contractor's Construction Schedule.
 - 3. Division 1, Section 01631 "Products and Substitutions" for administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 CONTRACT DOCUMENT SUPPLEMENTS

- A. Clarification / Supplemental Instructions (C-): Shall provide further detail to requirements inferred in the Contract Documents or authorize minor changes in the work, not involving an adjustment to the Contract Sum or Contract Time, and will be issued by the Architect with supplemental or revised drawings and specifications, if necessary. Clarifications / Supplemental Instructions issued by the Architect-Engineer shall become binding and a part of the Contract as minor changes in the work unless the Contractor notifies the Architect-Engineer within 21 days that the instructions result in changes that affect the Contract Cost or Contract Time.
- B. Request for Information / Supplemental Instructions (RFI-): Shall be initiated by the Contractor when necessary for performance of the work. The Architect's reply will constitute further detail to requirements if inferred in the Contract Documents or interpretations of the requirements. Requests for information must describe all document references that pertain to the issue and any conflicts and must include the contractor's interpretation or proposed action that would be made if there was not a process to obtain the information from the Architect. Requests for information that do not include this, or that request information already included in the contract documents without conflict, will be returned without action (RWA). The Architect will record the time expended to process such requests and notify the Contractor of the charges. The owner shall deduct any such compensation due the Architect from the Contractor's monthly periodic pay requests in accordance with the compensation terms for cost, overhead and profit in the Owner / Architect agreement. Use forms provided by the Architect. The Contractor shall maintain a sequentially numbered log of all such requests.

- C. Contractor Corrective Action Proposals (CCA-): Shall be initiated by the Contractor when deviation from the contract requirements has been constructed. The Contractor shall provide a fully detailed proposal for his corrective or remedial work. The Architect's reply will indicate approval of the proposed action as detailed, approval with certain modifications, or rejection of the proposal. Use forms provided by the Architect. The Contractor shall maintain a sequentially numbered log of all such proposals. Upon notification of a deviation and request for a CCA the Contractor shall submit one promptly. Should this not occur in a timely fashion which, in the judgment of the Architect, will allow time for processing and correction ahead of other advancing elements of work, the Architect will initiate a CCA giving direction for correction. If the Architect initiates the CCA or must provide significant direction to a Contractor initiated CCA, due to a lack of a fully detailed proposal, the Architect will record the time expended and notify the Contractor of the charges. The owner shall deduct any such compensation due the Architect from the Contractor's monthly periodic pay requests in accordance with the compensation terms for cost, overhead and profit in the Owner / Architect agreement.

1.4 PROPOSAL / CHANGE ORDER REQUESTS

- A. Request for Proposal (RFP-): The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
 2. Unless otherwise indicated in the proposal request, within 20 days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.
 - a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Itemize labor charges by time and category.
 - c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - d. Indicate overhead and profit charges.
 - e. Include a statement indicating the effect the proposed change in the work will have on the Contract Time.
- B. Contractor-Initiated Change Order Requests (RCO-): When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
 2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Comply with requirements in Section 01631 - PRODUCTS AND SUBSTITUTIONS if the proposed change requires substitution of one product or system for a product or system specified.
5. Change Order Request Form: Use forms provided by the Architect. The Contractor shall maintain a sequential log of all Requests for Change Orders.

1.5 ALLOWANCES

- A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 1. Include installation costs in the purchase amount only where indicated as part of the allowance.
 2. When requested, prepare explanations and documentation to substantiate the margins claimed.
 3. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 20 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. The Owner will reject claims submitted later than 20 days.
 1. Do not include the Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
 2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When the Owner and the Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. The Construction Change Directive will contain a complete description of the change in the work and designate the method to be followed to determine change in the Contract Sum or Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

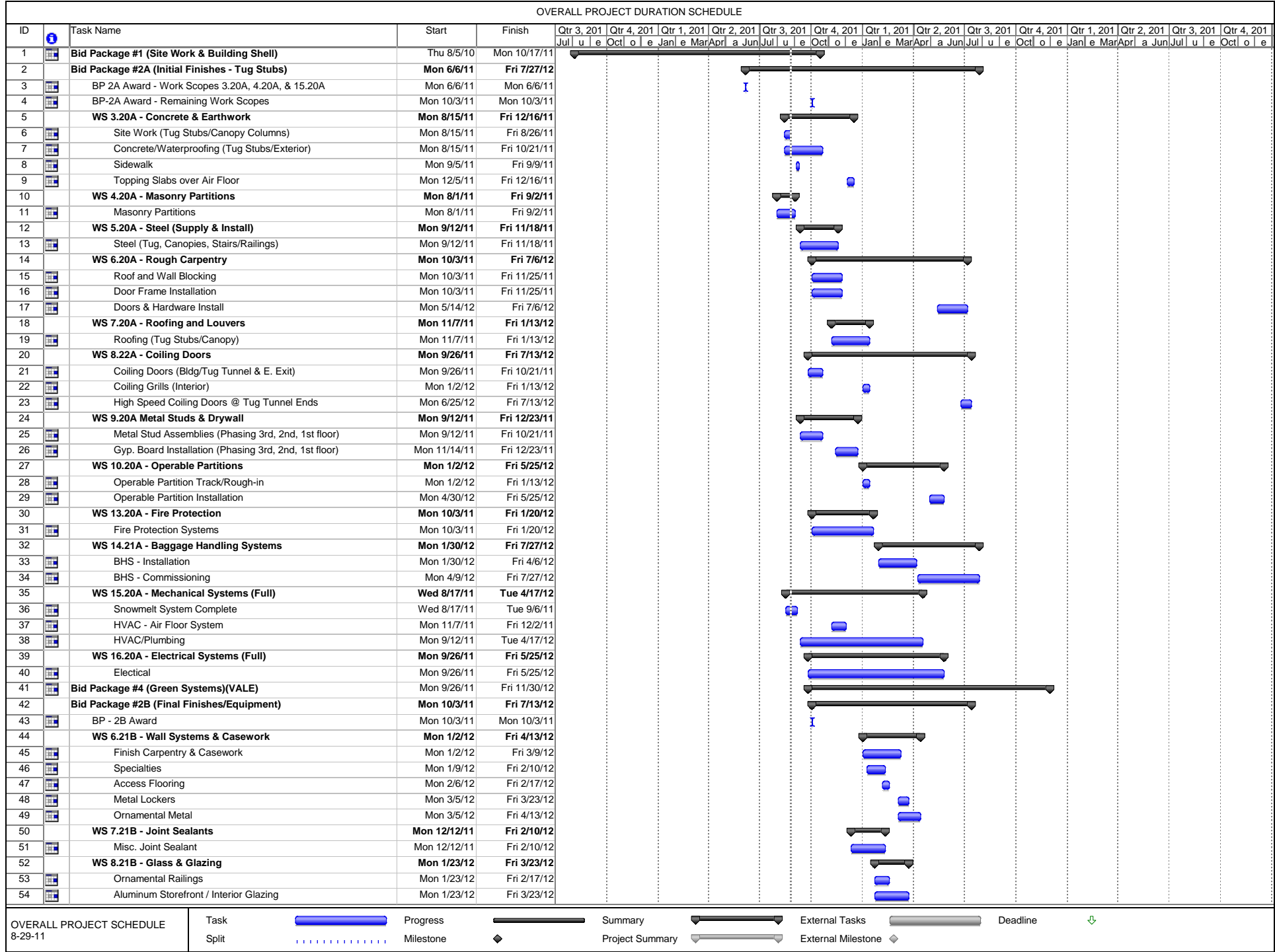
1.7 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701, as provided in the Conditions of the Contract.

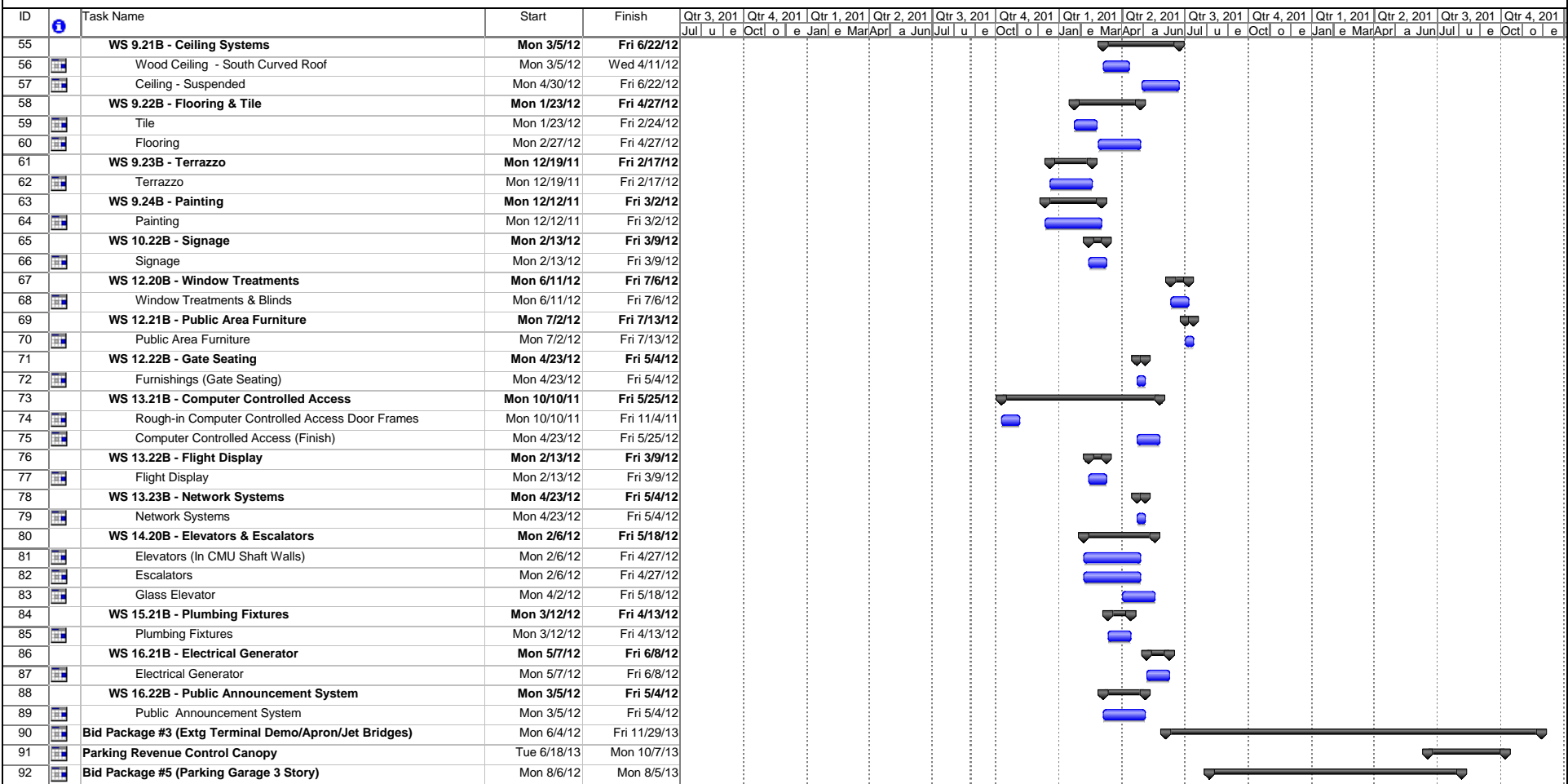
PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01035



OVERALL PROJECT DURATION SCHEDULE



OVERALL PROJECT SCHEDULE
8-29-11

Task
Split



Progress
Milestone



Summary
Project Summary



External Tasks
External Milestone



Deadline



**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01041 - SCHEDULES

GENERAL

1. RELATED DOCUMENTS

Drawings and general provisions of Contract, including General Conditions and Division 1 Specifications, apply to work of this Section.

2. COORDINATION

- A. The Contractor shall coordinate scheduling with the Construction Manager. In particular, the Contractor shall provide close coordination of progress schedule, schedule of values, listing of subcontractors, schedule of submittals, progress reports and payment requests.
- B. Close coordination will be required between all construction trades in order that individual areas of construction can be completed by their scheduled time. Consult the proposed construction sequence schedule for start and completion dates of individual work areas.

3. PRELIMINARY SCHEDULE

- A. The Construction Manager has developed a Preliminary Schedule included at the end of this section, showing work areas of the project which directly impact the orderly use of the facility during construction. The timing of these activities has been approved by the Owner.
- B. The Preliminary Schedule may not list the work completely and may vary from the drawings and specifications.

4. CONSTRUCTION SCHEDULE

- A. The Construction Manager shall computerize a Precedence Diagram Method (PDM) Network using data supplied by the Contractor and all subcontractor(s). The Contractor will be responsible for his own methods and procedures and the performance of the work consistent with good practice.
- B. Neither the Construction Manager nor the Owner warrants the information supplied by the Contractors is accurate or correct or that the project can be performed as scheduled based upon data supplied by the Contractors.
- C. The Contractor shall be responsible for providing all data to develop and update the schedule. The Contractor shall supervise all work activities to maintain progress in accordance with the schedule.
- D. The Contractor and Subcontractor shall provide their own data to the Construction Manager reflecting the actual plan of operation for the Project. Schedule input data shall include a comprehensive list of all activities of the construction phase of the project, including submittals (shop drawings,

SCHEDULES

samples, product data), procurement of material, and on-site activity (erection, installation, construction). Activities for procurement of materials shall be included to delineate between material purchasing and fabrication/delivery.

- E. The Contractor shall assign durations and sequencing to each activity. Submittal activities shall be listed with the anticipated date of submittal. Procurement activities shall be listed with the duration required for fabrication and delivery from date of purchase. The Construction Manager shall computerize a PDM network using input data supplied by the Contractor. The Construction Manager will meet with the Contractor to revise and expand the Schedule and resolve conflicts. The revised schedule shall conform to the specific plan of operation envisioned by the Contractor.

The Construction Manager will guide the Contractor in determining the level of detail to be included in the PDM Networks. The schedule shall be adequate enough to evaluate progress, cost of work in place and serve as a control technique for the Contractor's Field Superintendent.

- F. The Contractor and all subcontractors shall be obligated to perform in accordance with the Construction Schedule and to participate in updating the schedule. The Contractor shall include provisions in all subcontracts binding Subcontractors to participate in revisions of the schedule as are necessary, and to supply data throughout the project.
- G. Upon request, the Contractor shall submit to the Construction Manager purchase orders and subcontracts. Such information shall be submitted as soon as available so the Construction Manager will be aware of the progress being made by the Contractor in the placing of orders and the status of material. The Contractor shall be solely responsible for expediting the delivery of all material furnished by him and coordinating his subcontractors so construction progress shall be maintained according to Contract Schedule.

5. COMPLIANCE WITH THE CONSTRUCTION SCHEDULE

- A. If the Contractor shall fail to adhere to the Construction Schedule or to the said schedule as revised, he must promptly adopt such other or additional means and methods of construction as will make up for the time lost and will assure completion of the work in accordance with said Construction Schedule at no additional cost to the Owner, except in accordance with the provision of the contract governing such costs. If the Owner or the Construction Manager notifies the Contractor of any change in the contract or any extra work performed, or if any other conditions arise which are likely to cause delays, the Contractor shall notify the Construction Manager in writing within five (5) days of the receipt of such notice or occurrence of such condition. This notice shall document the effect, if any, of such change, or extra work, of suspension or other condition upon the Construction Schedule. No time extensions will be granted due to a delay in any activity unless the Owner deems the length of the delay exceeds the float time associated with the activity at the time the delay occurs.

6. FLOAT TIME

- A. The Contractor, in directing the compliance with Construction Schedule shall cooperate with the Owner and the Construction Manager in utilizing float time. Full control over use of total float time in the Schedule rests with the Owner and will be utilized by him in any necessary rescheduling of the Construction Schedule occasioned by design changes, field conditions, strikes, Acts of God, or unavoidable equipment and material delays. If rescheduling of any activity adversely affects the Contractor's operation, he shall advise the Construction Manager in writing no later than five (5) days after the receipt of the revised schedule or Notice of Intent to revise the schedule.

7. PRELIMINARY SCHEDULE DATES

- A. All work shall be completed as follows:
1. Refer to attached Draft Schedule dated August 25, 2011.

END OF SECTION 01041

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01045 - CUTTING AND PATCHING

1. WORK INCLUDED

- A. Refer to Section 01010 and 01500 for special requirements, protection, constraints, timing of work, scheduling of work, enclosures and similar requirements relating to this Section.
- B. This Section covers cutting, demolition, removal work, patching and restoration of work as necessary to accomplish and complete all work under the Contract, including any relocation or reuse of existing materials, equipment, systems, or other work, as well as the disposition of salvaged materials or debris. This Section applies to all work under the Contract, including general construction, mechanical and electrical work.
- C. Drawings generally indicate the extent of demolition, removals, relocations and cutting. The drawings shall not be construed as indicating all required work, nor indicating all conditions or details which might be encountered to accomplish the work of this Contract. The Contractor and his subcontractors shall examine the spaces themselves to determine the actual conditions and requirements. All removals, demolition, cutting, restoration, new installations and other work shall be accomplished to transform the existing spaces and conditions to the new conditions required under the Contract, as well as to accomplish all tie-in work of new to existing.
- D. It is the intent that unless specially shown on the general construction type drawings (i.e., architectural and structural) and schedules, or is inherent in the work to be accomplished under the general construction work of the area, that the mechanical and electrical Contractors shall perform the demolition, cutting, removals, relocations, patching and restoration as will be required to accomplish the work under their contracts. All work shown or indicated on the general construction drawings and schedules shall be accomplished by the associated Contractor.
- E. Except for general demolition of entire areas, it is the intent that at each area, or space, the Contractor and each subcontractor shall make the removals, perform cutting or demolition and accomplish relocations of work normal to his trades (i.e., Mechanical Contractor removes or relocates piping, ductwork and similar; Electrical Contractor removes or relocates panelboards, conduit lighting and similar). At areas of general demolition of the entire spaces, the Mechanical and Electrical shall make removals of work normal to their trades or as may be called for, for reuse or relocation, make any relocations and cut-off, terminate, cap or otherwise discontinue services that will be abandoned or removed in the space.

2. GENERAL REQUIREMENTS

- A. Accomplish all work of cutting, removal, demolition, relocation, patching and other restoration by using only mechanics skilled in the trade. If necessary, sublet the work to skilled contractors or subcontractors.
- B. The Contractor shall coordinate all work of this Section with all subcontractors so the work will progress without interruption and minimum delays. The Contractor shall also coordinate and schedule the work with the Owner and Construction Manager where possible disturbance may occur and where relocations or other potential disruptions of the Owner's functions and services may occur. All work affecting the Owner's functions and services shall be performed at times acceptable to the Owner.

END OF SECTION 01045

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01200 - PROJECT MEETINGS

1. GENERAL

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
1. Pre-Construction Conference.
 2. Pre-Installation Conference.
 3. Progress Meetings.

2. PRE-CONSTRUCTION CONFERENCE

- A. Pre-Construction Conference shall be scheduled as directed by Construction Manager. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: Construction Manager, the Owner, Architect and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
1. Construction schedule.
 2. Critical work sequencing.
 3. Designation of responsible personnel.
 4. Procedures for processing field decisions and change orders.
 5. Procedures for processing Applications for Payment.
 6. Distribution of contract documents.
 7. Submittal of shop drawings, product data and samples.
 8. Preparation of record documents.
 9. Use of the premises.
 10. Office, work and storage areas.
 11. Equipment deliveries and priorities.
 12. Safety procedures.
 13. First aid.
 14. Security.
 15. Housekeeping.
 16. Working hours.

3. PRE-INSTALLATION CONFERENCES

- A. The Contractor shall conduct a pre-installation conference at the Project Site before each construction activity that requires coordination with other construction.
- B. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the

meeting. Advise the Architect at least ten (10) working days in advance of scheduled meeting dates.

- C. Do not schedule conferences until the submittals required by the Contract Documents for work associated with the construction activity requiring the conference have been approved and returned to the Contractor.
- D. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
 - 1. Contract Documents.
 - 2. Options.
 - 3. Related Change Orders.
 - 4. Purchases.
 - 5. Deliveries.
 - 6. Shop Drawings, Product Data, and quality-control samples.
 - 7. Review of mockups.
 - 8. Possible conflicts.
 - 9. Compatibility problems.
 - 10. Time schedules.
 - 11. Weather limitations.
 - 12. Manufacturer's recommendations.
 - 13. Warranty requirements.
 - 14. Compatibility of materials.
 - 15. Acceptability of substrates.
 - 16. Temporary facilities.
 - 17. Space and access limitations.
 - 18. Governing regulations.
 - 19. Safety.
 - 20. Inspecting and testing requirements.
 - 21. Required performance results.
 - 22. Recording requirements.
 - 23. Protection.
- E. The Contractor shall record the results of the meeting and distribute copies to attendees and other interested parties.
- F. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of work and reconvene the conference at the earliest feasible date.

4. PROGRESS MEETINGS

- A. Construction Manager shall conduct regular progress meetings at the Project site. Time of meeting to be scheduled by Construction Manager.
- B. Attendees: In addition to representatives of the Owner, Construction Manager and Architect, each prime contractor, subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Deliveries.
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site utilization.
 - h. Temporary facilities and services.
 - i. Hours of work.
 - j. Hazards and risks.
 - k. Housekeeping.
 - l. Quality and work standards.
 - m. Change orders.
 - n. Documentation of information for payment requests.
- D. Reporting: No later than three (3) days after each progress meeting date, the Construction Manager shall distribute copies of minutes of the meeting to each party present and to other parties as applicable.
1. Schedule Updating: The construction schedule shall be revised after each progress meeting where revisions to the schedule have been made or recognized. The revised schedule shall be issued to all applicable parties.

END OF SECTION 01200

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - 4. Contingency allowances.
 - 5. Testing and inspecting allowances.
- C. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
 - 2. Division 1 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
 - 3. Divisions 2 through 16 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM / UNIT-COST AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.
- B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.8 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. **Allowance No. 1:** Include allowance in Work Scope 6.21B for miscellaneous finish carpentry labor and materials in the amount of \$24,000.00.
- B. **Allowance No. 2:** Include allowance in Work Scope 7.21B for additional joint sealant work in the amount of \$8,000.00.
- C. **Allowance No. 3:** Include allowance in Work Scope 8.21B for substitution of alternate glass and glazing materials in the amount of \$6,000.00.
- D. **Allowance No. 4:** Include allowance in Work Scope 9.21B for substitution of alternate ceiling finish materials in the amount of \$30,000.00.
- E. **Allowance No. 5:** Include allowance in Work Scope 9.22B for substitution of alternate floor finish materials in the amount of \$28,000.00.
- F. **Allowance No. 6:** Include allowance in Work Scope 9.23B for substitution of alternate terrazzo aggregates in the amount of \$32,000.00.
- G. **Allowance No. 7:** Include allowance in Work Scope 9.24B for substitution of alternate paint coatings in the amount of \$12,000.00.
- H. **Allowance No. 8:** Include allowance in Work Scope 10.21B for alternate finish materials in the amount of \$5,000.00.
- I. **Allowance No. 9:** Include allowance in Work Scope 10.22B for alternate finish materials in the amount of \$4,000.00.
- J. **Allowance No. 10:** Include allowance in Work Scope 12.20B for substitution of alternate shade materials in the amount of \$8,000.00.
- K. **Allowance No. 11:** Include allowance in Work Scope 12.21B for substitution of alternate furnishings in the amount of \$15,000.00.
- L. **Allowance No. 12:** Include allowance in Work Scope 12.22B for gate seating electrification in the amount of \$16,000.00.
- M. **Allowance No. 13:** Include allowance in Work Scope 13.21B for additional access control devices in the amount of \$21,000.00.

- N. **Allowance No. 14:** Include allowance in Work Scope 13.22B for additional Flight Information Displays in the amount of \$12,000.00.
- O. **Allowance No. 15:** Include allowance in Work Scope 14.20B for substitution of alternate cab finish materials in the amount of \$10,000.00.
- P. **Allowance No. 16:** Include allowance in Work Scope 15.21B for substitution of alternate plumbing fixtures in the amount of \$4,000.00.
- Q. **Allowance No. 17:** Include allowance in Work Scope 16.21B for alternate snow hood provisions in the amount of \$8,000.00.
- R. **Allowance No. 18:** Include allowance in Work Scope 16.22B for additional public address speakers in the amount of \$4,000.00.
- S. **Allowance No. 19:** Include allowance in Work Scope 16.23B for alternate security software requirements in the amount of \$10,000.00.

END OF SECTION 01210

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. **Alternate No. 1:** Substitute ornamental glass guardrail for interior aluminum-framed glass partition along south wall of 2nd Floor Corridor 202 as indicated on Drawing A633 as part of Work Scopes 6.21B and 8.21B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- B. **Alternate No. 2A:** Substitute solid phenolic wall paneling with wood grain pattern finish for flush wood paneling at core walls adjacent to E-line and G-line as depicted on Drawings A601, A602, A603 and A604 as part of Work Scope 6.21B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- C. **Alternate No. 2B:** Substitute solid phenolic wall paneling with wood grain pattern finish for flush wood paneling at core wall adjacent to G-line only as depicted on Drawing A604 as part of Work Scope 6.21B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- D. **Alternate No. 3:** Substitute manufacturer's standard solid polyurethane seats and backs for upholstered vinyl seats and backs as indicated in specification Section 12520 Gate Seating as part of Work Scope 12.22B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- E. **Alternate No. 4A:** Provide punched, pencil-proof louvers of equivalent open area as specified bar grilles on both horizontal and vertical faces of finned-tube enclosures in lieu of extruded aluminum bar grilles as depicted on Drawings A710, A711 and A712 as part of Work Scope 6.21B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- F. **Alternate No. 4B:** Provide punched, pencil-proof louvers of equivalent open area as specified bar grilles on vertical faces only of finned-tube enclosures in lieu of extruded aluminum bar grilles as depicted on Drawings A710, A711 and A712 as part of Work Scope 6.21B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- G. **Alternate No. 5:** Provide "off-site" remote host MUFIDs services in lieu conventional "on premises" system as described in specification Section 13742 for Work Scope 13.22B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- H. **Alternate No. 6A:** Add filling of surface voids and painting of concrete columns at C-line using mineral silicate paint system as specified in Section 09900 as part of Work Scope 9.24B.

Add (deduct) the sum of: _____ Dollars (\$_____).

- I. **Alternate No. 6B:** Add painting only of concrete columns at C-line using mineral silicate paint system as specified in Section 09900 as part of Work Scope 9.24B.

Add (deduct) the sum of: _____ Dollars (\$_____).

END OF SECTION 01230

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01270 – UNIT
PRICES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.
 - 3. See Civil Drawing Sheet C001 for a Summary of Estimated Quantities for Civil Work.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: Refer to Section 01014 "Work Scope Descriptions" and the Bid Form Package in Volume 1 of the Project Manual.

PART 2 - PRODUCTS (Not Used)

EXECUTION (Not Used)

END OF SECTION 01270

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01300 - SUBMITTALS

1. GENERAL

- A. This Section defines procedures for the following submittals required by the Contract Documents.

2. SCHEDULE OF SUBMITTALS - REQUIRED

- A. The following documents are required to be submitted to the Construction Manager for review at the times indicated.

1. Prior to Bidding (ten days prior to bid opening):
Request for approval of substitute material and equipment.
2. Within 10 days of Letter of Contract Award:
Performance and Payment Bonds
Insurance Certificate
Schedule of Values (based on specification sections – no Pay Application will be processed without approval of Schedule of Values)
List of materials and equipment
List of subcontractors
3. During Progress of Project as specified:
Samples
Test results
Application for Payment (see Specifications Section 01027)
4. Upon receipt of Substantial Completion Certificate, submit the following documents within 30 days:
Shop drawings and required submittals
Equipment and material guarantees
Operations manuals
As-built drawing notes
Completed punch lists
Final payment request accompanied by:

Affidavit of Payment of Claims	Affidavit of Release of Liens
Withholding Tax Affidavit	Consent of Surety to Final Payment

Note: No final retainage payment will be released without the receipt and approval of the above referenced documents.

3. SHOP DRAWINGS

- A. Three hard copies of drawings larger than 11" x 17" in size and electronic copy of drawings 11" x 17" or smaller in size of shop drawings prepared specifically for this work shall be submitted to the Construction Manager for submittal to the Architect. Contractors are to review and stamp shop drawings or they will be returned. At least 40 square inches of space in the lower right hand corner of each sheet shall be left blank for approval stamps and notes. After the Architect has checked and approved

each drawing, he will so stamp it, make such copies as he requires and return it through the Construction Manager to the Contractor who shall make and distribute such copies as he requires. In instances where minor corrections are required, they will be so noted on the drawing and it will be stamped "Make Corrections Noted" and returned to the Contractor as above. Where major corrections are required, the shop drawings will be returned to the Contractor who shall make a new drawing incorporating the required corrections and resubmit the revised drawings for approval (three hard copies of drawings larger than 11" x 17" in size and electronic copy of drawings 11" x 17" or smaller in size of shop drawings).

- B. Shop drawings in the form of printed descriptive information shall be bound together with a title and index sheet listing each sheet in the binding. The title and index sheet shall have a blank rectangular space of at least 4" x 8" for notes and approval stamps. Three hard copies of drawings larger than 11" x 17" in size and electronic copy of drawings 11" x 17" or smaller in size of shop drawings are to be submitted to the Construction Manager.
- C. Shop drawings and samples shall be dated and contain: Names of project, description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed.
- D. Submission of shop drawings shall be accompanied by transmittal letter, containing project name, Contractor's name, number of drawings, titles and other pertinent data such as section and article numbers.

4. SAMPLES

- A. Deliver samples of materials, equipment, assemblies and components as required by specifications to Construction Manager for submittal to the Architect (or other designated location) with delivery costs prepaid. At Construction Manager's direction, remove samples after approval. Samples shall be of like kind to the products to be provided for building and shall have finish and other characteristics required by work. Samples shall indicate type of construction and quality proposed for installation in the project.
- B. Where the Contractor requires approved samples to be returned, submit the number of samples required by the Contractor plus three (3) which shall be retained by the Architect and Construction Manager.

5. LIST OF MATERIALS

- A. Within ten (10) days after the award of the contract (notice to proceed or letter of intent), the Contractor shall submit three (3) copies of a complete list of all materials, products, and equipment proposed to be used in construction to the Construction Manager for acceptance. Materials shall not be ordered until the proposed listed materials, products and equipment proposed to be used in construction are reviewed by the Architect for acceptance and the listed materials are accepted.
- B. Where two or more makes or kinds of items are named in the specifications (or additional names are called for in addendum), the Contractor shall state which particular make or kind of each item he proposes to provide. If the Contractor fails to state a preference, the Owner shall have the right to select any of the makes of kinds named without change in price.

- C. This list shall be arranged in order of specification sections. The items listed shall fully conform to project requirements and specifications. All materials are subject to the Architect's acceptance. After acceptance, there shall be no changes or substitutions.
- D. The list shall clearly identify the material, product or equipment by manufacturer and brand by listing the names, for all items, including those where only one material or product is specified. Each and all material, products and equipment shall be specifically named, not listed "as specified".

6. LIST OF SUBCONTRACTORS

- A. Within ten (10) days after the award of the contract (notice to proceed) and prior to the execution of the Contract, the Contractor shall submit three (3) copies of a complete list of all work he proposes to subcontract and the subcontractors (and major material suppliers) he proposes to use in performance of the Contract to the Construction Manager for review by the Architect, Construction Manager and Owner. The list shall include Sub-subcontractors. No subcontracts shall be executed until the proposed list of subcontractors is accepted.
- B. Reasonable objection shall be deemed to have been exercised when, in the opinion of the Architect or Owner, objections have been made based on their reasonable belief that the proposed Subcontractor, Sub-subcontractor or material supplier: (1) cannot provide materials, equipment, facilities or other products as specified or required by the Contract Documents; (2) cannot provide labor and skill necessary to accomplish the part of Work for which he is proposed, including but not limited to quality of workmanship; (3) lacks adequate and appropriate experience for the part of the Work for which he is proposed, including materials or methods required; (4) has previously failed to perform timely or satisfactorily, including in cooperation and in necessary services after project completion; (5) proposed deviations in material or methods that are unacceptable to the Architect or Owner, such as proposing materials or methods that were not specified or not listed in addenda; (6) there is reasonable doubt he can satisfactorily perform the part of the Work for which he is proposed, within the time schedule, due to size of organization or existing work load; (7) cannot demonstrate his ability through quality or representative work to perform the part of the Work for which he is being considered; (8) of questionable integrity; (9) or other similar considerations bearing on the possibility of unsatisfactory performance. If the Owner, Construction Manager or the Architect has a reasonable objection to any person or entity proposed by a substitute to whom neither the Owner, Construction Manager, nor the Architect has any reasonable objection and no increase in the Contract Sum shall be allowed as a result of any such substitution.
- C. After review of the proposed list, no change of any Subcontractor, Sub-subcontractor or supplier not objected to by the Architect, Construction Manager or Owner, shall be made, except for cause acceptable to all parties. In the event of a proposed change, the Contractor shall submit the reasons for the change, in writing, along with the alternate proposed Subcontractor, Sub-subcontractor or material supplier. The proposed change is subject to the conditions of this Article and the requirements of the General Conditions.

7. GUARANTEES AND WARRANTIES

- A. Refer to Section 01740 - Warranties.
- B. Special Warranties: Contractor shall complete all manufacturer's warranty registrations and shall submit same to Construction Manager for transmittal to Owner.

8. INSTRUCTION MANUALS

- A. For all items of mechanical equipment and electrical apparatus, the Contractor shall obtain from the manufacturer and furnish to the Construction Manager three (3) copies of the following:
 - 1. Operating instructions.
 - 2. Parts lists (including name and address of nearest vendor or service agent).
 - 3. Maintenance instructions.
 - 4. Shop Drawings.
- B. These items are separate from and in addition to the operating placards required to be attached to or posted near the equipment.
- C. Contractor shall provide field instruction to Owner's personnel as required to fully instruct them in correct operating and maintenance procedure, for all equipment installed under this contract.
- D. Manual shall be submitted in 8-1/2" x 11" form in adequately sized three (3) ring loose leaf binders with entire contents indexed and thumb-tabbed.

9. RECORD SET OF DRAWINGS

- A. Contractor shall provide the record set of drawings to the Construction Manager at the completion of Contract.
- B. During construction, Contractor shall maintain a clean set of drawings for the sole purpose of recording changes and actual "as installed" information.
- C. As a general guide, the type of information to be recorded on the record set includes: (1) changes, deviations or revisions made, except minor or noncritical dimensions, including those made by Change Order or Supplementary Instructions; (2) omissions, including work omitted by accepted alternates; (3) dimensioned locations of major or main utility lines, such as main conduit runs, piping mains and similar work; (4) locations of control valves; (5) additions to the work; (6) changes in significant details; (7) changed footing or other elevations; (8) changes in locations of panelboards, outlets, drains, piping, opening, dampers and similar features; (9) other similar data. Refer to Section 01720 – Project Record Documents.

END OF SECTION 01300

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT****SECTION 01361 - SUSTAINABLE DESIGN
REQUIREMENTS****DULUTH, MINNESOTA****PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Construction Waste Management - Section 01524
- B. Construction IAQ Management - Section 01525
- C. Soil Erosion and Sedimentation Control Plan - Section 02125

1.3 SUMMARY

- A. The Owner requires the Contractor to implement practices and procedures to meet the Project's environmental performance goals, which include obtaining a LEED Silver certification based on LEED-NC, Version 2.2. Specific project features include (but are not limited to): materials and equipment that reduce the facility's energy and water consumption; recycled-content materials, locally-manufactured materials, low-emitting materials, construction waste recycling, and the implementation of a construction indoor air quality management plan. The Contractor shall ensure that the requirements related to these goals, as defined in this section and throughout the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work proposed by the Contractor or their subcontractors shall not be allowed if such changes compromise the stated LEED Requirements.

1.4 DEFINITIONS

- A. Certificates of Chain-of-Custody: Certificates signed by manufacturers verifying that the wood used to make products was obtained from forests certified by a Forest Stewardship Council (FSC) accredited certification body to comply with FSC "Principles and Criteria." Certificates shall include evidence that the mill is certified for chain-of-custody by an FSC-accredited certification body.
- B. LEED: The Leadership in Energy & Environmental Design rating system developed by the United States Green Building Council (USGBC). LEED-NC, New Construction, Version 2.2, is the rating system used for this project.
- C. Green Label Plus: The Carpet & Rug Institute's testing/certification program for carpet VOC emissions. Certification numbers guarantee product is within allowable VOC emission rates. Approved products are listed under the manufacturer's name at www.carpet-rug.com/.

1.5 LEED OVERVIEW AND GENERAL REQUIREMENTS

A. OVERVIEW:

1. LEED certification is determined by a system of assigned points (credits) based on sustainable building goals being met by a project.
2. There are some prerequisites for a project to qualify for LEED certification.
3. Some prerequisites and credits depend on material selections and may not be specifically identified as LEED requirements in this document. Refer to Item 1.7, LEED Prerequisites.
4. Some prerequisites and credits depend on the Architect's design and other aspects of the project that are not part of the work of the contractor.
5. LEED New Construction (NC) v. 2.2 Reference Guide is available at www.usgbc.org/.

B. GENERAL REQUIREMENTS:

For specific contractor requirements refer to Item 1.7, LEED Prerequisites and LEED ACTION PLANS under Item 1.9, LEED SUBMITTALS.

1. Erosion and Sedimentation Control (ESC)
 - a. Refer to Items 1.7 LEED Prerequisites and 1.9 LEED Submittals (Action Plans)
 - b. Typical precautions are:
 - 1) Silt fences, hay bales, and water retention areas to prevent sediment runoff
 - 2) Graveled truck wash-off areas
 - 3) Construction fencing to prevent dust from escaping the site
 - 4) Installation and maintenance of sump pumps
 - 5) Use of mulching and seeding, sometimes on a temporary basis
 - c. Refer to Civil Engineer's documents for project specific information
 - d. The Contractor shall in part:
 - 1) Develop an Erosion and Sedimentation Control (ESC) Plan in accordance with Section 02125
 - 2) Maintain ESC measures throughout the project
 - 3) Take dated photographs of the ESC measures in place
 - 4) Log maintenance activities, inspections and repairs after major rain falls.
2. Construction Waste Management (CWM)
 - a. Refer to Item 1.9 LEED Submittals (Action Plans).
 - b. CWM is the reuse of materials that otherwise would have been sent to a landfill.
 - c. The project requires that at least 50% of the construction waste be recycled.

- d. Reused site materials such as stone, excavated soil and land-clearing debris cannot count towards the recycled percent.
 - e. The contractor shall in part:
 - 1) A Construction Waste Management Plan shall be developed in accordance with Section 01524, Construction Waste Management outlining methods, goals and strategies.
 - 2) Maintain a spreadsheet with weight, category (e.g. concrete, metal, wood, paper), percent (%) diverted from landfill, method of diversion (i.e. recycled, reused, sold), dated, name of the hauler, and site of disposal.
 - 3) Keep back-up documentation (e.g. hauler's tickets, receipts from recycling centers, sales receipts).
3. Materials with Recycled Content
- a. LEED Recycled Content is the percent of a product that comes from recycled material. The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer)
 - 1) Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
 - 2) Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.
 - b. The project requirement is that at least 10% of the value of the project materials (without labor and equipment) be from recycled materials.
 - c. The manufacturer must provide the recycled content of the product.
 - d. To determine Recycled Content:
 - 1) The recycled content is determined by weight. 100% of post-consumer recycled content contributes, and 50% of pre-consumer (also called post-industrial) content contributes.
 - a) "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - b) "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.
 - 2) Determine the percentage of recycled content by weight:
 - a) Determine the total weight of the material or product.
 - b) Determine the weight of the recycled content contained in the product (100% post-consumer + 50% pre-consumer).

- c) Divide the recycled content weight by the total weight to get a percentage (%) of recycled content by weight.
 - 3) Determine the value of recycled content:
 - a) Determine the total value of the product (without labor and equipment)
 - b) Multiply the total value of the product by the percentage of recycled content to get the value of the recycled content.
- e. The contractor shall in part:
 - 1) Maintain a spreadsheet showing the recycled materials purchased, including the material name, supplier, percentage of pre-consumer and percentage of post consumer recycled material, the weight of the material, the value of the material (without labor and equipment), and the source of the recycled content information.
 - 2) Maintain records of recycled materials, including cut sheets, published product information and cost back up.
 - 3) Submit a completed "Green Building Materials Reporting Form" (GBMRF) in accordance with Item 1.9, LEED Submittals for each product, along with back up. A blank copy of the GBMRF is included at the end of this document.
- 4. Regional Materials
 - a. To qualify as LEED Regional Content a material must:
 - 1) Be manufactured within a 500 mile radius, AND
 - 2) Be extracted or harvested within a 500 mile radius.
 - b. The project goal is that at least 10% of the value of the project materials (without labor and equipment) be from regional materials.
 - c. The manufacturer must provide the location of manufacture and the location of extraction/harvest.
 - d. To determine Regional Content for LEED:
 - 1) Determine that the product is manufactured regionally
 - 2) Determine the percentage (%) of regional material weight:
 - a) Determine the total weight of the material or product
 - b) Determine the weight of the regional harvested/extracted component
 - 3) Divide the regionally harvested weight by the total weight to get a percentage (%) of regionally manufactured and harvested material.
 - e. Determine the value of the regional content:
 - 1) Determine the total cost of the product (without labor and equipment).
 - 2) Multiply the total value of the product by the percentage (%) of regionally manufactured and harvested material content to get the value of the Regional Content.
 - f. The contractor shall in part:
 - 1) Maintain a spreadsheet showing the Regional Materials purchased, including the material name, supplier, percentage (%) of locally extracted/harvested materials (by weight), the

total weight of the material, the cost of the material (without labor and equipment), and the source of the regional content information.

- 2) Maintain records of Regional Materials, including cut sheets, published product information and cost back up.
- 3) Submit a completed "Green Building Materials Reporting Form" (GBMRF) in accordance with Item 1.9, LEED Submittals for each product, along with back up. A blank copy of the GBMRF is included at the end of this document.

5. Low-Emitting Materials

- a. Refer to Items 1.9 LEED Submittals (Action Plans) and 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials".
- b. Carpet Systems
 - 1) Use carpets and carpet backing that meet the requirements for the Carpet and Rug Institute's Green Label Plus Program.
 - 2) Use carpet adhesives that do not have Volatile Organic Compound (VOC) contents in excess of 50 grams/liter
- c. Adhesives, Sealants, Paints and Coatings
 - 1) Use adhesives, sealants paints and coating that have a Volatile Organic Compound (VOC) limit below certain thresholds.
 - 2) Chemical component limitations are also defined for some categories of paint and primer.
 - 3) Maintain records of adhesives, sealants, paints and coatings including the manufacturer, product name and VOC content in grams per liter or pound per gallon.
- d. Non-Urea-formaldehyde Resins (Engineered Wood Products and Laminate Adhesives)
 - 1) Do not use engineered wood, composite wood or agrifiber board that contains urea-formaldehyde glue for any permanently installed materials or assemblies.
 - 2) Do not use adhesives containing urea-formaldehyde resins for bonding veneers and other laminates to substrates, both on-site and for shop work.
 - 3) Examples of materials included in this restriction are plywood, medium density fiberboard, door cores, wheat-board, strawboard, and panel substrates.
 - 4) Maintain records of engineered wood products with manufacturer, product name and manufacturer's written statement that product does not contain urea-formaldehyde resin.
- e. Forest Stewardship Council (FSC) Certified Materials
 - 1) To qualify as FSC wood material must:
 - a) Have its own FSC label and Chain of Custody (COC) Certificate (Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD 01-001,

- “FSC Principles and Criteria for Forest Stewardship.”
 Certificates shall include evidence that manufacturer is certified for Chain of Custody by an FSC-accredited certification body), OR
- b) Be manufactured in a shop that has its own FSC Certificate out of at least 70% FSC Certified wood.
- 2) The FSC wood content of the project can be determined by material costs (without labor and equipment), weight, or volume, but the same criteria must be applied consistently.
- 3) The Contractor shall in part:
- a) Maintain a spreadsheet showing the new wood materials purchased, including the material name, supplier, percentage (%) FSC Certified content, the total cost/weight/volume of the material, the cost of the material (without labor and equipment), the supplier and the COC Certificate number.
 - b) Maintain records of FSC wood, including COC Certificates, cut sheets, published product information and cost back up.
 - c) Submit a completed “Green Building Materials Reporting Form” (GBMRF) in accordance with Item 1.9, LEED Submittals for each product, along with back up. A blank copy of the GBMRF is included at the end of this document.
6. Indoor Air Quality (IAQ) During Construction
- a. IAQ during construction addresses the reduction of pollutants in the project
 - b. Comply with Sheet Metal and Air Conditioning National Contractors’ Association (SMACNA) Guidelines, as stated in Chapter 3 of the referenced “IAQ Guidelines for Occupied Buildings Under Construction”. The Construction IAQ Management Plan shall be organized in accordance with the SMACNA format, and shall address measures to be implemented by the Contractor and/or Subcontractors in each of the five categories (including subsections).
 - c. The Contractor Shall in part:
 - 1) Develop an IAQ Management Plan in accordance with Section 01525, Construction IAQ Management to be implemented by the Construction Manager, and by their subcontractors throughout the duration of the project construction, under the direction of the Construction Manager, and shall be documented per the Submittal Requirements of Item 1.9, LEED Submittals.
 - 2) Take Photographs (18 Total) that document the implementation of the Construction IAQ Management Plan throughout the course of the project construction. Examples include photographs of ductwork sealing and protection, temporary ventilation measures, and conditions of on-site materials storage (to prevent moisture damage). Photographs

shall include integral date stamping, and shall be submitted with brief descriptions, or a reference to project meeting minutes or similar project documents.

7. Commissioning of Building Systems
 - a. The project is required to meet the LEED requirements for Enhanced Commissioning
 - b. Coordinate and support the efforts of the Commissioning Agent.

1.6 REFERENCES, STANDARDS, AND REGULATORY REQUIREMENTS

- A. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of conflict between referenced standards, this specification or within themselves, the more stringent standard or requirement shall govern.
 1. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
 2. Carpet and Rug Institute (CRI)
 3. Environmental Protection Agency (EPA)
 4. Forest Stewardship Council (FSC)
 5. Green Seal (GS)
 6. Illuminating Engineering Society of North America (IESNA)
 7. Sheet Metal and Air-Conditioning National Contractor Association (SMACNA)
 8. South Coast Air Quality Management District (SQAMD)
 9. United States Green Building Council (USGBC): Leadership in Energy and Environmental Design (LEED) Green Building Rating System, Version CS-2.0.
- B. Rule 1168 – “Adhesive and Sealant Applications”, effective dated of July 1, 2005 and Rule Amendment date of January 7, 2005: South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov.
- C. “Green Seal Standard for Commercial Adhesives”, GS-36, requirements in effect October 19, 2000, www.greenseal.org/.
- D. “Green Seal Standard for Architectural Coating”, GS-11, plus “Green Seal Standard for Anti-Corrosive Paints”, GS-03, www.greenseal.org/.
- E. Rule 1113 “Architectural Coatings”, amended 7/9/04: South Coast Air Quality Management District (SQAMD), State of California, www.aqmd.gov.
- F. SMACNA IAQ “Guidelines for Occupied Buildings Under Construction”: Sheet Metal and Air-Conditioning National Contractor Association (SMACNA) November 1995, www.smacna.org.
- G. ANSI/ASHRAE 52.2, “Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size”. www.ashrae.org.

1.7 LEED PREREQUISITES

- A. The following LEED Prerequisites are required in order to achieve the project's targeted LEED rating. Compliance with all applicable prerequisite criteria, as defined in this specification and the contract drawings, is mandatory.
1. Prerequisite SS 1, Construction Activity Pollution Prevention
 2. The contractor and their subcontractors shall develop and implement a site Erosion and Sediment Control Plan which complies with all applicable regulatory requirements and the applicable control measures established in Chapter 3, "Sediment and Erosion Control" of the U.S. Environmental Protection Agency (EPA) document No. 832R92005, Storm Water Management for Construction Activities, September 1992.
 3. Prerequisite EA 1, Fundamental Commissioning of the Building Energy Systems
 4. Building systems including HVAC, lighting, electrical, domestic hot water and renewable energy systems (if applicable) shall be commissioned, with oversight provided by a third-party Commissioning Authority contracted directly to the Owner. Commissioning requirements shall be defined under Divisions 1, 15, 16 and 17.
 5. Prerequisite EA 2, Minimum Energy Performance
 6. The project is designed to meet or exceed the energy conservation requirements of the standard ASHRAE/IESNA 90.1-2004, "Energy Standard for Buildings except Low-Rise Residential Buildings".
 7. Prerequisite EA 3, CFC Fundamental Refrigerant Management
 8. Chlorofluorocarbon (CFC) refrigerants are prohibited from all HVAC&R systems installed as part of the project.
 9. Prerequisite MR 1, Storage & Collection of Recyclables
 10. The project includes dedicated storage/collection facilities for recyclable materials, including paper, corrugated cardboard, glass, plastics and metals.
 11. The project is designed to meet or exceed the ventilation performance requirements of standard ASHRAE 62.1-2004, "Ventilation for Acceptable Indoor Air Quality", including approved Addenda.
 12. Prerequisite EQ 1, Minimum IAQ Performance
 13. Prerequisite EQ 2, Environmental Tobacco Smoke (ETS) Control

14. Smoking shall be prohibited in the public areas of the building and exterior designated smoking areas shall be 25 feet from entries, air intakes and operable windows. No applicable contractor/subcontractor requirements.

1.8 LEED PERFORMANCE CRITERIA FOR MATERIALS

- A. The following sub-sections, organized by CSI Division, list the required LEED performance criteria for materials used in this project. Product substitutions, if proposed by the Contractor or their subcontractors, shall not be allowed if such changes compromise the stated LEED requirements. The percentages should be adjusted to reflect availability of products with the greatest amount of recycled content within the S. Korean market.

1. It is the responsibility of the contractors to bring to the attention of the Architect any conflicts between the LEED Performance criteria listed in this section and any additional performance criteria or "acceptable products" listed in other sections of the contract documents (specifications or drawings). These conflicts shall be brought to the Architect's attention for resolution prior to the purchase or installation of the materials in question. LEED criteria will not be waived unless specifically approved, in writing, by the Architect.

B. DIVISION 2 – SITE CONSTRUCTION

1. Recycled Content Materials:
 - a. While there is no minimum requirement for the use of flyash, ground granulated blast furnace (GGBF) slag, or other recycled materials within the concrete mix designs, the use of such products is encouraged where: 1) it is readily available; 2) it does not negatively impact the performance characteristics of the concrete; and 3) it does not add to the product cost. Any use of flyash, GGBF slag, or other recycled materials within the concrete mix designs shall be reported and documented in accordance with Item 1.9, LEED Submittals below. All design mixes are subject to review and approval by the project's Structural Engineer.
 - b. Recycled materials within the concrete mix designs shall be reported and documented in accordance with Item 1.9, LEED Submittals below. All design mixes are subject to review and approval by the project's Structural Engineer.
 - c. Steel reinforcing bar, rods, wire, and welded wire fabric shall contain a minimum of 25% combined post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Item 1.9, LEED Submittals below.
2. Regionally-manufactured/Harvested Materials
 - a. The manufacturing locations for concrete and bituminous pavement materials shall be within 500 miles (by air) of the project site, and

shall be documented in accordance with Item 1.9, LEED Submittals below.

- b. The location of the nursery or other source for all landscape plantings shall be documented in accordance with Item 1.9, LEED Submittals below.

C. DIVISION 3 - CONCRETE

1. Recycled Content Materials:

- a. While there is no minimum requirement for the use of flyash, ground granulated blast furnace (GGBF) slag, or other recycled materials within the concrete mix designs, the use of such products is encouraged where: 1) it is readily available; 2) it does not negatively impact the performance characteristics of the concrete; and 3) it does not add to the product cost. Any use of flyash, GGBF slag, or other recycled materials within the concrete mix designs shall be reported and documented in accordance with Item 1.9, LEED Submittals below. All design mixes are subject to review and approval by the project's Structural Engineer.
- b. Steel reinforcing bar, rods, wire, welded wire fabric, anchors, and ties shall contain a minimum of 25% combined post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Item 1.9, LEED Submittals below.

2. Regionally-manufactured/Harvested Materials

- a. The manufacturing location(s) for cast-in-place concrete shall be within 500 miles (by air) of the project site, and shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. The manufacturing location(s) for steel reinforcing products shall be documented in accordance with Item 1.9, LEED Submittals below.
- c. The origin of the raw materials from which the concrete and steel reinforcing products were manufactured shall be documented in accordance with Item 1.9, LEED Submittals below.

3. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

D. DIVISION 4 - MASONRY

1. Recycled Content Materials:

- a. Steel reinforcing bar, rods, wire, anchors, and ties shall contain a minimum of 25% combined post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Item 1.9, LEED Submittals below.

2. Regionally-manufactured/Harvested Materials

- a. The manufacturing location(s) for all concrete masonry units shall be within 500 miles (by air) of the project site, and shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. The manufacturing location(s) for dimensional stone and for steel reinforcing products shall be documented in accordance with Item 1.9, LEED Submittals below.
- c. The origin of the raw materials from which the concrete masonry units and dimensional stone products were manufactured shall be documented in accordance with Item 1.9, LEED Submittals below.

3. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

E. DIVISION 5 – METALS

1. Recycled Content Materials:

- a. Structural Steel, steel deck and miscellaneous steel shall contain a minimum of 35% combined post-industrial/post consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with item 1.9, LEED Submittals below.

2. Regionally-manufactured/Harvested Materials

- a. The manufacturing location(s) for all structural steel products shall be documented in accordance with Item 1.9, LEED Submittals below. For the purposes of this LEED credit, the steel fabricator can be considered the manufacturer.
- b. The origin of the raw materials from which the structural steel and steel deck was manufactured shall be documented in accordance with Item 1.9, LEED Submittals below. For the purposes of this LEED credit, the steel mill can be considered the source of the raw material.

3. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

F. DIVISION 6 – WOODS, PLASTICS AND COMPOSITES shall be revised to state the following:

1. Certified Wood:

- a. The use of "FSC Certified" products is required in all wood products as listed under Item 1.11, Products where available. If a wood product with the "FSC Certified" label does not exist or is not available, a non "FSC Certified" product may be substituted in place. Any use of "FSC Certified" wood products (except recycled or salvaged wood) which have been harvested in accordance with the "FSC Principles and Criteria" for well-managed forests developed by the Forest Stewardship Council (FSC) shall be reported and documented in accordance with Item 1.9, LEED Submittals below.

2. Low-emission Products:

- a. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, and medium-density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with Item 1.9, LEED Submittals below.
- b. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

G. DIVISION 7 - THERMAL AND MOISTURE PROTECTION

1. Recycled Content Materials:

- a. The post-industrial and/or post-consumer recycled content (by weight) of fiberglass insulation products shall be reported and documented in accordance with Item 1.9, LEED Submittals below.
- b. The post-industrial and/or post-consumer recycled content (by weight) of Mineral-wool insulation products shall be reported and documented in accordance with Item 1.9, LEED Submittals below.

- c. The post-industrial and/or post-consumer recycled content (by weight) of metal wall panels shall be documented in accordance with Item 1.9, LEED Submittals below.
- d. The post-industrial and/or post-consumer recycled content (by weight) of metal roof panels shall be documented in accordance with Item 1.9, LEED Submittals below.
- e. The post-industrial and/or post-consumer recycled content (by weight) of Cementitious and/or fibrous fireproofing shall be reported and documented in accordance with Item 1.9, LEED Submittals below. Metal lath and reinforcing fabric shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content. Certification of recycled content shall be in accordance with Item 1.9, LEED Submittals below.
- f. The post-industrial and/or post-consumer recycled content (by weight) of Polystyrene Insulation products shall be reported and documented in accordance with Item 1.9, LEED Submittals below. Certification of recycled content shall be in accordance with Item 1.9, LEED Submittals below.

2. Regionally-manufactured/Harvested Materials

- a. The manufacturing location(s) for metal wall panels shall be documented in accordance with Item 1.9, LEED Submittals below. For the purposes of this LEED credit, the steel fabricator can be considered the manufacturer.
- b. The manufacturing location(s) for metal roof panels shall be documented in accordance with Item 1.9, LEED Submittals below. For the purposes of this LEED credit, the steel fabricator can be considered the manufacturer.
- c. The origin of the raw materials from which the metal wall panels were manufactured shall be documented in accordance with Item 1.9, LEED Submittals below. For the purposes of this LEED credit, the steel mill can be considered the source of the raw material.
- d. The origin of the raw materials from which the metal roof panels were manufactured shall be documented in accordance with Item 1.9, LEED Submittals below. For the purposes of this LEED credit, the steel mill can be considered the source of the raw material.
- e. Energy Star roof materials manufactured within 500 miles (by air) of the project site shall be documented in accordance with Item 1.9, LEED Submittals below.

3. Energy Star Roofing

- a. All exposed roofing products including membranes and pavers shall be ENERGY STAR® compliant and have a Solar Reflectance Index (SRI) of at least 78 when tested in accordance with ASTM E-1980. Any selected product with an SRI less than 78 requires the Architect's approval.

4. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

H. DIVISION 8 – DOORS AND WINDOWS

1. Recycled Content Materials:

- a. The post-industrial and/or post-consumer recycled content (by weight) of Aluminum curtain wall shall be reported and documented in accordance with Item 1.9, LEED Submittals below.
- b. Steel doors with recycled content shall be documented in accordance with Item 1.9 (LEED Submittals) below.

2. Regionally-manufactured/Harvested Materials

- a. Aluminum curtain wall systems manufactured within a 500 mile radius of the project shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. Steel doors manufactured within a 500 mile radius of the project shall be documented in accordance with Item 1.9, LEED Submittals below.

3. Certified Wood

- a. Wood doors made from "FSC Certified" products (except recycled or salvaged wood) which have been harvested in accordance with the "FSC Principles and Criteria" for well-managed forests developed by the Forest Stewardship Council (FSC) shall be reported and documented in accordance with Item 1.9, LEED Submittals below.

4. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, and medium-density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with Item 1.9, LEED Submittals below.

I. DIVISION 9 – FINISHES

1. Recycled Content Materials:

- a. Gypsum wallboard shall contain “synthetic” gypsum produced with a minimum of 90% post-industrial recycled content, if readily available. Recycled content shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. Steel studs, track, and miscellaneous framing shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Recycled content shall be documented in accordance with Item 1.9, LEED Submittals below.
- c. The post-industrial and/or post-consumer recycled content (by weight) of Mineral Fiber Acoustical Ceiling Panels shall be reported and documented in accordance with Item 1.9, LEED Submittals below.
- d. Steel ceiling grid and suspension system shall have a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Recycled content shall be documented in accordance with Item 1.9, LEED Submittals below.
- e. The post-industrial and/or post-consumer recycled content (by weight) of Carpet tile face fibers and/or backings shall be reported and documented in accordance with Item 1.9, LEED Submittals below.
- f. The post-industrial and/or post-consumer recycled content (by weight) of Broadloom carpet shall be reported and documented in accordance with Item 1.9, LEED Submittals below.

2. Regionally-manufactured/Harvested Materials

- a. Gypsum wallboard products manufactured within 500 miles (by air) of the project site shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. The origin of the raw materials from which the gypsum wallboard was manufactured shall be documented in accordance with Item 1.9, LEED Submittals below.
- c. The manufacturing location(s) for steel studs, track, and miscellaneous framing shall be documented in accordance with Item 1.9 LEED Submittals below. For the purposes of this LEED credit, the steel fabricator can be considered the manufacturer.
- d. Acoustical panel ceiling products manufactured within 500 miles (by air) of the project site shall be documented in accordance with Item 1.9, LEED Submittals below.
- e. The origin of the raw materials from which the miner fiber acoustical ceiling panels were manufactured shall be documented in accordance with Item 1.9, LEED Submittals below.

3. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.
- b. Carpet, Carpet Backing and Carpet tiles and adhesives shall meet or surpass all criteria of the "Green Label Plus" Indoor Air Quality Test Program established by the Carpet and Rug Institute (CRI) of Dalton, Georgia.

J. DIVISION 10 – SPECIALTIES

1. Recycled Content Materials:

- a. The post-industrial and/or post-consumer recycled content (by weight) of Plastic toilet partitions shall be reported and documented in accordance with Item 1.9, LEED Submittals below.

2. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

K. DIVISION 11 – EQUIPMENT

1. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

L. DIVISION 12 – FURNISHINGS

1. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., "VOC Limits for Low-Emitting Materials". Only those products used on the interior of the building (inside of the weatherproofing system) are required to

comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

- b. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, and medium-density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with Item 1.9, LEED Submittals.

M. DIVISION 13 – SPECIAL CONSTRUCTION

1. Low-emission Products:

- a. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) in fixed audience seating shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with Item 1.9, LEED Submittals below.
- b. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., “VOC Limits for Low-Emitting Materials”. Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

N. DIVISION 14 – CONVEYING SYSTEMS

1. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., “VOC Limits for Low-Emitting Materials”. Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

O. DIVISION 15 – MECHANICAL

1. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., “VOC Limits for Low-Emitting Materials”. Only those products used on the interior of the building (inside of the weatherproofing system) are required to

comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

P. DIVISION 16 – ELECTRICAL

1. Low-emission Products:

- a. Field-applied adhesives, sealants, and paints shall meet the requirements of Item 1.11, Products, Sub-Item D., “VOC Limits for Low-Emitting Materials”. Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. VOC content shall be documented in accordance with Item 1.9, LEED Submittals below.

1.9 LEED SUBMITTALS

- A. LEED submittals are required for all installed materials in specification Divisions 2 through 12 and adhesives, sealants, and paints through Divisions 16. The GREEN BUILDING Submittal information shall be assembled into one (1) package per Specification section or sub-contractor. Two (2) copies of the submittals are required. Incomplete or inaccurate LEED Submittals may be used as the basis for rejecting the submitted products or assemblies. Contractor and/or subcontractors shall submit the following LEED BUILDING reporting items:

- 1. A completed GREEN BUILDING MATERIALS REPORTING FORM (GBMRF) for each trade (sample to be provided by architect). Information to be supplied for this form shall include:
 - a. Cost breakdowns for the materials included in the contractor's or subcontractor's work. Cost breakdowns shall include total installed cost and itemized material costs.
 - b. The amount of post consumer and/or post industrial recycled content in the supplied products.*
 - c. Identification (Y/N) of materials manufactured within 500 miles of the project site.*
 - d. Identification (Y/N) of materials harvested or extracted within 500 miles of the project site.*
 - e. Identification (Y/N) of “FSC Certified” wood products used.*
 - f. VOC content of all field applied adhesives, sealants, and paints used in interior applications.

*If applicable – see Item 1.8 (LEED Performance Criteria for Materials) above to determine the applicable reporting based on the material type.

- B. MATERIALS REPORTING FORM BACK-UP DOCUMENTATION: These documents are used to validate the information provided on the Green Building Materials Reporting Form (except cost data). For each material listed on the form, provide documentation to certify the material's LEED BUILDING attributes, as applicable:

- a. Recycled content: Provide published product literature or letter of certification on the manufacturer's letterhead certifying the amounts of post-consumer and/or post-industrial content.
 - b. Regional manufacturing (within 500 miles): Provide published product literature or letter of certification on the manufacturer's letterhead indicating the city/state where the manufacturing plant is located and the distance in miles from the project site.
 - c. Regional raw materials (within 500 miles): Provide published product literature or letter of certification on the manufacturer's letterhead indicating the city/state from which each of the raw materials in the product were extracted, harvested or recovered, and the distance in miles from the project site.
 - 1) If only some of the raw materials for a particular product or assembly originate within 500 miles of the project site, provide the percentage (by weight) that these materials comprise in the complete product.
 - d. FSC Certified Wood:
 - 1) Provide vendor invoices for each wood product that has been harvested in accordance with the "FSC Principles and Criteria" for well-managed forests developed by the Forest Stewardship Council (FSC) of Bonn, Germany. Invoices shall include chain-of-custody certificate numbers and itemized costs for all certified products.
 - 2) For assemblies, provide the percentage (by cost and by weight) of the assembly that is FSC-certified wood.
 - e. VOC content: Provide Material Safety Data Sheets (MSDS) certifying the Volatile Organic Compound (VOC) content of the adhesive, sealant, paint, or coating products. VOC content is to be reported in grams/liter or lbs/gallon. If the MSDS does not show the product's VOC content, this information must be provided through other published product literature from the manufacturer, or stated in a letter of certification from the product manufacturer on the manufacturer's letterhead.
- 1. **PRODUCT CUT SHEETS:** Provide product cut sheets with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project.
 - 2. **CRI GREEN LABEL CERTIFICATION:** For carpets and carpet cushions, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the products comply with the "Green Label Plus" IAQ testing program of the Carpet and Rug Institute of Dalton, GA.

3. **CARPET COMPONENT IDENTIFICATION:** For all synthetic carpets, provide documentation from the manufacturer on the manufacturer's letterhead of the specific carpet component identification code that is printed on, or attached to, the carpet supplied for the project. The code must identify the carpet face fiber, and may identify its primary backing, secondary backing, adhesive, adhesive filler, and dyes.
4. **CERTIFICATION OF COMPOSITE WOOD OR AGRIFIBER RESINS:** For all composite wood, engineered wood and agrifiber products, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the products do not contain added urea-formaldehyde resins.
5. **CERTIFICATION OF COMPOSITE WOOD OR AGRIFIBER LAMINATING ADHESIVES:** For all composite wood, engineered wood and agrifiber products, provide published product literature or letter from the manufacturer on the manufacturer's letterhead verifying that the products do not contain added urea-formaldehyde or phenol-formaldehyde resins.
6. **GREEN SEAL COMPLIANCE:** Provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the following product types comply with the VOC limits and chemical component restrictions developed by the Green Seal organization of Washington, DC (www.greenseal.org/):
 - a. Topcoat paints: refer to Green Seal standard GS-11 (1st edition, May 1993)
 - b. Anti-corrosive and Anti-rust paints: refer to Green Seal standard GS-03 (2nd Edition, January 1997)
 - c. Aerosol Adhesives: refer to Green Seal standard GS-36 (1st edition, October 2000)
7. **ENERGY STAR ROOFING:** For exposed roofing materials, including membranes and pavers, provide certification from the manufacturer of ENERGY STAR compliance for the Solar Reflectance Index (SRI). (An SRI of at least 78 when tested in accordance with ASTM E-1980).
8. **HIGH ALBEDO ROOFING:** For exposed roofing membranes, pavers, and ballast products, provide published product literature or letter from the manufacturer on the manufacturer's letterhead verifying the following minimum Solar Reflectance Index (SRI) values:
 - a. 78 for low-sloped roofing applications (slope \leq 2:12)
 - b. 29 for steep-sloped roofing applications (slope $>$ 2:12)
 - c. SRI values shall be calculated according to ASTM E 1980.
 - d. Reflectance shall be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance shall be measured according to ASTM E 408 or ASTM C 1371.
 - e. Vegetated roof surfaces are exempt from the SRI criteria.

9. HIGH ALBEDO PAVEMENT AND WALKWAYS: For paving and walkway materials made from concrete or brick provide published product literature or letter from the manufacturer on the manufacturer's letterhead verifying a minimum Solar Reflectance Index (SRI) value of 29. SRI values shall be calculated according to ASTM E 1980. Reflectance shall be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance shall be measured according to ASTM E 408 or ASTM C 1371.

C. CONSTRUCTION PROGRESS

1. Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
2. Waste Reduction Progress Reports complying with Division 01524 Section "Construction Waste Management".
3. Regional Materials. Provide updated spreadsheet to track Regional Materials.
4. Recycled Content Materials. Provide updated spreadsheet to track Recycled Content.
5. FSC Certified Wood Products. Provide updated spreadsheet to track FSC Certified Wood Materials.
6. Low Emitting VOC Content Materials. Provide updated spreadsheet to track Low Emitting VOC Content Materials.
7. Low Emitting Composite Wood. Provide updated spreadsheet to track low emitting (non-urea-formaldehyde) composite and engineered wood products.

D. LEED ACTION PLANS

- a. The following plans are to be prepared by the Contractor and refer to work reviewed in Items 1.5, LEED Overview and General Requirements of this section.
- b. Erosion and Sedimentation Control Plan (ESC): Indicate what ESC for site work measures are anticipated and how they will be documented.

E. Construction Waste Management (CWM):

- a. General: Develop a plan consisting of waste identification, waste reduction work plan, and progress reporting per the requirements of Section 01524, Construction Waste Management. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
1. Construction Indoor Air Quality Management (IAQ): A copy of the draft and final versions of the Construction IAQ Management Plan, as defined below.
 - a. General: Develop a plan in accordance with Section 01525, Construction IAQ Management where construction activities are planned to meet or exceed standards included in Chapter 3 of the SMACNA "IAQ Guidelines for Occupied Buildings Under Construction", First Edition, 1995.
 - b. Upon the Plan's approval by the Owner and Consultant, the Contractor and subcontractors shall implement the Plan through the duration of the construction process.

- 1) Develop a construction schedule outlining the start-up date and expected duration of all Construction IAQ Management Plan control measures.

1.10 QUALITY ASSURANCE

- A. Contractor's Quality Control Responsibilities: Contractor is solely responsible for the quality control of the work.
- B. Contractor's LEED Representative: Designate a Representative that is LEED accredited by the USGBC. Contractor's LEED Representative shall oversee the sustainable building for the project, shall instruct workers concerning these goals, and shall be present on site when work is in progress.
- C. LEED Certification Meetings: Schedule and conduct LEED Certification meetings monthly in addition to those outlined in Division 1 "Project Management and Coordination". Meeting attendees shall include at least the following: Owner's Representative, Architect, Contractor's Project Manager, Contractor's LEED Representative, and Sub-Contractor Representatives as appropriate to the stage of work. Discuss LEED Certification at Pre-bid, Pre-construction, and regular job site meetings.
- D. LEED Training: Provide environmental training for workers performing work on the project site. Training shall include the following:
 1. Overview of environmental issues related to the building industry
 2. LEED Building System – Requirements for this project

1.11 PRODUCTS

- A. Materials with Recycled Content
 1. Provide recycled content and/or report recycled content as indicated in Items 1.8, LEED Performance Criteria for Materials and 1.9, LEED Submittals.
- B. Regional Materials
 1. Report regional content as indicated in Items 1.8, LEED Performance Criteria for Materials and 1.9, LEED Submittals.
- C. Forest Stewardship Council Certified Materials
 1. Track and report (by cost) of permanently all installed wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
 - a. Wood-based materials included, but are not limited to, the following materials when made from wood, engineered wood products, or wood based panels products:
 - 1) Rough carpentry
 - 2) Miscellaneous carpentry
 - 3) Heavy timber construction
 - 4) Wood decking
 - 5) Metal-plate-connected wood trusses

- 6) Structural glued-laminated timber
- 7) Finish carpentry
- 8) Architectural woodwork
- 9) Wood paneling
- 10) Wood veneer wall covering
- 11) Wood flooring
- 12) Wood lockers
- 13) Wood cabinets

D. VOC Limits for Low-Emitting Materials

1. Field-Applied Adhesives and Sealants:

- a. The VOC content of adhesives, adhesive bonding primers, or adhesive primers used in this project shall not exceed the limits defined in Rule 1168 "Adhesives and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD) of the State of California.
- b. The VOC content of aerosol adhesives shall not exceed the limits defined in the Green Seal Standards for Commercial Adhesives GS-36, requirements in effect October 19, 2000.
- c. Sealants used as filler must meet or exceed California Bay Area Air Resources Board Reg. 8, Rule 51, Organic Compounds: Adhesive and Sealant Products (Adopted November 18, 1992, with Amendments through January 7, 1998).
- d. The VOC limits defined by SCAQMD (based on 1/7/05 amendments) are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.
- e. General: Unless otherwise specified below, the VOC content of all adhesives, adhesive bonding primers, or adhesive primers shall not be in excess of 250 grams per liter.
- f. Non-General: For specified applications, the allowable VOC content is as follows (in grams/liter):
 - 1) Architectural Applications

a) Indoor carpet adhesive	50
b) Carpet pad adhesive	50
c) Outdoor carpet adhesive	150
d) Wood flooring adhesive	100
e) Rubber floor adhesive	60
f) Sub-floor adhesive	50
g) Ceramic tile adhesive	65
h) VCT and asphalt tile adhesive	50
i) Drywall and panel adhesive	50
j) Cove base adhesive	50
k) Multipurpose construction adhesive	70
l) Structural glazing adhesive	100
m) Single ply roof membrane adhesives	450
 - 2) Specialty Applications

a) PVC welding	510
b) CPVC welding	490
c) ABS welding	325

- | | | |
|----|--|-----|
| d) | Plastic cement welding | 250 |
| e) | Adhesive primer for plastic | 550 |
| f) | Contact adhesive | 80 |
| g) | Special purpose contact adhesive | 250 |
| h) | Structural wood member adhesive | 140 |
| i) | Sheet applied rubber lining operations | 850 |
| 3) | Substrate Specific Applications | |
| a) | Metal to metal | 30 |
| b) | Plastic foams | 50 |
| c) | Porous material (except wood) | 50 |
| d) | Wood | 30 |
| e) | Fiberglass | 80 |
2. If an adhesive is used to bond dissimilar substrates together, the adhesive with the highest VOC content shall be allowed.
 3. VOC limits for aerosol adhesives (defined as % of VOC weight in grams per liter less water):
 - a. General purpose mist spray 65% VOC by weight
 - b. General purpose web spray 55% VOC by weight
 - c. Special purpose aerosol adhesives 70% VOC by weight
 4. The VOC content of sealants or sealant primers used in this project shall not exceed the limits defined in Rule 1168 "Adhesives and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD) of the State of California.
 5. The VOC limits defined by SCAQMD Rule 1168 are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.
 - a. Sealants
 - 1) Architectural 250
 - 2) Marine deck 760
 - 3) Roadways 250
 - 4) Single ply roof material installation/repair 450
 - 5) Non-membrane roof installation/repair 300
 - 6) Other 420
 - b. Sealant Primer
 - 1) Architectural - nonporous 250
 - 2) Architectural - porous 775
 - 3) Other 750
 6. Paints and Coatings:
 - a. Paints and primers (non-specialized applications): Paints and primers used in non-specialized interior and exterior applications (i.e. For wallboard, plaster, wood, metal doors and frames, etc.) shall meet the VOC and chemical component limitations of the Green Seal Paint Standard GS-11, and anti-corrosive paints (IE used in preventing the corrosion of ferrous metal substrates) shall meet the VOC and chemical component limitations of Green Seal Standard GC-03 of Green Seal, Inc., Washington, DC. Product-specific environmental requirements are as follows:

- 1) VOC concentrations (in grams per liter) of the product shall not exceed those listed below as determined by U.S. Environmental Protection Agency (EPA) Reference Test Method 24. The calculation of VOC shall exclude water and tinting color added at the point of sale.
 - a) Interior coatings
 - i. Non-flat 150
 - ii. Flat 50
 - b) Interior anti-corrosive paints
 - i. Gloss 250
 - ii. Semi-gloss 250
 - iii. Flat 250
 - c) Exterior coatings
 - i. Non-flat 200
 - ii. Flat 100

- b. Chemical Component Limitations – Aromatic Compounds: The product must contain no more than 1.0% by weight of the sum total of aromatic compounds. Testing for the concentration of these compounds will be performed if they are determined to be present in the product during a material audit.

- c. Chemical Component Limitations – Other Chemicals: The manufacturer shall demonstrate that the following chemical compounds are not used as ingredients in the manufacture of the product.
 - 1) Halomethanes: methylene chloride
 - 2) Chlorinated ethanes: 1,1,1-trichloroethane
 - 3) Aromatic solvents: benzene, toluene (methylbenzene), ethylbenzene
 - 4) Chlorinated ethylenes: vinyl chloride
 - 5) Polynuclear aromatics: naphthalene
 - 6) Chlorobenzenes: 1,2-dichlorobenzene
 - 7) Phthalate esters: di (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, dimethyl phthalate
 - 8) Miscellaneous semi-volatile organics: isophorone
 - 9) Metals and their compounds: antimony, cadmium, hexavalent chromium, lead, mercury
 - 10) Preservatives (antifouling agents): formaldehyde
 - 11) Ketones: methyl ethyl ketone, methyl isobutyl ketone
 - 12) Miscellaneous volatile organics: acrolein, acrylonitrile

- d. Paints and other Architectural Coatings (specializes applications): Paints and other architectural coatings used in specialized interior and exterior applications (as defined below) shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by

SCQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter (g/L), less water and less exempt compounds.

- | | | |
|----|----------------------|-----|
| 1) | Clear wood finishes: | |
| | a) Varnish | 350 |
| | b) Lacquer | 550 |
| 2) | Sealers | |
| | a) Sanding | 275 |
| | b) Waterproofing | 250 |
| 3) | Floor Coatings | 100 |
| 4) | Stains | 250 |
- e. Low-Emitting Carpet Systems
- 1) Document that the installed carpets products and carpet backing are CRI Green Plus Certified.
 - 2) Document that all carpet adhesives contain fewer than 50 grams per liter VOC content.
- f. Non-Urea-Formaldehyde Resins in Engineered Woods
- 1) Document that the bonding resins in all engineered wood products do not contain added urea-formaldehyde or phenol-formaldehyde resins.
 - 2) Document that the adhesives used for field and shop applied laminations (veneers, plastics, metals) do not contain added urea-formaldehyde resins.

1.12 EXECUTION

A. EROSION AND SEDIMENTATION CONTROL (ESC)

1. Comply with requirements for Construction Activity Pollution Prevention as outlined in the Sedimentation and Erosion Control Plan.

B. CONSTRUCTION WASTE MANAGEMENT (CWM)

1. Comply with Section 01524, Construction Waste Management.
2. Maintain spreadsheet tracking waste material description, hauler or recycling location and tabulation of material diverted or recycled based on weight or volume.

C. RECYCLED CONTENT

1. Maintain a spreadsheet to track Recycled content of materials specified in Divisions 02-10. Include material description, material costs (without labor and equipment), post consumer recycled content, pre consumer recycled content and recycled content information source. Recycled content is based on the cost of qualifying materials as a percent of overall materials costs for Divisions 02 –10.

D. REGIONAL MATERIALS

1. Maintain a spreadsheet to track Regional Materials specified in Divisions 02-10. Include the product name, manufacturer, material cost (without labor and equipment), direct line distance from project to extraction/harvest location,

direct line distance from project to manufacturer's location and source of information regarding harvest/extraction and manufacturing locations.

E. (FSC) MATERIALS

1. Maintain a spreadsheet listing all new wood on the project. Identify which components are FSC certified, the source of the materials, the value of all FSC certified wood materials (as a % of total product value), and the COC number. Recycled wood fiber that qualifies as contributing to recycled content shall be excluded.

F. LOW EMITTING VOC CONTENT MATERIALS

1. Maintain a spreadsheet of all adhesives, sealants, and sealant primers, paints and coatings used on the project. Include product manufacturer, product name/model, VOC content, allowable VOC content as per Item 1.11, Products, Sub-Item D., VOC Limits for Low-Emitting Materials, the source of the VOC data, an estimated quantity of the product used on the project and an estimated cost for each product.

G. LOW EMITTING CARPET

1. Maintain a spreadsheet of all installed carpets and carpet backings. Include manufacturer, recycled content, manufacturing location, and confirmation that the product meets the requirements of the CRI 'Green Label Plus' program. Maintain a listing of all carpet adhesives including the manufacturer, product name and VOC content as reported by the manufacturer.
2. For all synthetic carpets maintain a spreadsheet including the manufacturer, the product name, the specific carpet component identification code that is printed on, or attached to, the carpet supplied for the project.

H. LOW EMITTING COMPOSITE WOOD

1. Maintain a spreadsheet of all install composite wood, engineered wood and agrifiber, including manufacturer, product name and confirmation that the product does not contain any added urea formaldehyde resins. Maintain a listing of the glues used for bonding veneers and laminates to substrates with confirmation that they do not contain any added urea-formaldehyde resins.

I. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

1. Comply with the requirements for indoor air quality during construction activity as outlined in the Construction IAQ Management Plan, Section 01525.

END OF SECTION 01361

GREEN BUILDING MATERIALS REPORTING FORM CONTRACTOR:				TEL. NO:			PROJECT NAME:			
							SPEC SECTION:			
Product	Vendor or Manufacturer	REQUIRED for ALL products identified in specifications (except MEP)		Is the product salvaged, refurbished or reused?1 (Y/N)	If contains Recycled Content		100% Extracted & Manufactured4 w/n 500 mile radius of site (Y/N)	Partially Extracted & Manufactured5 w/n 500 mile radius of site (Enter % by weight)	For Wood Products: FSC Certified (Y/N)7	VOC Content8 (for adhesives, sealants, paints and coatings)
		Total Installed COST	Material COST (excluding labor & equipment)		% post-consumer 2	% Pre-consumer3				
1.										
2.										
3.										
4.										
5.										
6.										
7.										

1. Salvaged: Material or product which has been recovered from existing buildings or construction sites and reused in other buildings (e.g., structural beams, doors, brick).
2. Post-Consumer Recycled Content: Portion of material or product which derives from discarded consumer waste that has been recovered for use as a raw material (e.g., plastic bottles, newspaper)
3. Pre-Consumer Recycled Content: Portion of material or product which derives from recovered industrial and mfg. materials that are diverted from municipal solid waste for use in a different mfg. process, prior to use by a consumer (e.g., fly-ash in concrete or synthetic gypsum board, both of which are by-products of coal-burning power plants). Note that spills and scraps from the original mfg. process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product do not qualify.
4. Regional Extraction/Manufacture: Extracted: Extraction, harvesting or recovery of materials that are used for manufacturing of products to be installed in the building. Manufactured: Final assembly of components into a finished product that is furnished and installed by trades (e.g., If the lumber is from Missoula, MT, and the joist (the finished product in this case) is assembled in Kent, WA; then the location of final assembly is Kent, WA). Since Missoula, MT is within a 500 mile radius of Kent, WA the answer for this example would be 'Yes'
5. Partial Extraction/Manufacture: If only a fraction of the material is extracted/harvested/recovered and manufactured within a 500 mile radius then (only) that percentage (by weight) contributes to the regional value.
6. Rapidly Renewable: Materials and products made from raw materials that are harvested within a 10-year cycle (e.g., bamboo, cork, linoleum, fast-growing poplar, wheatboard, wool carpet)
7. FSC Certified: Wood-based products which are certified by the Forest Stewardship Council and carry a Chain-of-Custody certificate number from the vendor or manufacturer.

8. VOC Content: The quantity of volatile organic compounds contained in products such as adhesives, sealants and architectural coatings. VOC content is to be reported in grams/liter or lbs/gallon

Contractor Certification:

I, _____ a duly authorized representative of _____ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any change in such qualifications during the purchasing period will require prior written approval from the Construction Manager and Owner.

SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____ Date: _____ p. ____ of ____

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01400 - QUALITY CONTROL -
TESTING SERVICES**

1. GENERAL

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.
- B. This section specifies the general requirements for testing and inspection services.
- C. Cooperate with Owner's testing laboratory and all others responsible for testing and inspecting the Work.
- D. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in these Specifications.
- E. Provide quality control by the observation and acceptance of work by others being built upon.
- F. Related work described elsewhere:
 - 1. Requirements for testing are described in Divisions 2, 3, 4 and 5 product sections of these Specifications.
 - 2. Where no testing requirements are described, but the Construction Manager decides that testing is required, he may direct that such testing be performed under current standards for testing and Section 7.7 of the General Conditions.
- G. Selection of testing laboratory: The Owner shall hire and pay for an independent testing laboratory.

2. CODES AND STANDARDS

- A. Testing, when required, will be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

3. REVIEW OF THE CONTRACT DOCUMENTS

- A. On all Project Drawings, figures take precedence over measurement by scale, and any scaling is done at the Contractor's own risk. Before ordering any materials or performing any Work, the Contractor shall verify all measurements at the project site and be responsible for the correctness of same.
- B. Promptly respond to test reports and related instructions to ensure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

4. FIELD CONDITIONS

- A. The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions with the Contract Documents and any shop drawings and product data before commencing any related work. Errors, inconsistencies or omissions shall be reported to the Construction Manager and the Architect at once.

5. PAYMENT FOR TESTING

- A. Initial Services: The Owner's Testing Laboratory shall be responsible for initial testing services as outlined in various sections and Section 7.7 of the General Conditions.
- B. Re-Testing Services: When initial tests indicate non-compliance with the Contract Documents, all subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency and the costs thereof will be borne by the Contractor responsible for the work that is non-compliant.

6. TESTING

- A. Code Compliance Testing: Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.
- B. Contractor's Convenience Testing: Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

7. INSPECTION

- A. Inspection by Owner's Personnel: From time to time, personnel in the employ of the Owner may inspect the Work where the Work is in progress, but shall have no authority to direct the Contractor or request changes in the Work except through the Construction Manager and the Architect.
- B. Inspection of Work by Others: Each Contractor shall inspect Work of others which will receive or is adjacent to his Work before commencing his Work. Do not proceed until conditions which would result in a less than first class installation are satisfactorily corrected. Commencing Work shall be construed as acceptance of the Work of others, by the Contractor, as satisfactory to receive his Work. The Contractor shall bear all costs to correct the unsatisfactory Work.

8. COOPERATION WITH TESTING LABORATORY

- A. Representatives of the testing laboratory shall have access to the Work at all times. Provide facilities for such access in order that the laboratory may properly perform its function.
- B. Specimens and samples for testing, unless otherwise provided in the Contract Documents, will be taken by the testing personnel. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

- C. Test results and reports shall be furnished simultaneously to the Engineer (2 copies) and the Construction Manager (1 copy) within one week of testing.

9. TESTING SCHEDULE

- A. The Owner shall pre-qualify and identify qualified independent inspection agencies in a timely manner, allowing Engineer adequate time for review and approval.
- B. Special Structural Testing Schedule to be implemented per specifications.
- C. When changes of construction schedule are necessary during construction, the Construction Manager shall coordinate such changes of schedule with the testing laboratory as required.
- D. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be backcharged to the Contractor and shall not be borne by the Owner.

END OF SECTION 01400

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01421 – STANDARDS
AND DEFINITIONS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 DEFINITIONS

- A. General: Basic contract definitions are included in the Conditions of the Contract.
- B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. No limitation on location is intended.
- C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases. However, no such implied meaning will be interpreted to extend the Architect's responsibility into Contractor's area of construction supervision.
- D. "Approved": The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. Trades: Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
- J. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. "Testing Agencies, Laboratories or Service": All terms interchangeably refer to an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
- L. "Nationally Recognized Testing Laboratories": The term "nationally recognized testing laboratory (NRTL)" shall mean a firm or organization which is recognized by OSHA in accordance with 29 CFR Part 1910.7 to test and approve (i.e., certify, label or list) equipment or materials as being safe for the intended use. Labeling and / or listing of products by NRTL is acceptable wherever a reference to the UL or FMRC label is made in the specifications.
- M. "Label": The label must be provided by a nationally recognized testing laboratory. The Contractor shall provide a statement from the testing laboratory attesting that the laboratory has been approved by OSHA to certify the category of product(s) being submitted for approval.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
 - 1. Reference standards (standards referenced directly in the contract documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the work.
 - 2. Unreferenced Standards: Except as otherwise limited by the contact documents, standards not referenced but recognized in the construction industry as having direct applicability will be enforced for performance of the work. The decision as to whether an industry code or standard is applicable, or as to which of several standards are applicable, is the sole responsibility of the Architect.

- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
 - 1. Updated Standards: Submit a change order proposal where an applicable industry code or standard has been revised and reissued after the date of the Contract Documents and before the performance of the work affected. The Architect will decide whether to issue a change order to proceed with the updated standard.

- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different but apparently equal to the Architect for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
 - 2. The Architect is the sole interpreter of what constitutes "minimum requirements" in any given situation. Exceeding minimum requirements in one or more aspects of any given specification does not cancel or replace the need to meet minimum requirements of any other aspect of that specification.

- D. Copies of Standards: Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale

Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

1.5 GOVERNING REGULATIONS AND AUTHORITIES

- A. The Architect has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents. Contact authorities having jurisdiction directly for information and decision having a bearing on the work.

1.6 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01421

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01500 - CONSTRUCTION
FACILITIES AND TEMPORARY
CONTROLS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Temporary heaters and fuel for heating the enclosed building will be provided by the CM. Any other misc. temp. heat equipment, fuel and associated costs are by the corresponding Work Scope.
- C. Temporary electric service: The CM will contract the work to bring in one - 100 amp temporary power panel per level centrally located. This power will be available prior to 12/31/10 on each floor if the concrete over metal is in place.

1.2 SUMMARY

- A. This section includes requirements for temporary services and facilities, including temporary utilities, support facilities, security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Temporary heat.
 - 4. Ventilation.
 - 5. Telephone service.
 - 6. Sanitary facilities, including drinking water.
 - 7. Storm and sanitary sewer.
- C. Temporary construction and support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds.
 - 2. Temporary roads and paving.
 - 3. Dewatering facilities and drains.
 - 4. Temporary enclosures.
 - 5. Temporary project identification signs and bulletin boards.
 - 6. Waste disposal services.
 - 7. Rodent and pest control.
 - 8. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, and lights.
 - 3. Sidewalk bridge or enclosure fence for the site.
 - 4. Environmental protection.

1.3 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, Fire Department, and Rescue Squad rules.
 - 5. Environmental protection regulations.
- B. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.4 PROJECT CONDITIONS

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
 - 1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Contractor's Facilities: Provide a field office building and sheds adequate in size and accommodation for all Contractor's offices, supply and storage.
 - 1. Within the Contractor's facilities, provide enclosed space adequate for holding project meetings. Furnish with all required tables, chairs and utilities.
 - 2. The entire facilities, including furniture, will remain the property of the Contractor and shall be removed from the site after completion of the work.

- C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
 - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat or as required by conditions to allow continuation of scheduled construction activities. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Protection and temporary closures shall be provided at all exterior openings in the building including doors, walls and roof to maintain the building weather and dust tight. All protection shall be substantial so that it will not be disturbed by wind and weather normal to the area and season.
 - 3. Openings in floors shall be protected and closures provided to prevent floor to floor transfer of dust, debris and conditioned air. Conform to fire and safety regulations of the authorities having jurisdiction.
- D. Project Identification and Temporary Signs: Furnish and install and maintain one project identification sign of the size, graphic design, style of lettering and construction as shown on the drawings or included at the end of this section.
 - 1. Finishes and painting materials shall be adequate to resist weathering and fading for the scheduled construction period.
 - 2. Location: Unless noted otherwise, erect on the site at a lighted location of high public visibility, adjacent to the main entrance to the site, as approved by the Architect.
 - 3. Informational Signs: Provide informational signs with painted lettering, or standard products. Size of signs and lettering shall be as required by regulatory agencies, or as appropriate to the usage. Colors as required by regulatory agencies, otherwise of uniform colors throughout the project. Erect at appropriate locations to provide the required information and at a height for optimum visibility.
 - 4. Materials: Structure and framing may be preservative-treated wood or steel, in sound condition and structurally adequate to the work and suitable specified finish. Paint is specified in Division 9.
 - 5. Maintenance: Maintain signs and supports in a neat, clean condition, and repair damages to structure, framing or sign as required.
 - 6. Relocate informational signs as required by progress of the work.
 - 7. Remove signs, framing, supports and foundations at project completion.
- E. No other signs or advertising of any kind shall be allowed on the job site, except as specifically approved by the Architect.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with

NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 2. Store combustible materials in containers in fire-safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- D. Covered Walkway: Comply with regulations of authorities having jurisdiction as necessary if determined required by applicable codes erect a structurally adequate, protective covered walkway for passage of persons along the adjacent public street. Coordinate with entrance gates, other facilities, and obstructions.
1. Construct covered walkways using scaffold or shoring framing. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner and the Architect.
- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

Bid Package 2B – Issue for Bid

- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts subject to unusual operating conditions.
 - c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 01500

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL TERMINAL
DULUTH, MINNESOTA**

**SECTION 01631 – PRODUCTS
AND SUBSTITUTIONS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 1, Section 01421 "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 - 2. Division 1, Section 01300 "Submittals" specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.

1.3 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
 - 1. "Products" are items purchased for incorporation in the work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.
 - 2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the work.
 - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:
 - 1. Substitutions requested by bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this section for substitutions.
 - 2. Revisions to the Contract Documents requested by the Owner or Architect.

3. Specified options of products and construction methods included in the Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Materials, products, equipment and systems are specified in the Contract Documents by manufacturer, trade name or distributor to establish a standard of the required criteria, including function, performance, dimension, appearance and quality to be met by any proposed substitution. Unless otherwise specified, application for substitutions will be considered by the Owner and the Architect after execution of the agreement. The burden of proof of merit of proposed substitute is upon the proposer. Substitute items shall not be incorporated in the work without prior written approval of the item by the Architect.
- B. Where an item is specified by one or more manufacturer's model number or specific item identification and "or approved equal" is included, only the item(s) that is specified by manufacturer's model number or specific identification is approved and any other item must be submitted for approval as a substitution.
- C. Where an item is specified by a referenced standard, the item must be submitted for approval same as a substitute.
- D. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
- E. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and drawing numbers.
- F. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 1. Coordination information, including a list of changes or modifications needed to other parts of the work and to construction performed by the Owner and separate contractors that will be necessary to accommodate the proposed substitution.
 2. A detailed comparison of significant qualities of the proposed substitution with those of the work specified. Significant qualities may include elements such as performance, weight, size, durability, and visual effect.
 3. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 4. Samples, where applicable or requested.
 5. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 6. Cost information, including a proposal of the net change, if any in the Contract Sum.
 7. The Contractor's certification that the proposed substitution conforms to or exceeds requirements in the Contract Documents in every respect and is appropriate for the applications indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

- G. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection of the substitution within two (2) weeks of receipt of the request, or one week of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a change order. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
 4. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.
 5. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.
- B. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturers or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.

- d. Speed.
- e. Ratings.

2.2 SUBSTITUTIONS

- A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.
 - 1. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.
 - 2. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
 - 3. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting offsetting responsibilities the Owner may be required to bear. The Owner's additional responsibilities may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
 - 4. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - 5. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
 - 6. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
 - 7. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
- B. The Contractor's submittal and the Architect's acceptance of shop drawings, product data, or samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.
- C. Whether or not the Architect and Owner accept a proposed substitution, the Contractor shall reimburse the Owner for the Architect's cost for the Architect and the Architect's consultants for evaluating any proposed substitute including changes required in the Contract Documents for the substitute.
- D. The Architect's decision of approval or disapproval of a proposed substitution shall be final.
- E. All costs that may be incurred associated with a substitution proposed by the Contractor shall be borne by the Contractor. This shall apply to all interfacing components recognized prior to or after approval of the substitution by the Architect.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01631

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01700 - CONTRACT
CLOSEOUT**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.1 SUMMARY

- A. This section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operation and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate sections in Divisions 2 through 17.
- C. Definitions: Closeout is hereby defined to include general requirements near the end of Contract time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Division 2 through 17. Special requirements for mechanical and electrical work are specified in Divisions 15 and 16 sections, respectively. Time of closeout is directly related to "Substantial Completion" and, therefore, may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation (if any) shall be applicable to other provisions of this section, regardless of whether resulting from "phased completion" originally specified by the Contract Documents or subsequently agreed upon by Owner and Contractor.

1.2 SUBSTANTIAL COMPLETION

- A. Certificates of Substantial Completion: Certificates of Substantial Completion will be filled out with punch lists attached and shall define the areas of the work which are being accepted. Procedures required to call for inspections and to request certificates shall be as required in this section.
- B. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, for either the entire work or portions thereof, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete.

- a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the work is not complete.
2. Advise the Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 4. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Deliver tools, spare parts, extra stock, and similar items.
 6. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
 7. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue or change over and remove temporary facilities and services from the site, along with mockups, construction tools, and similar elements.
 8. Complete final cleanup requirements, including touchup painting. Touch up and otherwise repair and restore marred, exposed finishes.
- C. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Architect will repeat inspection when requested and assured that the work is substantially complete.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.3 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by the Architect.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the work.
 5. Submit consent of surety to final payment.
 6. Submit a final liquidated damages settlement statement.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

8. Submit record documents, final project photographs, property survey and similar final record information.
- B. Reinspection Procedure: The Architect will reinspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.
1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance. If the work is incomplete, the Architect will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated. Contractor will promptly reimburse the Architect for all incurred costs.

1.4 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Architect's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the work.
 2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
 3. Note related change-order numbers where applicable.
 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
 5. Preparation of Transparencies: In preparation for certification of Substantial Completion on the last major portion of the work, review completed markup of record drawings with Architect. When authorized, proceed with preparation of a full set of corrected transparencies for Contract Drawings and shop drawings. Incorporate changes and additional information previously marked-up on print sets, by erasing and redrawing where applicable, and by adding details and notations where applicable; refer instances of uncertainty to Architect for determination. Identify and date each updated drawing.
 6. One set of transparencies of original Contract Drawings will be furnished by Architect to Contractor for use in recording changes and additional information. Other printing as required herein is Contractor's responsibility.
 7. Review of Transparencies: Prior to forwarding to Architect, submit corrected transparencies to Architect for review and acceptance. Architect will review each transparency for general scope of changes and information recorded thereon, and of the general quality of draftsmanship thereon (erasures and drafting). Transparencies will be returned to Contractor for organizing into a set and for final submittal.

8. Copies, Distribution: At the completion of the Work the Contractor shall forward one set of original marked-up transparencies to Architect for distribution to Owner. Organize transparencies into a set matching print sets, place set in a durable tube-type drawing container (with end caps), and mark end cap with suitable identification.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda. Include with the Project Manual one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
1. Mark these documents to show substantial variations in actual work performed in comparison with the text of the Specifications and modifications.
 2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 3. Note related record drawing information and Product Data.
 4. Upon completion of the work, submit record Specifications to the Architect for the Owner's records.
- D. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor shall meet with the Architect and the Owner's personnel at the site to determine which of the submitted samples that have been maintained during progress of the work are to be transmitted to the Owner for record purposes. Comply with the Owner's instructions regarding packaging, identification marking and delivery to the Owner's designated storage area. Dispose of other samples in a manner specified for disposal of surplus and waste materials, unless otherwise indicated by the Architect.
- E. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Architect for the Owner's records.
- F. Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2-inch, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Provide the Architect with two (2) copies of each manual. Include the following types of information:
1. Emergency instructions.
 2. Spare parts list.
 3. Copies of warranties.
 4. Wiring diagrams.
 5. Recommended "turn-around" cycles.
 6. Inspection procedures.
 7. Shop Drawings and Product Data.
 8. Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
 - 1. Maintenance manuals.
 - 2. Record documents.
 - 3. Spare parts and materials.
 - 4. Tools.
 - 5. Lubricants.
 - 6. Fuels.
 - 7. Identification systems.
 - 8. Control sequences.
 - 9. Hazards.
 - 10. Cleaning.
 - 11. Warranties and bonds.
 - 12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
 - 1. Startup.
 - 2. Shutdown.
 - 3. Emergency operations.
 - 4. Noise and vibration adjustments.
 - 5. Safety procedures.
 - 6. Economy and efficiency adjustments.
 - 7. Effective energy utilization.

3.2 FINAL CLEANING

- A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1, Section 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturers' instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Except as otherwise indicated, avoid disturbance of natural wea-

- thering of exterior surfaces. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
 - f. Remove debris and surface dust from limited access spaces including roofs, plenums, shafts, trenches, equipment vaults, man-holes, attics and similar spaces.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Submit report (letter) of compliance from exterminator.
- D. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction, where applicable.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
- 1. Where extra materials of value remain after completion of associated work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION 01700

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

SECTION 01710 - CLEANING UP

1. GENERAL

- A. The Contractors shall furnish all labor, materials, tools, equipment, and perform all work and services necessary for cleaning up required in conjunction with work performed, as shown on drawings and as specified, in accordance with provisions of the Contract Documents and completely coordinated with work of all other trades.
- B. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- C. This Section specifies administrative and procedural requirements for final cleaning at Substantial Completion.
 - 1) Special cleaning requirements for specific elements of the Work are included in appropriate Sections of Divisions 2 through 16.
 - 2) Multiple Prime Contracts: Except as otherwise indicated, each Prime Contractor is responsible for coordination of final cleaning where more than one Prime Contractor is involved in final cleaning a single area or piece of equipment.
 - 3) Environmental Requirements: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
 - a. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - b. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.
 - 4) Related work specified elsewhere:
 - a. Section 01700 - Contract Closeout, include general project closeout requirements.
 - b. Section 01500 - Temporary Facilities, include general cleanup and waste removal requirements.

2. MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

3. DURING CONSTRUCTION

- A. Oversee cleaning and ensure that building and grounds are maintained free from accumulation of waste and rubbish.
 - 1) Special attention shall be given to cleaning up the site of debris, waste and rubbish. The Owner is extremely concerned over items left in the open that can be thrown through windows.
- B. Sprinkle dusty debris with water.
- C. At reasonable intervals, minimum once a week, clean up site and access and dispose of debris.
- D. Provide metal containers for collection of debris.
- E. Remove debris from site. Legally dispose of off Owner's site.
- F. Vacuum interior areas when ready for painting.
- G. Handle waste materials in a controlled manner. Do not drop or throw materials from heights.
- H. Schedule cleaning operations so that contaminants resulting from cleaning do not fall on wet painted surfaces.

END OF SECTION 01710

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01720 - PROJECT RECORD
DOCUMENTS**

1. GENERAL

- A. This section covers the furnishing of all labor, materials, tools, equipment, and performing all work and services to provide record documents as specified, in accordance with the provisions of the Contract Documents, and completely coordinated with work of all other trades.
- B. This Section specifies administrative and procedural requirements for Project Record Documents.
 - 1) Project Record Documents required include:
 - a. Marked-up copies of Contract Drawings.
 - b. Marked-up copies of Shop Drawings.
 - c. Newly prepared Drawings.
 - d. Marked-up copies of Specifications, addenda and Change Orders.
 - e. Marked-up Product Data submittals.
 - f. Record Samples.
 - g. Field records for variable and concealed conditions.
 - h. Record information on Work that is recorded only schematically.
 - 2) Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and Samples available at all times for inspection by the Architect.
- C. Related work specified elsewhere:
 - 1) Section 01700 - Contract Closeout, includes general project closeout requirements.
 - 2) Section 01300 - Submittals, includes general requirements for submittal of Project Record Documents.

2. RECORD DRAWINGS

- A. Mark-Up Procedure: During the construction period, maintain a set of blue- or black-line white-prints of Contract Drawings and Shop Drawings for Project Record Document purposes. Include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing.
 - 1) Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:

- a. Dimensional changes to the Drawings.
 - b. Revisions to details shown on the Drawings.
 - c. Changes made by Change Order.
 - d. Details not on original Contract Drawings.
 - e. RFPs, SIs, PCOs.
- 2) Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
 - 3) Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.
 - 4) Mark important additional information which was either shown schematically or omitted from original Drawings.
 - 5) Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.
 - 6) Responsibility for Mark-Up: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record Drawings.
 - a. Accurately record information in an understandable Drawing technique.
 - b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.
 - c. At time of Substantial Completion, submit three (3) copies of the record Drawings to Construction Manager for the Architect's approval. Upon Architect's approval, the Drawings will then become the Owner's records. Organize into sets, bind and label sets for Owner's continued use.

3. RECORD SPECIFICATIONS

- A. During the construction period, maintain one copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.
 - 1) Mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.
 - a. In each Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
 - 2) Upon completion of mark-up, submit record Specifications to the Construction Manager for Owner's records.

4. RECORD PRODUCT DATA

- A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.
- 1) Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.
 - 2) Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 3) Note related Change Orders and mark-up of record Drawings, where applicable.
 - 4) Upon completion of mark-up, submit a complete set of record Product Data to the Construction Manager for the Owner's records.
 - 5) Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual, instead of submittal as record Product Data.
 - 6) Each prime Contractor is responsible for mark-up and submittal of record Product Data for its own Work.

5. MISCELLANEOUS RECORD SUBMITTALS

- A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Construction Manager for the Owner's records.
- 1) Categories of requirements resulting in miscellaneous records include, but are not limited to the following:
 - a. Field records on excavations and foundations.
 - b. Field records on underground construction and similar Work.
 - c. Survey showing locations and elevations of underground lines.
 - d. Invert elevations of drainage piping.
 - e. Surveys establishing building lines and levels.
 - f. Authorized measurements utilizing unit prices or allowances.
 - g. Records of plant treatment.
 - h. Ambient and substrate condition tests.
 - i. Certifications received in lieu of labels on bulk products.
 - j. Batch mixing and bulk delivery records.
 - k. Testing and qualification of tradesmen.
 - l. Documented qualification of installation firms.
 - m. Load and performance testing.
 - n. Inspections and certifications by governing authorities.
 - o. Leakage and water-penetration tests.

- p. Fire resistance and flame spread test results.
- q. Final inspection and correction procedures.

6. RECORDING

- A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project.

END OF SECTION 01720

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 01740 – WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies general administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Contractor's period for correction of the work and special warranty of workmanship and materials.
- B. The Contractor will provide a warranty on all project work (including that added by subsequent change order after execution of the construction contract) for a period of one (1) year following the formal declaration of Substantial Completion. This one (1) year warranty will be separate from and in no way affect other standard product / manufacturer or workmanship warranties that extend beyond this one (1) year period for goods and services provided to this project.
- C. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 1, Section 01300 - SUBMITTALS specifies procedures for submitting warranties.
 - 2. Division 1, Section 01700 - CONTRACT CLOSEOUT specifies contract closeout procedures.
 - 3. Divisions 2 through 16 sections for specific requirements for warranties on products and installations specified to be warranted.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- D. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace other work that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written

endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

- C. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- E. Where the Contract Documents require a special warranty, or similar commitment on the work or part of the work, the Owner reserves the right to refuse to accept the work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.4 SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the work, or a designated portion of the work, submit written warranties upon request of the Architect.
 - 1. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen (15) days of completion of that designated portion of the work.
- B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
 - 1. Refer to Divisions 2 through 16 sections for specific content requirements and particular requirements for submitting special warranties.
- C. Form of Submittal: At Final Completion compile two (2) copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed

- description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES AND BONDS," Project title or name, and name of the Contractor.
 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01740

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 01742 - CONSTRUCTION
WASTE MANAGEMENT**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging non-hazardous demolition and construction waste
 - 2. Recycling non-hazardous demolition and construction waste
 - 3. Disposing of non-hazardous demolition and construction waste
- B. Related Sections include the following:
 - 1. Division 1 Section 01040 "Coordination" for coordination of responsibilities for waste management
 - 2. Division 1 Section 01361 "Sustainable Design Requirements"
 - 3. Division 1 Section 01500 "Temporary Facilities and Controls" for environmental-protection measures during construction
 - 4. Division 1 Section 01732 "Selective Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements.

1.3 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, paint, or the like
- B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations
- D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction
- E. Diversion: Avoidance of demolition and construction waste sent to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to-energy processes
- F. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity or reactivity

- G. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse
- H. Recycling: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Salvage: Recovery of demolition or construction waste and subsequent reuse or sale in another facility
- J. Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work
- K. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste
- L. Toxic: Poisonous to humans either immediately or after a long period of exposure
- M. Trash: Any product or material unable to be reused, returned, recycled, or salvaged
- N. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 PERFORMANCE REQUIREMENTS

- A. The Owner has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
- B. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills or incinerators shall be minimized, thereby reducing disposal costs.
- C. Develop a construction waste management plan that results in end-of-Project rates for salvage / recycling of 95% (by weight) of construction and demolition waste.
- D. Salvage / Recycle Requirements: Salvage and recycle as much non-hazardous demolition and construction waste as possible, including the following materials:
 - 1. Demolition Waste:
 - a. Asphaltic concrete paving
 - b. Concrete
 - c. Concrete reinforcing steel
 - d. Brick
 - e. Concrete masonry units
 - f. Wood studs
 - g. Wood joists
 - h. Plywood and oriented strand board
 - i. Wood paneling
 - j. Wood trim
 - k. Structural and miscellaneous steel

CONSTRUCTION WASTE MANAGEMENT

Bid Package 2B – Issue for Bid

01742 - 2

- l. Rough hardware
- m. Roofing
- n. Insulation
- o. Doors and frames
- p. Door hardware
- q. Windows
- r. Glazing
- s. Metal studs
- t. Gypsum board
- u. Acoustical tile and panels
- v. Carpet
- w. Carpet pad
- x. Demountable partitions
- y. Equipment
- z. Cabinets
- aa. Plumbing fixtures
- bb. Piping
- cc. Supports and hangers
- dd. Valves
- ee. Sprinklers
- ff. Mechanical equipment
- gg. Refrigerants
- hh. Electrical conduit
- ii. Copper wiring
- jj. Lighting fixtures
- kk. Lamps
- ll. Ballasts
- mm. Electrical devices
- nn. Switchgear and panelboards
- oo. Transformers
- 2. Construction Waste:
 - a. Masonry and CMU
 - b. All untreated wood, including lumber and finish materials
 - c. Wood sheet materials
 - d. Wood trim
 - e. Metals
 - f. Roofing
 - g. Insulation
 - h. Carpet and pad
 - i. Gypsum board
 - j. Unused (leftover) paint
 - k. Piping
 - l. Electrical conduit
 - m. Packaging: Regardless of salvage / recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper
 - 2) Cardboard
 - 3) Boxes
 - 4) Plastic sheet and film
 - 5) Polystyrene packaging
 - 6) Wood crates
 - 7) Plastic pails

CONSTRUCTION WASTE MANAGEMENT

Bid Package 2B – Issue for Bid

n. Beverage and packaged food containers

1.5 SUBMITTALS

- A. Construction Waste Management Plan (CWMP): It is the intent of this specification to maximize the diversion of demolition and construction waste from landfill disposal. Accordingly, not more than 30 days after receipt of Notice to Proceed and prior to the generation of any waste, prepare and submit a draft Construction Waste Management Plan in accordance with Section 01742 including, but not limited to, the following:
1. Procedures for Recycling / Reuse Program to divert a minimum of 95% (by weight) of construction and demolition waste from landfill disposal, including waste resulting from demolition of any existing building and site paving scheduled for demolition; any site paving is required to be ground on site and reused as granulated fill on site.
 2. Approval of the Contractor's CWMP shall not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
- B. Submit a 3-ring binder with calculations on end-of-project recycling rates, salvage rates, and landfill rates itemized by waste material, demonstrating that a minimum of 75% of construction wastes were recycled or salvaged and diverted from landfill. Include documentation of recovery rate (if commingled); waste hauling certificates or receipts, and a brief narrative explaining how and to where each waste type has been diverted.
- C. Construction Waste Management Plan: Submit four copies of plan within forty-five (45) days of date established for the Notice to Proceed.
- D. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit four (4) copies of report. Include separate reports for demolition and construction waste. Include the following information:
1. Material category
 2. Generation point of waste
 3. Total quantity of waste in tons
 4. Quantity of waste salvaged, both estimated and actual in tons
 5. Quantity of waste recycled, both estimated and actual in tons
 6. Total quantity of waste recovered (salvaged plus recycled) in tons
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste
 8. Include up-to-date records of donations, sales, recycling and landfill / incinerator manifests, weight tickets, hauling receipts, and invoices.
- E. Waste Reduction Calculations: Before request for Substantial Completion, submit four copies of calculated end-of-project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Complete a table similar to the example below.

Recycled / Salvaged / Diverted Materials	Hauler or Location	Quantity of Material (tons)

Total Construction Waste Diverted		
Landfilled Materials		
Total Construction Waste Landfilled		

Total Construction Waste		Total Construction Waste Diverted + Total Construction Waste Landfilled
Percentage of Construction Waste Diverted from Landfill		(Total Construction Waste Diverted / Total Construction Waste)*100

- F. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax-exempt.
- G. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax-exempt.
- H. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- I. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills (or transfer stations) and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with all applicable local ordinances and regulations.
- B. Waste Management Meetings: Conduct an initial conference at Project Site to comply with requirements in Division 1 Section "Project Management and Coordination." Contractor shall include discussions on construction waste management requirements in the preconstruction meeting. Contractor shall include discussions on construction waste management requirements in the regular job meetings conducted during the course of the Project; at these meetings, review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of the Waste Management Coordinator.

2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.7 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. General: Develop and implement a CWMP consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use the same units of measure throughout the CWMP.
- B. Draft Construction Waste Management Plan: Within 30 days after receipt of Notice to Proceed, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Owner and Architect a Draft Waste Management Plan.
- C. Final Construction Waste Management Plan: Once the Owner has determined which of the recycling options addressed in the draft Waste Management Plan are acceptable, the Contractor shall submit, within 10 calendar days, a Final Waste Management Plan.
- D. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- E. Landfill Options: Indicate the name of the landfill(s) and / or transfer station(s) and / or incinerator(s) where trash will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all Project waste in the landfill(s).
- F. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, reused, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Describe method that will be used for separating recyclable waste, including sizes of containers, container labeling, and designated location on Project Site where materials separation will be located.

- G. Materials: The following list of required materials, at a minimum, must be included for salvaging / recycling:
1. Cardboard
 2. Clean dimensional wood
 3. Beverage and food containers
 4. Paper
 5. Concrete
 6. Concrete Masonry Units (CMUs)
 7. Asphalt: Include the approximate weight of the asphalt paving to be crushed and utilized as granulated fill from the existing paving as a component of waste material diverted from the landfill.
 8. Ferrous and non-ferrous metals (banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
 9. Stretch and shrink wrap
 10. Gypsum wallboard
 11. Paint containers and other clean, empty plastic containers
- H. Meetings: Provide a description of the regular meetings to be held to address waste management.
- I. Materials Handling Procedures: Provide a description of the means by which any waste materials identified will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
- J. Transportation: Provide a description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.

1.8 CONSTRUCTION WASTE MANAGEMENT RESOURCES

- A. General information contacts regarding construction and demolition waste:
1. EPA Construction and demolition (C&D) debris website:
<http://www.epa.gov/epaoswer/non-hw/debris-new/bytype.htm>
 2. Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies:
http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf
 3. Additional resources to be developed by Contractor with assistance from Owner and Architect, as requested.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Architect and Owner. Provide handling, containers, storage, signage, transportation, and other

items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at the Project Site full-time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project Site.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project Site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Recycling and waste bin areas are to be kept neat, and clean, and clearly marked in order to avoid contamination of materials.
 3. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.
- E. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations and should not be included in Construction Waste Management Plan's calculations of waste.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Owner's Use:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
 6. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

CONSTRUCTION WASTE MANAGEMENT

Bid Package 2B – Issue for Bid

01742 - 8

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
 - 1. List to be developed by Contractor.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project Site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility or recycle on-site into new paving.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 4-inch (100-mm) size.
 - 2. Crush concrete and screen to comply with requirements in Division 2 Section "Earthwork" for use as satisfactory soil for fill or subbase.
- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 1-1/2-inch (38-mm) size.
 - a. Crush masonry and screen to comply with requirements in Division 2 Section "Earthwork" for use as general fill or subbase.
 - b. Crush masonry and screen to comply with requirements in Division 2 Section "Exterior Plants" for use as mineral mulch.
 - 2. Clean and stack undamaged, whole masonry units on wood pallets.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, and panel products for reuse and /

or recycling. Separate wood material treated with heavy metal preservatives for reuse or landfill disposal.

- E. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts for recycling into asphalt paving or by other recycling entities.
- G. Gypsum Board: Stack large, clean pieces on wood pallets and store in a dry location for recycling off-site. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
 - 1. Moisture-damaged gypsum board with evidence of significant mold growth shall be disposed of in accordance with New York City's "Guidelines on Assessment and Remediation of Fungi in Indoor Environments": <http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml>
- H. Acoustical Ceiling Panels and Tile: Stack large, clean pieces on wood pallets and store in a dry location.
 - 1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.
- I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - 1. Store clean, dry carpet and pad in a closed container or trailer provided by a carpet recycler or manufacturer-related carpet reclamation agency.
- J. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- K. Plumbing Fixtures: Separate by type and size.
- L. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- M. Lighting Fixtures: Separate lamps by type and protect from breakage.
- N. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- O. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
 1. Comply with requirements in Division 2 Section "Exterior Plants" for use of chipped organic waste as organic mulch.
- C. Wood Materials:
 1. Clean Cut-Offs of Lumber: Grind or chip into material appropriate for mulch or erosion control.
 2. Lumber Treated with Heavy-Metal Preservatives: Do not grind, chip, or incinerate; must be reused or landfilled.
- D. Gypsum Board: Stack large, clean pieces on wood pallets and store in a dry location for recycling and / or reuse on-site or off-site.
 1. Moisture-damaged gypsum board with evidence of significant mold growth shall be disposed of in accordance with New York City's "Guidelines on Assessment and Remediation of Fungi in Indoor Environments": <http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml>
 2. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Division 2 Section "Exterior Plants" for use of clean ground gypsum board as inorganic soil amendment.
- E. Miscellaneous: Anything called out to be ground and used on site should utilize an on-site grinder.
 1. Grinder should be able to accommodate a variety of materials including masonry, asphalt shingles, wood, and drywall.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Do not burn or bury waste materials on or off site. Appropriate on-site topical application of ground gypsum or wood, or use of site paving as granulated fill is considered reuse, not waste.

END OF SECTION 01742

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 05500 – METAL
FABRICATIONS**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- B. Related Sections:
 - 1. Division 05 Section “Ornamental Metal.”
 - 2. Division 05 Section “Ornamental Handrails and Railings.”
 - 3. Division 08 Section “Automatic Entrance Doors.”
 - 4. Division 08 Section “Interior Glazing.”
 - 5. Division 10 Section “Toilet Compartments.”
 - 6. Division 14 Section “Hydraulic Elevators.”
 - 7. Division 14 Section “Escalators.”

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, “Structural Welding Code – Steel.”

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrication exposed to view in the complete Work, provide materials without seam marks, roller marks, rolled trade names or blemishes

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- D. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
 - 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B; 0.0677 inch (1.7 mm) minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/1 47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicates; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- D. Eyebolts: ASTM A 489.
- E. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

- F. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
- G. Wood Screws: Flat head, ASME B18.6.1.
- H. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- I. Lock Washers: Helical, spring type, ASME B17.21.1 (ASME B18.21.2M).
- J. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six (6) times the load imposed when installed in unit masonry and four (4) times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- K. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 194M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- L. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Non-shrink, Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum twenty-eight (28) day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to the greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces with straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and method that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- F. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6 inch (150 mm) embedment and 2 inch (50 mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- A. Galvanize miscellaneous framing and supports where indicated.
- B. Prime miscellaneous framing and supports with primer specified in Division 09 Section "Painting."

2.9 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.10 STEEL AND IRON FINISHES

- A. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 2. Shop prime with primers specified in Division 09 Section, "Painting."
- B. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3 "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings:" SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to comply with SSOPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitation. Do not weld, cut or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws and other connectors.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erections, clean field welds, bolted connections and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting and 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 (0.05 mm) dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and repair galvanizing to comply with ASTM A 780. Apply Galvanizing Repair Compound in accordance with manufacturer's recommendations.
 1. Apply by brush or spray to provide a minimum 1.5 mil (0.04 mm) dry film thickness.

END OF SECTION 05500

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 05700 - ORNAMENTAL
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. Mechanical finned-tube enclosures.
 - 2. Column Protection.
 - 3. Metal trim and perforated metal base at paneled and glazed walls.
 - 4. Ornamental annunciator panel enclosure.
- B. Related Sections:
 - 1. Section 05500 "Metal Fabrications" for non-decorative metal fabrications.
 - 2. Section 05720 "Ornamental Handrails and Railings" for decorative metal railings.
 - 3. Section 06402 "Interior Architectural Woodwork" for casework incorporating metal components.
 - 4. Section 06422 "Flush Wood Paneling" for wall panel systems trimmed with metal.
 - 5. Section 06424 "Solid Phenolic Wall Paneling" for wall panel systems trimmed with metal.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Show fabrication and installation details for decorative metal.
 - 1. Include plans, elevations, component details, and attachments to other work.
 - 2. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

3. Include details of support-framing systems.
4. Indicate relative locations of adjacent materials

D. Samples for Verification: For each type of exposed finish required.

1. Stainless steel sheet: 12" x 12"
2. Stainless steel bar or extrusion: 12" length.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative 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. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockups for the following types of decorative metal:
 - a. Landside Pavilion finned-tube enclosure.
 - b. Boarding Lounge finned-tube enclosure.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
- B. Deliver and store cast-metal products in wooden crates surrounded by sufficient packing material to ensure that products will not be cracked or otherwise damaged.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate installation of anchorages for decorative 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.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Pipe: ASTM A 312, Grade TP 304.
- C. Castings: ASTM A 743, Grade CF 8 or CF 20.
- D. Sheet: ASTM A 666, Type 304, thickness as recommended by manufacturer, but not less than 0.050" unless otherwise indicated.
- E. Plate: ASTM A 240, Type 304, mechanically leveled.
- F. Bars and Shapes: ASTM A 276, Type 304.

2.3 STEEL AND IRON

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
- C. Bars: Hot-rolled, carbon steel complying with ASTM A 29, Grade 1010.
- D. Plates, Shapes, and Bars: ASTM A 36.
- E. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47 unless otherwise indicated.
- F. Steel Sheet, Cold Rolled: ASTM A 1008, either commercial steel or structural steel, exposed.

2.4 ALUMINUM

- A. Pipe and Tube: ASTM B 429, material of alloy and temper as recommended by the aluminum producer.
- B. Plate and Sheet: ASTM B 209, alloy 3003-H16.
- C. Extrusions: ASTM B 221 or ASTM B 308, material of alloy and temper as recommended by the aluminum producer.

2.5 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Items: Type 304 stainless-steel fasteners.
 - 2. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
- C. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless otherwise indicated.
 - 1. Provide hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.7 FABRICATION, GENERAL

- A. Assemble items 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.
- B. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

- D. 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.
- E. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- F. Carefully match exposed work to produce continuity of line and design.
- G. Provide framing, braces, and supports required for anchoring the assemblies.
- H. Except where otherwise indicated, the method of assembly shall be the fabricator's option provided the results are acceptable to the Authority
 - 1. Fabricate and fasten metal Work so that the Work will not be distorted or fasteners overstressed from expansion and contraction of the metal.
 - 2. Conceal fasteners unless otherwise detailed on the Drawings. Where exposed in finished surfaces, finish shall match adjacent metal
- I. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 - 1. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.
- J. Wherever dissimilar metals are in contact, paint contact surfaces with a heavy brush coat of bituminous paint or separate contact surfaces by use of preformed tape.
 - 1. Paint contact surfaces of metals, except stainless steel, which will be in contact with concrete, mortar, plaster, or other masonry, with a heavy brush coat of bituminous paint

2.8 MECHANICAL FINNED-TUBE ENCLOSURES AND COLUMN PROTECTION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Architectural Grille; Division of Giumenta Corporation.
 - 2. Binzel Industries, Inc.
 - 3. Environmental Interiors, Inc.
 - 4. Harrington & King Perforating Company, Inc.
 - 5. Kees, Inc.
 - 6. Metalworks, a WSM Enterprise Co.
 - 7. Register & Grille Mfg. Co., Inc.
 - 8. Sterling Hydronics.
 - 9. Tesko Enterprises.
 - 10. Vulcan Radiator, a Mestek Company.

- B. Unless otherwise indicated, finned tube enclosures shall comply with OSHA requirements and ASTM E 985 for structural performance, based upon testing performed according to ASTM E 894 and ASTM E 935, and safely support the following minimum design loads without deformation.
 - 1. Minimum 100 psf uniform live load and a 300 lb. concentrated live load in center of unit
- C. Fabricate from stainless-steel sheet of thickness, size, and pattern indicated. Form perforations by punching, cutting, or drilling to produce openings of sizes and shapes indicated. Roll, press, and grind perforated metal to flatten and to remove burrs and deformations.
- D. Provide framing, braces, and supports required for anchoring the assemblies.

2.9 METAL TRIM AND PERFORATED METAL BASE AT PANELED AND GLAZED WALLS

- A. Manufacturers: Subject to compliance with requirements, available manufacturer/fabricators qualified to produce the Work include, but are not limited to, the following:
 - 1. Binzel Industries, Inc.
 - 2. Environmental Interiors, Inc.
 - 3. Harrington & King Perforating Company, Inc.
 - 4. Metalworks, a WSM Enterprise Co.
 - 5. Schluter Systems, L.P.
 - 6. Tesko Enterprises.
- B. Fabricate metal corner trim for paneled walls from stainless-steel sheet, plate, bars or extruded sections to produce the profile indicated. Trim must be capable of withstanding a concentrated load of 200 lbf at any point without permanent deformation or noticeable damage.
- C. Fabricate perforated metal base from 16 ga. stainless steel sheet to produce profile and pattern indicated.

2.10 ANNUNCIATOR PANEL ENCLOSURE

- A. Manufacturers: Subject to compliance with requirements, available manufacturer/fabricators qualified to produce the Work include, but are not limited to, the following:
 - 1. Binzel Industries, Inc.
 - 2. Environmental Interiors, Inc.
 - 3. Metalworks, a WSM Enterprise Co.
 - 4. Tesko Enterprises.
- B. Fabricate from stainless-steel sheet of thickness, size, and pattern indicated. Form perforations by punching, cutting, or drilling to produce openings of sizes

and shapes indicated. Roll, press, and grind perforated metal to flatten and to remove burrs and deformations.

- C. Provide framing, braces, and supports required for anchoring the assemblies.
 - 1. Enclosure shall safely support the following minimum design loads without deformation.
 - a. Concentrated load of 200 lb applied at any point and in any direction.
 - b. Uniform load of 50 lb per linear foot applied horizontally and concurrently with uniform load of 100 lb per linear foot applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.

2.11 MISCELLANEOUS

- A. Provide other metal work of ornamental nature shown or noted on the Drawings and not specified elsewhere.
 - 1. Items shall be fabricated as detailed of indicated metals.
 - 2. Provide anchors and fasteners necessary to complete the Work.

2.12 FINISHES, GENERAL

- 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 shipping.
- C. Ferrous metal Work for reinforcing shall be thoroughly cleaned and given a heavy shop coat of bituminous paint, well worked into joints and open spaces. Do not prime surfaces to be field welded. After installation, touch up as required.
- D. Provide protection against galvanic action wherever dissimilar metals are in contact. Paint contact surfaces with a heavy brush coat of bituminous or zinc chromate paint (complete coverage) or separate with preformed tape.

2.13 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 substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
- B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
- D. 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.
- E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
- F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
 - 1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.
- G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are

not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

- H. Field Brazing: Comply with requirements for brazing and for finishing brazed connections in "Fabrication, General" Article. Braze connections that are not to be left as exposed joints but cannot be shop brazed because of shipping size limitations.

3.3 INSTALLING MECHANICAL FINNED-TUBE ENCLOSURES

- A. Mount decorative grilles in positions indicated.
 - 1. Secure to framing and blocking with specified fasteners.
 - 2. On marble, brick, and other solid surfaces, secure with wood screws in lead plugs.

3.4 INSTALLING METAL TRIM AT PANELED WALLS

- A. Install metal corner trim at paneled walls before paneling is installed. Secure to wood grounds with specified screws.

3.5 CLEANING AND PROTECTION

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Clean stainless steel according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
- C. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.
- D. 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.

END OF SECTION 05700

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 05721 - ORNAMENTAL
HANDRAILS AND RAILINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes stainless steel post supported railing systems with glass infill.
- B. Related Sections include the following:
 - 1. Division 5, Section 05500 – “Metal Fabrications”
 - 2. Division 5, Section 05700 – “Ornamental Metal”
 - 3. Division 14, Section 14310 – “Escalators”

1.3 REFERENCES

- A. American National Standards Institute (ANSI) Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. ASTM International (ASTM):
 - 1. A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 2. A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - 3. C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT, Coated and Uncoated Glass.
 - 4. E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
- C. National Association of Architectural Metal Manufacturers (NAAMM) AMP 503 - Finishes for Stainless Steel.

PERFORMANCE REQUIREMENTS

- A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections:
 - 1. Top of Guardrails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf / ft. applied horizontally and concurrently with uniform load of 100 lbf / ft. applied vertically downward.

- c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 2. Handrails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf / ft. applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
 - a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.
- 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. Steel: 72 percent of minimum yield strength.
 - 3. 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."
 - 4.
- C. 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. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by Professional Structural Engineer licensed in State in which project is located.
- C. Samples for Verification: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. 12-inch-long sections of each different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Samples of railings, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

- D. Product Test Reports: Indicating products comply with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum two (2) years documented experience in work of this Section.
- B. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- C. 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 Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.6, "Structural Welding Code - Stainless Steel."
- E. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Mockups: Before installing handrails and railings, build mockup to demonstrate aesthetic effects and qualities of materials and execution. Mockup to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockup in the location indicated or, if not indicated, as directed by Architect.
 - 2. Build mockups as shown on Drawings.
 - 3. Build mockups for each form and finish of railing consisting of two posts, handrail, infill area, and anchorage system components that are full height and are not less than 48 inches in length.
 - 4. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 5. Obtain Architect's approval of mockups before fabricating ornamental handrails and railings.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed.
 - 8. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- G. Pre-Installation Conference:
 - 1. Convene pre-installation conference approximately two weeks prior to beginning work of this Section.
 - 2. Attendance: Construction Manager, Architect, railing fabricator, and railing installer.
 - 3. Review:
 - a. Installation methods for frame components attaching to supporting construction.
 - b. Installation, adjusting, and protection of railing system.
 - c. Coordination with other work.

1.6 STORAGE

- A. Store handrails and railings in a dry, well-ventilated, weathertight place.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 COORDINATION

- A. Coordinate installation of anchorages for handrails and 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.

1.9 SCHEDULING

- A. Schedule installation so handrails and railings are mounted only on completed work. Do not support temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Binzel Industries, Inc.
 - 2. Blum, Julius & Co., Inc.
 - 3. Blumcraft of Pittsburgh.
 - 4. Livers Bronze Co.
 - 5. P & P Artec
 - 6. VIVA Railings, LLC
 - 7. Wylie Systems.

2.2 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- A. Stainless Steel:
 - 1. Bars and Shapes: ASTM A276, Type 304 or 316.
 - 2. Tube: ASTM A554, Type 304 or 316.
 - 3. Castings: ASTM A743, Grade CF8 or CF20.
 - 4. Sheet, Strip, Plate and Flat Bar: ASTM A666, Type 304 or 316.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
 - 1. Provide formed steel brackets with predrilled hole for bolted anchorage.

2.3 GLASS PRODUCTS AND GLAZING MATERIALS

- A. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent glass, flat), Quality q3 (glazing select). Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR, Part 1201 for Category II materials.
 - 1. Thickness for Glass Infill Panels: As required by structural loads, but not less than 10.0 mm.
- B. Glazing Accessories: Provide glazing accessories recommended or supplied by railing manufacturer.

2.4 FASTENERS

- A. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
 - 1. Where exposed, use fasteners fabricated from Type 304 or Type 316 stainless steel.
- B. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 1. Provide countersunk fasteners for interconnecting railing components and for attaching them to other Work, unless otherwise indicated.
- C. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Cast-in-place anchors.
 - 2. Chemical anchors.
 - 3. Expansion anchors.

2.5 FABRICATION

- A. Assemble handrails and railings 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. Use connections that maintain structural value of joined pieces.
- B. Components:
 - 1. Posts: 1/2 inch to 1 inch bar.
 - 2. Handrails: 1.5 inch diameter stainless steel round tubing.
 - 3. Glass mountings: Stainless steel, clip type.
 - 4. Mounting method: Fascia.
- C. Fabricate railings in accordance with approved Shop Drawings.
- D. Fabricate railings with joints located symmetrically.
- E. Fabricate railings with joints tightly fitted and secured. Furnish fittings to accommodate site assembly and installation.
- F. Supply components required for anchorage of railings. Fabricate anchors and related components of same material and finish as railing.
- G. Conceal fastenings where possible.
- H. Use welds for permanent connections where possible.
 - 1. Grind exposed welds smooth.
 - 2. Tack welds prohibited on exposed surfaces.
- I. Accommodate for expansion and contraction of members and building movement without damage to connections or members.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
- K. Provide anchorage devices to connect handrails and railings to concrete. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- L. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- M. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- N. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

2.6 GLAZING PANEL FABRICATION

- A. Glass Panels: Cut tempered glass to final size and shape before heat treatment; provide for proper edge clearance and bite on glass. Provide thickness indicated, but not less than that required to support structural loads.

- B. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.

2.7 FINISHES, GENERAL

- 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: 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 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.

2.8 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Directional Satin Finish: No. 4: Grind and polish surfaces to produce uniform finish, free of cross scratches. Run grain of directional finishes with long dimension of each piece.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing handrails and railings. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
 - 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 from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust handrails and railings before anchoring to ensure alignment at abutting joints. Space posts at interval indicated, but not more than that required by structural loads.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.2 INSTALLING GLASS PANELS

- A. Post-Supported Glass Handrails and Railings: Install assembly to comply with railing manufacturer's written instructions. Erect posts and other metal railing components, then set factory-cut glass panels. Do not cut, drill, or alter glass panels in field. Protect edges from damage.

3.3 CLEANING

- A. Clean and polish glass.

3.4 PROTECTION

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the 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 field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05721

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 06100 - ROUGH
CARPENTRY**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Wood blocking and nailers.
- B. Related Sections include the following:
 - 1. Division 06 Section 06402 – “Interior Architectural Woodwork”
 - 2. Division 06 Section 06422 – “Flush Wood Paneling”
 - 3. Division 06 Section 06424 – “Solid Phenolic Wall Paneling”
 - 4. Division 10 Section 10110 – “Display Cases”
 - 5. Division 10 Section 10400 – “Panel Signage”

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other sections and generally not exposed, unless otherwise specified.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. LEED Submittals:

1. Certificates for Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee's (ALSC) Board of Review.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Wood-Preservative-Treated Materials:
 - A. Baxter: J. H. Baxter Co.
 - B. Chemical Specialties, Inc.
 - C. Continental Wood Preservers, Inc.
 - D. Hickson Corp.
 - E. Hoover Treated Wood Products, Inc.
 - F. Osmose Wood Preserving, Inc.

2.2 LUMBER, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. SPIB - Southern Pine Inspection Bureau.
 - 2. WWPA - Western Wood Products Association.
 - 3. NELMA - Northeastern Lumber Manufacturers Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWWPA C2 (lumber) and AWWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
 - 1. Do not use chemicals containing chromium or arsenic.
- B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
- C. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.
- D. Do not use oil borne pentachlorophenol for surfaces that are to be painted and surfaces in contact with roofing.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of Southern pine-SPIB or Douglas fir south-WWPA, unless otherwise indicated.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A153 or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

2.6 MISCELLANEOUS MATERIALS

- A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

- B. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum number of joints or optimum joint arrangement.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- D. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. "Recommended Nailing Schedule" of referenced framing standard and with AFPA's "National Design Specifications for Wood Construction." Comply with requirements of applicable codes and of authorities having jurisdiction.
- G. Use hot-dip galvanized nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

3.2 WOOD BLOCKING AND NAILERS

- A. Install wood blocking and nailers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

END OF SECTION 06100

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 06402 – INTERIOR
ARCHITECTURAL
WOODWORK**

PART 1. - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Plastic laminate-faced and metal-faced cabinets and casework including:
 - a. Base cabinets and wall cabinets
 - b. Check-in counters,
 - c. Podia,
 - d. Backscreens,
 - e. Rent-a-car counters,
 - f. Processing booths
 - g. Work stations.
 - 2. Shelving and Clothes Rods.
 - 3. Wood furring, blocking, shims, and hanging strips for installing cabinets and shelving unless concealed within other construction before cabinet installation.
- B. Related Sections include the following:
 - 1. Section 05700 - ORNAMENTAL METALS for metal trim, sheet, etc., associated with architectural woodwork.
 - 2. Section 06100 - ROUGH CARPENTRY for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 3. Section 08801 – INTERIOR GLAZING for glass associated with architectural woodwork.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for items installed in architectural woodwork.
- C. Samples for Verification: For the following:
 - 4. Plastic-laminate, 8 by 10 inches, for each type, color, pattern, and surface finish.

2. Bonded-metal facing, 8 by 10 inches, for each type, color, pattern, and surface finish.
3. Corner pieces as follows:
 - a. Cabinet front frame joints between stiles and rail, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
4. Exposed cabinet hardware and accessories, one unit for each type.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Fabricator(s) and Installer(s). . Provide lists of successfully completed projects of similar size and scope including project names and addresses, names of architects and owners, and other information specified.
- B. Product Certificates: For each type of product.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing architectural woodwork 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. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
 1. Provide AWI Quality Certification Program labels indicating that woodwork complies with requirements of grades specified.
- C. Mockups: Before fabricating and installing interior architectural woodwork, build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups using materials indicated for the completed Work:
 1. Build mockups of:
 - a. Check-in Counters.
 - b. Gateroom Podia and Backscreens.
 - c. Rent-a-car counters.
 - d. CBP Processing booths.
 - e. CBP Triage Podia.
 2. Notify Architect seven days in advance of dates and times when mockups will be fabricated and installed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1, Section 01200 - PROJECT MEETINGS.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in

INTERIOR ARCHITECTURAL WOODWORK

Bid Package 2B – Issue for Bid

06402 - 2

other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2. - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 - 3. Particleboard: ANSI A208.1, Grade M-2.
 - 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - 5. Hardwood Plywood and Face Veneers: HPVA HP-1.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Formica Corporation.
 - b. International Paper; Decorative Products Div.
 - c. Laminart.
 - d. Pioneer Plastics Corp.
 - e. Westinghouse Electric Corp.; Specialty Products Div.

- f. Wilsonart International; Div. of Premark International, Inc.
 - g. Phenolic laminate backer sheets as manufactured by the approved laminate supplier.
- D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- E. Bonded Metal Panel: "Mara" Bonded Metal by Forms + Surfaces, or equal, in colors indicated, bonded to MDF with backing sheet in accordance with Manufacturer's recommendations.
- F. Stainless Steel: Comply with following:
 - 1. Tubing: ASTM A 554, Grade MT 304
 - 2. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
 - 3. Bars and Shapes: ASTM A 276, Type 304.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8, Section 08710 - FINISH HARDWARE.
- B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
- C. Catches: Magnetic catches, BHMA A156.9, B03141.
- D. Grommets for Cable Passage through Countertops: 1-1/4-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- E. Paper Slots: 12 inches long by 1-3/4 inches wide by 1 inch deep; black, molded-plastic, paper-slot liner with 1/4-inch lip.
- F. Exposed Hardware Finish:
 - 1. Stainless Steel: ASTM A240, Type 304.
- G. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ASTM A240 No. 4, satin brush finish, Type 304.

2.3 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Refer to Division 6, Section 06100 - ROUGH CARPENTRY.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard for public areas, Custom grade for non-public areas.

- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.
- F. Laminate fabrications to be completed in accordance with decorative plastic laminate association (DLP), ANSI-A-161.2-1979 and "Architectural wood work quality standards, guide specification and quality certification program" guidelines of the architectural woodwork institute (AWI) where applicable. All laminate fabrications shall be "balanced construction" in accordance with AWI guidelines.
- G. Install glass to comply with applicable requirements in Division 8, Section 08800 - GLAZING and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.5 METAL FACED CABINETS

- A. Fabricators: Subject to compliance with requirements, available fabricators include, but are not limited to, the following:
 - 1. Barsanti Woodwork Corp.
 - 2. Eggers Industries
 - 3. Fish Construction, Inc.
 - 4. Jensen Cabinet, Inc.
 - 5. JR Jones Fixture Company
 - 6. St. Germain's Cabinet, Inc.
 - 7. Wilkie Sanderson
- B. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.

- C. Laminate Cladding for Exposed Surfaces: Metal faced panels.
 - 1. Stainless Steel.
 - 2. "Mara" Bonded Metal, or equal.
- D. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- E. Concealed surfaces: manufacturer's phenolic laminate backer sheets
- F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Provide Architect's selections from laminate manufacturer's full range of colors and finishes.

2.6 PLASTIC-LAMINATE FACED CABINETS

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.
- B. AWI Type of Cabinet Construction: Flush overlay.
- C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: HGS.
 - 2. Postformed Surfaces: HGP.
 - 3. Vertical Surfaces: HGS.
 - 4. Edges: HGS.
- D. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- E. Concealed surfaces: manufacturer's phenolic laminate backer sheets
- F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Provide Architect's selections from laminate manufacturer's full range of colors and finishes

2.7 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
- B. High-Pressure Decorative Laminate Grade: HGS.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following

requirements:

1. Provide Architect's selections from manufacturer's full range of colors and finishes.
- D. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- E. Core Material: Particleboard.
- F. Core Material at Sinks: Exterior-grade plywood.
- G. Concealed surfaces

2.8 SOLID-SURFACING-MATERIAL COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
- B. Solid-Surfacing-Material Thickness: 1/2 inch.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
1. Provide Architect's selections from manufacturer's full range of colors and finishes.
- D. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
- E. Install integral sink bowls in countertops in shop.
- F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.9 SHOP FINISHING

- A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.
1. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

PART 3. - EXECUTION

3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 4. Calk space between backsplash and wall with sealant specified in Division 7, Section 07920 - JOINT SEALANTS.
- H. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless otherwise indicated.
1. Install flush paneling with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- I. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.
- 3.3 ADJUSTING AND CLEANING
- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
 - B. Clean, lubricate, and adjust hardware.
 - C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 06422 – FLUSH
WOOD 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:
 - 1. Flush wood paneling (wood-veneer wall surfacing).
 - 2. Wood furring, blocking, shims, hanging strips, and panel clips for installing flush wood paneling.
 - 3. Shop finishing of flush wood paneling.
- B. Related Requirements:
 - 1. Section 05700 "Ornamental Metal" for metal trim at wood paneling.
 - 2. Section 06100 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling and that are concealed within other construction before paneling installation.

1.3 REFERENCES

- A. AWI Quality Standards (Architectural Woodwork Institute).
- B. ASTM E84 (Method of test for surface burning characteristics of building materials).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and

preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Certificates: Chain-of-custody certificates indicating that paneling complies with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
 3. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.
 4. Product Data for Credit IEQ 4.4: For composite wood products and fabrication adhesives, documentation indicating that products contain no urea formaldehyde.
- C. Shop Drawings: Show location of paneling, large-scale details at panel joints and edge conditions indicating adjacent materials, attachment devices, and other components. Include dimensioned plans and elevations.
- D. Samples for Verification:
1. Provide three (3) Veneer-faced panel corner sections with two veneered edges, 12 by 12 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Manufacturer.
- B. Product Certificates: For each type of product.
- C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- D. Evaluation Reports: For fire-retardant-treated paneling, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer must be a firm with a minimum of five (5) years of experience and a successful record of in service performance in the actual production of the specified products.
- B. Installer Qualifications: Installer shall be a firm with not less than two (2) years of successful experience in installation of wood paneling of similar requirements to this project.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockups of typical paneling as shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. The Flat Veneer Panels shall be delivered to the project site in original, unopened packages. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. Care in handling must be exercised to avoid damage. All shipments to the job site shall be made on wooden pallets.
- B. The Flat Veneer Panels shall be stored flat and level in a fully enclosed space. For a minimum of seventy-two (72) hours immediately prior to ceiling installation, the Flat Veneer Panels shall be stored in the room in which they will be installed. The temperature and humidity of the room shall closely approximate those conditions that will exist when the building is occupied. The Flat Veneer Panels shall be stored off the floor.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. The layout and installation of the Flat Veneer Wall Panel Systems shall be coordinated with other work penetrating the wall. This includes light fixtures, Life Safety Components, HVAC equipment, and fire suppression system components.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Flush Wood Panels: Full-size units equal to 2 percent of quantity installed.
 - 2. Attachment System Components: Quantity of each attachment component equal to 2 percent of quantity installed

1.11 WARRANTIES

- A. Manufacturer: All materials supplied by the paneling manufacturer shall be guaranteed against manufacturing defects for one (1) year. Because of differing

site conditions, wood stains and colorings can vary with age and shall be excluded from this warranty.

- B. Installer: All work shall be guaranteed for one (1) year from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 PANELING FABRICATORS

- A. Source Limitations: Engage a qualified fabricator to assume undivided responsibility for production of paneling.
- B. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Barsanti Woodwork Corp.
 2. Construction Specialties, Inc.
 3. Damschen Wood, Inc.
 4. Eggers Industries
 5. JR Jones Fixture Company
 6. Marlite
 7. Rulon Company
 8. St. Germain's Cabinet, Inc.
 9. Wilkie Sanderson
 10. World of Wood, Ltd.

2.2 PANELING, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of flush wood paneling (wood-veneer wall surfacing) indicated for construction, finishes, installation, and other requirements.
 1. Provide certificates from AWI certification program indicating that paneling complies with requirements of grades specified.

2.3 FLUSH WOOD PANELING (WOOD-VENEER WALL SURFACING)

- A. Grade: Economy.
- B. Certified Wood: Wood and composite wood components of flush wood paneling shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Wood Species and Cut: Cherry, quarter sawn.
- D. Matching of Adjacent Veneer Leaves: Slip match.
- E. Matching within Panel Face: Balance match.

- F. Matching of Adjacent Veneer Leaves and within Panel Face: Slip match.
- G. Panel-Matching Method: No matching is required between panels. Select and arrange panels for similarity of grain pattern and color between adjacent panels.
- H. Panel Core Construction: Fire-retardant particleboard or fire-retardant, medium-density fiberboard.
 - 1. Thickness: 3/4 inch.
- I. Exposed Panel Edges: Inset wood-veneer matching faces.
- J. Panel Reveals: Open.
- K. Fire-Retardant-Treated Paneling: Panels shall consist of wood-veneer and fire-retardant particleboard or fire-retardant, medium-density fiberboard. Panels shall have a Class A Interior Finish designation per ASTM E 84, with a flame-spread index of 25 or less and a smoke-developed index of 450 or less and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
- L. Assemble panels by gluing and concealed fastening.

2.4 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 5 to 10 percent.
- C. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 3. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
- D. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.5 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
1. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
- C. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

2.6 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: kiln dried to less than 15 percent moisture content.
- B. Flat Strap and Backing Plate: Steel sheet for blocking and bracing.
1. Minimum Base-Metal Thickness: 0.0312 inch.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.
- D. Panel Clips: Aluminum, with 1/4" nominal thickness and 3/8" lift off or manufacturer's approved standard.
- E. VOC Limits for Installation Adhesives: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Wood Glues: 30 g/L.
 2. Multipurpose Construction Adhesives: 70 g/L.
 3. Contact Adhesive: 80 g/L.
 4. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.

2.7 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.8 SHOP FINISHING

- A. General: Finish paneling at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.
 - 1. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling
- C. Finish: Custom stain to match Architect's Control Sample.
 - 1. Grade: Same as item to be finished.
 - 2. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition paneling to average prevailing humidity conditions in installation areas.
- B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- C. Panels must be applied over a smooth solid, flat backing such as plywood or drywall. All drywall joints should be taped and finished. Walls should be primed before installation begins.

3.2 INSTALLATION

- A. Install blocking and strapping as required for reinforcement of substrate in accordance with panel manufacturer's recommendations.
 - 1. Coordinate panel anchorage with framing for installation of blocking and strapping as required prior to installation of substrate by others
- B. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
 - 1. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/16 inch.
- C. Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening unless otherwise indicated.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects; where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore soiled areas.

END OF SECTION 06422

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 06424 – SOLID PHENOLIC
WALL 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:
 - 1. Solid phenolic wall paneling
 - 2. Furring, blocking, shims, hanging strips, and panel clips for installing solid phenolic wall paneling.
- B. Related Requirements:
 - 1. Section 05700 "Ornamental Metal" for metal trim at solid phenolic wall paneling.
 - 2. Section 06100 "Rough Carpentry" for furring, blocking, shims, and hanging strips required for installing paneling and that are concealed within other construction before paneling installation.

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.
 3. Product Data for Credit IEQ 4.4: For composite wood products and fabrication adhesives, documentation indicating that products contain no urea formaldehyde.
- C. Shop Drawings: Show location of paneling, large-scale details at panel joints and edge conditions indicating adjacent materials, attachment devices, and other components. Include layout drawings consisting of dimensioned plans and elevations.
- D. Samples for Verification:
1. Provide three panel corner sections with two finished edges, 12 by 12 inches.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Fabricator/Installer and Manufacturer.
- B. Product Certificates: For each type of product.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer must be a firm with a minimum of ten (10) years of experience and a successful record of in service performance in the actual production of the specified material.
- B. Source Limitations: Engage a qualified fabricator/installer to assume undivided responsibility for production of wall paneling.
- C. Fabricator/Installer Qualifications: Fabricator/Installer shall be approved by the manufacturer and be a firm with not less than two (2) years of successful experience in the fabrication and installation of paneling of similar type and scope to this project.
- D. Preconstruction Meeting: Before starting the work, arrange a pre-construction meeting with the Owner, Construction Manager, fabricator/installer, and manufacturer to discuss construction procedures, specifications, surface readiness, application, and material storage and protection.
- E. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build full-size mockups of paneling as indicated on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. If paneling must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- B. The solid phenolic wall panels shall be delivered to the project site in original, unopened packages. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. Care in handling must be exercised to avoid damage. All shipments to the job site shall be made on wooden pallets.
- C. The solid phenolic wall panels shall be stored flat and level in a fully enclosed space. For a minimum of seventy-two (72) hours immediately prior to ceiling installation, panels shall be stored in the room in which they will be installed. The temperature and humidity of the room shall closely approximate those conditions that will exist when the building is occupied. Panels shall be stored off the floor.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. The layout and installation of the solid phenolic wall panel systems shall be coordinated with other work penetrating the wall. This includes light fixtures, Life Safety Components, HVAC equipment, and fire suppression system components.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Solid Phenolic Wall Panels: Full-size units equal to 2 percent of quantity installed.
 - 2. Attachment System Components: Quantity of each attachment component equal to 2 percent of quantity installed

1.11 WARRANTIES

- A. Manufacturer: All materials supplied by the paneling manufacturer shall be guaranteed against manufacturing defects for five (5) years.
- B. Frabricator/Installer: All work shall be guaranteed for one (1) year from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 SOLID PHENOLIC PANELS

- A. Material, General: Provide solid phenolic flat panels based on thermosetting resins homogeneously reinforced with cellulose fiber and manufactured under high pressure and temperature. Panels shall have an integrated, decorative surface facing with pigmented resins.
 - 1. Provide material to meet the following performance requirements:
 - a. Modulus of elasticity: 1,300,000-psi minimum, according to ASTM D 790.
 - b. Tensile strength: 8,700-psi, minimum, according to ASTM D 638.
 - c. Flexural strength: 11,600-psi minimum, according to ASTM D 790.
 - d. Surface Impact Resistance: 9 lb.
 - e. Scratch Resistance: 0.8 lb.
 - f. Water Absorption: Less than 1.0%
 - g. Porosity: Non-porous surface and edges
 - 2. Provide material with the following fire resistant properties when tested according to ASTM E 84:
 - a. Flame spread: Class A.
 - b. Smoke development: 200 max
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Arborite Div. of ITW.
 - 2. Formica Corporation.
 - 3. Nevamar Company, LLC.
 - 4. Trespa North America.
 - 5. Wilsonart International.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed surfaces complying with the following requirements:
 - 1. Metallics: To match "Amber" by Trespa North America.
 - 2. Wood grains, matte finish: As selected by Architect from manufacturer's full range
 - 3. Panel core: Black.
- D. Thickness: 3/8" nominal.

- E. Panel Edges: Exposed black core.
- F. Panel Reveals: Open.

2.2 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: kiln dried to less than 15 percent moisture content.
- B. Flat Strap and Backing Plate: Steel sheet for blocking and bracing.
 - 1. Minimum Base-Metal Thickness: 0.0312 inch.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.
- D. Panel Clips: Aluminum, with 1/4" nominal thickness and 3/8" lift off or manufacturer's approved standard.
- E. VOC Limits for Installation Adhesives: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Multipurpose Construction Adhesives: 70 g/L.
- F. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.3 FABRICATION

- A. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.4 SHOP FINISHING

- A. General: Finish paneling at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Before commencing installation, examine substrate surfaces to determine that they are free of conditions which might be detrimental to proper and timely completion of the Work. Start of Work shall indicate acceptance of the substrate.

3.2 PREPARATION

- A. Before installation, condition paneling to average prevailing humidity conditions in installation areas.
- B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing.
- C. Panels must be applied over a smooth solid, flat backing such as drywall. All drywall joints should be taped and finished. Walls should be primed and painted before installation begins.

3.3 INSTALLATION

- A. Install blocking and strapping as required for reinforcement of substrate in accordance with panel manufacturer's recommendations.
 - 1. Coordinate panel anchorage with framing for installation of blocking and strapping as required prior to installation of substrate by others.
- B. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims.
 - 1. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
 - 2. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
 - 3. For paneling with revealed open joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/16 inch.
- C. Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening unless otherwise indicated.

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects; where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore soiled areas.

END OF SECTION 06424

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 06611 – SOLID POLYMER
FABRICATIONS**

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 WORK INCLUDES

- A. Solid polymer countertops as shown on the Drawings and specified herein.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- B. Samples: Submit minimum 6"x6" samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.
- C. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
- D. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.

- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation. Store indoors.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.6 QUALITY CRITERIA

- A. Applicable standards: Standards of the following, as referenced herein:
 - 1. American National Standards Institute (ANSI).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. National Electrical Manufacturers Association (NEMA).
- B. Allowable tolerances:
 - 1. Variation in component size: +/- 1/8".
 - 2. Location of openings: +/- from indicated location.
- C. Sustainable Design Requirements:
 - 1. Recycled Content Materials: Furnish materials with recycled content.
 - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

1.7 WARRANTY

- A. Provide manufacturer's warranty. The manufacturer shall warrant that the manufacturer shall at its option repair or replace, without charge, such product if it fails due to manufacturing defect during the first 10 years after initial installation. This shall include reasonable labor charges needed to repair or replace the product covered hereunder.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:

- B. Approved Manufacturers:
 - 1. Corian
 - 2. Avonite
 - 3. Hi-Macs by LG Hausys America Inc.
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 MATERIAL

- A. Countertops: adhesively joined with no exposed seams, having edge details and thickness as indicated on the drawings.

2.3 ACCESSORY PRODUCTS

- A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints.
- B. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive meeting ANSI A136.1-1967 and UL listed.
- C. Sealant: Manufacturer's standard mildew-resistant, FDA/UL recognized silicone sealant in colors matching component.

2.4 FABRICATION

- A. Factory fabricate components to greatest extent practicable to sizes and shapes indicated, in accordance with approved shop drawings.
- B. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints.
- C. Cut and finish component edges with clean, sharp returns. Route radii and contours to template. Repair or reject defective and inaccurate work.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and product installation data.

- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.
- C. Remove adhesive, sealants and other stains. Replace stained components.

3.2 SCHEDULE

- A. Refer to Millwork Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 06611

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 07841 – THROUGH - PENETRATION
FIRESTOP SYSTEMS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Provide firestopping penetration sealing system which shall have a continuous bond between substrate and penetrating item to assure a positive and effective fire and smoke seal. Provide sealing system for all penetrations through floor slabs (not in protected enclosures), fire walls and other fire-rated partitions or assemblies.
- B. This section includes firestop systems for the following:
 - 1. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 3. Sealant joints in fire-resistance-rated construction.
 - 4. Construction-gap firestop systems at connections of same or different materials in fire-rated construction.
 - 5. Construction-gap firestop systems occurring within fire-rated wall assemblies.
 - 6. Construction-gap firestop systems occurring at the top of fire-rated walls.
- C. Coordinate all sleeves (sizes and locations) specified in Divisions 15 and 16 of these specifications.
- D. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7, Section 07920 - JOINT SEALANTS for non-fire-resistive-rated joint sealants.
 - 2. Division 15 sections specifying ducts and piping penetrations.
 - 3. Division 16 sections specifying cable and conduit penetrations.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide firestop systems that are produced and installed to resist the spread of fire, according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of assembly penetrated.
- B. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E814, but not

less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

- C. **T-Rated Through-Penetration Firestop Systems:** Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:
 - 1. Where firestop systems protect penetrations located outside of wall cavities and fire-resistive shaft enclosures.
 - 2. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
 - 3. Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. **Fire-Resistive Joint Sealants:** Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- E. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
 - 3. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing plates or by other means.
- F. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E84.

1.4 ACTION SUBMITTALS

- A. Product data for each type of product specified. Data shall include product characteristics, typical uses, performance and limitation criteria and test data.
- B. **LEED Submittals:**
 - 1. **Product Data for Credit IEQ 4.1:** For penetration firestopping sealants and sealant primers, documentation including printed statement of VOC content.
- C. Product certificates signed by manufacturers of firestop systems products certifying that their products comply with specified requirements.
- D. **Shop Drawings:** Indicate dimensions, description of materials and finishes, specific modifications, component connections, anchorage methods, hardware and installation procedures.
 - 1. Include detail drawings of each proposed assembly identifying intended products and applicable UL, GA or FM system number or UL classified

devices. Indicate which firestop materials will be used and thickness for different hourly ratings.

- E. Engineering Judgments: Submit manufacturer's drawings for all nonstandard applications where no UL, GA or FM tested system exists. All drawings must indicate the "tested" UL, GA or FM system upon which the judgment is based so as to assess the relevance of the judgment to some known performance.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
 - 1. A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
 - 2. A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping

1.6 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified under the "System Performance Requirements" article:
 - 1. Firestop systems tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL, GA or FM in their "Fire Resistance Directory," or Warnock Hersey.
 - 3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as

measured 0.78 inch from the face exposed to furnace fire. Provide systems complying with the following requirements:

- a. Fire-Resistance Ratings of Joint Sealants: As indicated by reference to design designations listed by UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.
 - b. Joint sealants, including backing materials, bear classification marking of qualified testing and inspection agency.
- B. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
 - C. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
 - D. Do not use any product containing solvents that require hazardous waste disposal or which after curing dissolve in water.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle firestop system materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this section with the work of other trades.
- B. Do not cover up those firestopping installations that will become concealed behind other construction until authorities having jurisdiction, if required, have examined each installation.

1.9 WARRANTY

- A. Provide written warranty, signed by manufacturer of firestopping materials and his authorized installer, agreeing to replace/repair defective materials and workmanship as required to maintain firestopping conditions. Warranty shall state that the firestopping materials have been installed and used properly and for the purpose which intended.
 - 1. Warranty period is 2 years after date of Substantial Completion.
- B. If products offered have a manufacturer's warranty that states that Owner/user shall test application/determine suitability then Contractor shall have independently monitored tests performed on conditions identical to proposed construction, and shall submit copies of these tests for review. Submittals made without this testing will not be considered or approved.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide firestop system products by one of the following:
 - 1. 3M Fire Protection Products.
 - 2. Cafco Through Penetration Systems; Isolatak International.
 - 3. Hilti Firestop Systems.
 - 4. International Protective Coatings Corporation.
 - 5. SpecSeal Firestop Products; Specified Technologies, Inc.
 - 6. Dow Corning Corp.

2.2 FIRESTOP SYSTEMS, GENERAL

- A. Compatibility: Provide firestop systems composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestop systems under conditions of service and application, as demonstrated by firestop systems manufacturer based on testing and field experience.
- B. Accessories: Provide components for each firestop systems system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestop systems manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials including the following:
 - a. Semirefractory fiber (mineral wool) insulation.
 - b. Ceramic fiber.
 - c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - d. Fire-rated formboard.
 - e. Joint fillers for joint sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

- C. Penetration seals shall be of the type and shape required to continuously fill the annular space between the pipe, conduit, cable, etc., and the wall or floor opening with or without sleeves.
- D. Seal shall be constructed to provide electrical insulation between the pipe and wall, thus reducing the chances of cathodic reaction between these members.
- E. Provide materials as required for all blank openings through floor and walls where a fire rating is required.
- F. Provide metal sleeves, collars and plates not specified in other sections as required to meet the fire resistance ratings in which the penetrations occur.

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. Ceramic-Fiber and Mastic Coating: Ceramic fibers in bulk form formulated for use with mastic coating, and ceramic fiber manufacturer's mastic coating.
- B. Ceramic-Fiber Sealant: Single-component formulation of ceramic fibers and inorganic binders.
- C. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
- D. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
- E. Intumescent Putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum foil on one side.
- G. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E136, with flame-spread and smoke-developed ratings of zero per ASTM E84.
- H. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogenous mortar.
- I. Pillows / Bags: Re-usable, heat-expanding pillows / bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- J. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping / gunnable sealant, unless

THROUGH-PENETRATION FIRESTOP SYSTEMS

Bid Package 2B – Issue for Bid

indicated firestop system limits use to nonsag grade for both opening conditions.

- L. Solvent-Release-Curing Intumescent Sealant: Solvent-release- curing, single-component, synthetic-polymer-based sealant of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping / gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that complies with ASTM C920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.
- B. Sealant Colors: Provide color of exposed joint sealants as selected by Architect from manufacturer's standards.
- C. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand the following percentage changes in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, and remain in compliance with other requirements of ASTM C920 for uses indicated:
 - a. 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.
- D. Multicomponent, Nonsag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand the following percentage change in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, and remain in compliance with other requirements of ASTM C920 for uses indicated:
 - a. 50 percent movement in both extension and compression for a total of 100 percent movement.
- E. Single-Component, Nonsag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other

conditions affecting performance of the Work. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestop systems to comply with recommendations of firestop systems manufacturer and the following requirements:
 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestop systems.
 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form release agents from concrete.

3.3 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming / damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Any material found to be defective shall be removed and replaced by the applicator.

3.4 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
- E. Any material found to be defective shall be removed and replaced by the applicator.

3.5 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestop systems products and of products in which opening and joints occur.
- B. Protect firestop systems during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

END OF SECTION 07841

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 07920 – JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Elastomeric sealants.
 - 2. Latex joint sealants.
 - 3. Acoustical joint sealants.
 - 4. Preformed joint sealants and compressible fillers.
- B. Related Sections include the following:
 - 1. Section 07842 "Through-Penetration Firestop Systems" for sealing joints in fire-resistance-rated construction.
 - 2. Division 8 Section 08801 "Interior Glazing" for glazing sealants.
 - 3. Division 8 Section 08460 "Automatic Entrance Doors" for structural and other glazing sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. 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.

- D. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 3/8-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- E. 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. 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.
- E. Field-Adhesion Test Reports: For each sealant application tested.
- F. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a 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 elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
 - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.7 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 or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric 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: Five years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 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.

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 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. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Single-Component Pourable Neutral-Curing Silicone Sealant:
 - 1. Products:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 300 Pavement Sealant (Self Leveling).
 - c. Dow Corning Corporation; SL Parking Structure Sealant.
 - 2. Type and Grade: S (single component) and P (pourable).
 - 3. Class: 100/50.
 - 4. Use Related to Exposure: T (traffic).
 - 5. Uses Related to Joint Substrates: M, A, and O, as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Ceramic tile.
- C. Single-Component Neutral-Curing Silicone Sealant:
 - 1. Products:
 - a. Dow Corning Corporation; 799.
 - b. GE Silicones; UltraGlaze SSG4000.
 - c. GE Silicones; UltraGlaze SSG4000AC.
 - d. Polymeric Systems Inc.; PSI-631.
 - e. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
 - f. Tremco; Proglaze SG.
 - g. Tremco; Spectrem 2.
 - h. Tremco; Tremsil 600.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

- a. Use O Joint Substrates: Aluminum coated with a high-performance coating and ceramic tile.

D. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:

- 1. Products:
 - a. Pecora Corporation; 898.
 - b. Tremco; Tremsil 600 White.
- 2. Type and Grade: S (single component) and NS (nonsag).
- 3. Class: 25.
- 4. Use Related to Exposure: NT (nontraffic).
- 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating and ceramic tile.

E. Single-Component Nonsag Urethane Sealant:

- 1. Products:
 - a. Sika Corporation, Inc.; Sikaflex - 1a.
 - b. Sonneborn, Division of ChemRex Inc.; Ultra.
 - c. Sonneborn, Division of ChemRex Inc.; NP 1.
 - d. Tremco; Vulkem 116.
- 2. Type and Grade: S (single component) and NS (nonsag).
- 3. Class: 25.
- 4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
- 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating and ceramic tile.

F. Single-Component Nonsag Urethane Sealant:

- 1. Products:
 - a. Bostik Findley; Chem-Calk 900.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Polymeric Systems Inc.; Flexiprene 1000.
 - d. Tremco; DyMonic.
- 2. Type and Grade: S (single component) and NS (nonsag).
- 3. Class: 25.
- 4. Use Related to Exposure: NT (nontraffic).
- 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

- a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating and ceramic tile.
- G. Single-Component Pourable Urethane Sealant:
 - 1. Products:
 - a. Bostik Findley; Chem-Calk 950.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Polymeric Systems Inc.; Flexiprene 952.
 - d. Tremco; Vulkem 45.
 - 2. Type and Grade: S (single component) and P (pourable).
 - 3. Class: 25.
 - 4. Use Related to Exposure: T (traffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating and ceramic tile.
- H. Butyl-Rubber-Based Solvent-Release Joint Sealant (Roofing only): Comply with ASTM C 1085.
 - 1. Products:
 - a. Bostik Findley; Bostik 300.
 - b. Fuller, H. B. Company; SC-0296.
 - c. Pecora Corporation; BC-158.
 - d. Polymeric Systems Inc.; PSI-301
 - e. Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
 - f. Tremco; Tremco Butyl Sealant.

2.3 LATEX JOINT SEALANTS

- A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.
- B. Products:
 - 1. Bostik Findley; Chem-Calk 600.
 - 2. Pecora Corporation; AC-20+.
 - 3. Schnee-Morehead, Inc.; SM 8200.
 - 4. Sonneborn, Division of ChemRex Inc.; Sonolac.
 - 5. Tremco; Tremflex 834.

2.4 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 2. Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
1. Products:
 - a. Pecora Corporation; BA-98.
 - b. Tremco; Tremco Acoustical Sealant.

2.5 PREFORMED JOINT SEALANTS AND COMPRESSIBLE FILLERS

- A. Precompressed Sealant: Silicone pre-coated, preformed, pre-compressed, self-expanding, sealant system.
1. Expanding foam to be open-cell polyurethane foam impregnated with a water-based, non-drying, polymer-modified acrylic adhesive. Seal shall combine factory-applied, low-modulus silicone and a backing of acrylic-impregnated expanding foam into a unified hybrid sealant system. Silicone must be proved to have been tested for hardness according to ASTM D2240 (Shore-A hardness not to exceed 25). Silicone external color facings to be factory-applied to the foam while it is partially pre-compressed to a width greater than maximum joint extension and cured before final compression. When compressed to final supplied dimension, distinct and uniform folds must be created in the silicone coating.
 2. Material shall be capable of movements of +50%, -50% (100% total) of nominal material size. Sealant must be supplied precompressed to less than the joint size, packaged in shrink-wrapped lengths (sticks) with a mounting adhesive on one face. End to end joints of consecutive lengths of material to be butted and joined bellows surfaces to be lightly coated with silicone. To obtain identical color sealant, use sealant supplied by manufacturer.
 3. Basis of Design: SEISMIC COLORSEAL-DS (Double-Sided) by EMSEAL
- B. Compressible Fillers: Expanded closed-cell Ethylene Propylene Diene (EPDM) sponge rubber.
1. Basis of Design: Everlastic EPDM Sponge 3000 by Williams Products, Inc.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are

approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 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, blast cleaning, 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 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. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on 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 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. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type 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.
- 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 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 configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 1 test for each day of sealant application.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193.

- a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 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.

3.6 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.

END OF SECTION 07920

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 08110 – STEEL DOORS
AND FRAMES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Standard hollow metal work.
- B. Related Sections
 - 1. Division 4 Section 04202 "Interior Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
 - 2. Division 8 Section 08710 "Finish Hardware" for door hardware for hollow metal doors and frames.
 - 3. Division 8 Section 08801 "Interior Glazing" for glazed sidelights and doors.
 - 4. Division 9 Section 09900 "Painting" for field painting hollow metal doors and frames
 - 5. Division 16 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
- B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include the following:
1. Elevations of each door type.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, joints, field splices, and connections.
 7. Details of accessories.
 8. Details of moldings, removable stops, and glazing.
 9. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
 2. For "Doors" and "Frames" subparagraphs below, prepare Samples about 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.
- E. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with [FPA 105 or UL 1784.
- E. Preinstallation Conference: Conduct conference at Project site.
- F. Design pressure certification up to +/- 80 psf.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site.
 - 1. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.
 - 2. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Amweld International, LLC.
 2. Ceco Door Products; an Assa Abloy Group company.
 3. Curries Company; an Assa Abloy Group company.
 4. Pioneer Industries, Inc.
 5. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G90 (Z180) metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units:
1. For exterior walls use hot-dip galvanized according to ASTM A 153/A 153M.
 2. Fasteners for glazing stops: oval head spanner screws, unless otherwise indicated.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. Ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Division 8 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard, polystyrene or, polyurethane, core.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 1) Locations: Exterior doors and interior doors where indicated.
 - 3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
 - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Pre conduit frames and doors with UL rated Electro Lynx conduit and back boxes as required for electro mechanical hardware specified in Section 08710.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Frames for Level 3 Steel Doors: 0.067-inch-thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as face welded unless otherwise indicated.
 - 3. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.
 - 4. Frames for Wood Doors: 0.053-inch-thick steel sheet.
 - 5. Frames for Borrowed Lights: Same as adjacent door frame.
 - 6. Frames for all door openings over 3'6": 0.067-inch-thick steel sheet.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
- E. Pre conduit frames and doors with UL rated Electro Lynx conduit and back boxes as required for electro mechanical hardware specified in Section 08710.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.8 LOUVERS

- A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
 - 1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
 - 2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other, any angle.
 - 3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.

2.9 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.10 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 2. All steel doors and frames receiving electro-mechanical hardware shall be factory pre wired with UL approved conduit and junction boxes with ElectroLynx quick connect system Option 3 or approved equal.

3. Glazed Lites: Factory cut openings in doors.
 4. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. All steel doors and frames receiving electro-mechanical hardware shall be factory pre wired with UL approved conduit and junction boxes with ElectroLynx quick connect system Option 3 or approved equal.
 3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 5. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 7. Jamb Anchors: Provide number and spacing of anchors as follows:
 8. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - a) Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 5) Three anchors per jamb up to 60 inches high.
 - 6) Four anchors per jamb from 60 to 90 inches high.
 - 7) Five anchors per jamb from 90 to 96 inches high.
 - 8) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 9) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - a) Compression Type: Not less than two anchors in each jamb.
 - b) Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 9. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.11 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

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 the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, 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 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition.

Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08110

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 08411 – ALUMINUM-FRAMED
ENTRANCES AND STOREFRONTS**

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. Interior storefront framing.
 - 2. Interior manual-swing entrance doors and door-frame units.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications."
 - 2. Division 8 Section "Interior Glazing."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Bid Package 2B – Issue for Bid

08411 - 1

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has a minimum two (2) years documented experience in work of this Section, who has completed glazing similar in material, design, and extent to that indicated for this Project; and whose work has resulted in glass installations with a record of successful in-service performance.

1.7 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockup of typical wall areas as shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal.
 2. Warranty Period: Five years from date of Substantial Completion.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Bid Package 2B – Issue for Bid

08411 - 2

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
- B. Structural Loads: Provide storefronts capable of withstanding the following structural loads without exceeding allowable design working stress of materials:
 - 1. Concentrated load of 200 lbf applied at any point and in any direction.
 - 2. Uniform load of 50 lbf / ft. applied in any direction.
- C. Deflection of Framing Members:
 - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Arch Aluminum & Glass Co., Inc.
 - 2. CMI Architectural.
 - 3. EFCO Corporation.
 - 4. Kawneer North America.
 - 5. Pittco Architectural Metals, Inc.
 - 6. TRACO.

7. Trainor Glass.
8. Tubelite.
9. United States Aluminum.
10. Wausau Window and Wall Systems.

- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Nonthermal.
 2. Glazing System: Retained mechanically with gaskets on two sides and structural sealant on two sides.
 3. Glazing Plane: Front.
 4. Finish: Clear anodic finish.
 5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.
 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011.
- E. Surface-Burning Characteristics: Comply with ASTM E 84; testing 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: 50 or less.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: Narrow stile; 2-1/8-inch nominal width.
 - 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

2.5 GLAZING

- A. Glazing: Comply with Section 08801 "Interior Glazing."
- B. Glazing Gaskets: Comply with Section 08801 "Interior Glazing."
- C. Glazing Sealants: Comply with Section 08801 "Interior Glazing."
- D. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront system indicated.
 - 1. Color: As selected by Architect from manufacturer's full range of colors.

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
- C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Bid Package 2B – Issue for Bid

08411 - 5

- B. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- D. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. Provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.9 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine 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 have been corrected.

3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components plumb and true in alignment with established lines and grades.
- D. Install glazing as specified in Section 08800 "Glazing."
- E. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Field-Installed Entrance Door Hardware: Install entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet.
 2. Level: 1/8 inch in 20 feet
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 4. Location: Limit variation from plane to 1/8 inch in 12 feet 1/2 inch total length.

END OF SECTION 08411

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 08460 -AUTOMATIC
ENTRANCE DOORS**

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. Sliding, bi-parting, power-operated automatic entrances including sliding doors, sidelites, side jambs, header with roller track. Operator, bottom door guides, and activation devices.

B. Related Sections:

- 1. Division 08 Section 05500 "Metal Fabrications" for miscellaneous metal framing and supports.
- 2. Division 08 Section 8801 "Interior Glazing"
- 3. Division 13 Section 13700 "Part 1542 Computer controlled Access System" for access control devices installed at door openings and provided as part of a security system
- 4. Division 16 Sections for electrical connections including conduit and wiring for automatic entrance operators.

1.3 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- C. IBC: International Building Code.
- D. Safety Device: Device that, to avoid injury, prevents a door from opening or closing.
- E. For automatic door terminology, refer to ANSI/BHMA A156.10 for definitions of terms.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide entrances meeting the requirements of ANSI/BHMA A156.10, American National Standard for Power Operated Doors.
- B. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and wind loads within limits and under conditions indicated according to SEI/ASCE 7.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Operating Temperature Range: Provide automatic entrances that operate within minus 40 to plus 102 deg F.
- E. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of fixed entrance system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..
- F. Opening-Force Requirements:
 - 1. Power-Operated Doors: Not more than 30 lbf required to manually set door in motion if power fails, and not more than 15 lbf required to open door to minimum required width.
 - 2. Breakaway Device for Power-Operated Doors: Not more than 50 lbf required for a breakaway door or panel to open.
- G. Entrapment Force Requirements:
 - 1. Power-Operated Sliding Doors: Not more than 30 lbf required to prevent stopped door from closing.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic entrances. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Wiring Diagrams: For power, signal, and control wiring.
 3. Activation and safety devices.
 4. Include hardware schedule and indicate hardware types, functions, quantities, and locations.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Product Certificates: For each type of emergency-exit automatic entrance, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for automatic entrances.
- D. Field quality-control reports.
- E. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For automatic entrances, safety devices, and control systems to include in maintenance manuals

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer with company certificate issued by AAADM.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.
- C. Certified Inspector Qualifications: Certified by AAADM.
- D. Source Limitations for Automatic Entrances: Obtain automatic entrances from single source from single manufacturer.
- E. 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.
- F. Power-Operated Door Standard: BHMA A156.10.

- G. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.
- H. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to automatic entrances including, but not limited to, the following:
 - a. Structural load limitations.
 - b. Construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Coordination with electrical, glazing, and other trades.
 - d. Required testing, inspecting, and certifying procedures.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings to receive automatic entrances by field measurements before fabrication.

1.10 COORDINATION

- A. Templates: Obtain templates for doors, frames, and other work specified to be factory prepared for installing automatic entrances, and distribute to parties involved. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.
- B. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of Project.
- C. Electrical System Roughing-in: Coordinate layout and installation of automatic entrances with connections to power supplies.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic entrances that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of operators, controls, and hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Warranty Period: 10 years from date of Substantial Completion.

1.12 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of automatic entrance Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper automatic entrance operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
1. Engage a certified inspector to perform safety inspection after each adjustment or repair and at end of maintenance period. Furnish completed inspection reports to Owner.
 2. Perform maintenance, including emergency callback service, during normal working hours.
 3. Include 24-hour-per-day, 7-day-per-week, emergency callback service.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 2. Sheet and Plate: ASTM B 209 (ASTM B 209M).
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after

surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- C. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- E. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness, in entrance manufacturer's standard thickness.
- F. Glazing: As specified in Division 8 Section "Glazing."
- G. Sealants and Joint Fillers: As specified in Division 7 Section "Joint Sealants."
- H. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil (0.76-mm) thickness per coat.
- I. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.2 SLIDING AUTOMATIC ENTRANCES

- A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, miscellaneous framing and supports and accessories required for a complete installation.
- B. Sliding Automatic Entrance:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Besam Automated Entrance Systems, Inc.; an ASSA ABLOY Group company.
 - b. DORMA Automatics; Div. of DORMA Group North America.
 - c. Horton Automatics; Div. of Overhead Door Corporation.
 - d. Record-USA.
 - e. Stanley Access Technologies; Div. of The Stanley Works.
 2. Configuration: Biparting-sliding doors, with two sliding leaves and sidelites on each side.

- a. Traffic Pattern: Two way.
 - b. Emergency Breakaway Capability: Sliding leaves and sidelites and as indicated on Drawings.
 - c. Mounting: Between jambs.
3. Operator Features:
- a. Power opening and closing.
 - b. Drive System: Chain or belt.
 - c. Adjustable opening and closing speeds.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. On-off/hold-open switch to control electric power to operator, key operated.
4. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
- a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
5. Sliding Door Threshold: Manufacturer's standard threshold members and bottom-guide track system, with stainless-steel, ball-bearing-center roller wheels.
- a. Configuration: Recessed threshold across door opening and recessed guide track system at sidelites.
6. Combination Activation and Safety Device: Combination motion/presence sensor mounted on each side of door header to detect pedestrians in activating zone and to open door.
7. Safety Devices: Two photoelectric beams mounted in sidelite jambs to detect pedestrians in presence zone and to prevent door from closing.
8. Sidelite Safety Device: Presence sensor, mounted above each sidelite on side of door opening through which doors travel, to detect obstructions and to prevent door from opening.
9. Finish: Finish framing, door(s), sidelite(s), and header with Class I, clear anodic finish.

2.3 ENTRANCE COMPONENTS

- A. Framing Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.
 - 1. Nominal Size: 1-3/4 by 4-1/2 inches.
- B. Stile and Rail Doors: Manufacturer's standard 1-3/4-inch-thick, glazed doors with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members and clad in stainless-steel sheet. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.
 - 1. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and manufacturer's standard preformed gaskets.
 - 2. Stile Design: Narrow stile, 2-inch nominal width or as indicated on Drawings.
 - 3. Rail Design: 6-inch nominal height or as indicated on Drawings.
- C. Sidelite(s): Manufacturer's standard 1-3/4-inch-deep sidelite(s) with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members and clad in stainless-steel sheet, matching door design and finish.
 - 1. Glazing Stops and Gaskets: Same materials and design as for doors.
- D. Headers: Fabricated from minimum 0.125-inch-thick, extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
 - 1. Mounting: Concealed, with one side of header flush with framing.
 - 2. Capacity: Capable of supporting doors up to 175 lb per leaf over spans up to 14 feet without intermediate supports.
 - a. Provide sag rods for spans exceeding 14 feet.
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Signage: Affixed to both sides of each door as required by BHMA A156.10 for type of door and its operation.
 - 1. Application Process: Door manufacturer's standard process.
 - 2. Provide sign materials with instructions for field application after glazing is installed.

2.4 DOOR OPERATORS AND ACTIVATION AND SAFETY DEVICES

- A. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
 - 1. Door Operator Performance: Provide door operators that will open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
 - 2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.
- B. Combination Motion/Presence Sensors: Self-contained units; consisting of both motion and presence sensors in a single metal or plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.
 - 1. Motion Sensor: K-band-frequency, microwave-scanner units; with relay hold time of not less than 2 to 10 seconds.
 - 2. Presence Sensor: Infrared-scanner units; with relay hold time of not less than 2 to 10 seconds. Sensors shall remain active at all times.
- C. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.
- D. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.
- E. Opening-Width Control: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

2.5 HARDWARE

- A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.
- B. Breakaway Device for Power-Operated Doors: Provide breakaway device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Maximum force to open door shall be 50 lbf (222 N) according to BHMA A156.10. Interrupt powered operation of door operator while in breakaway mode.

- C. Pivots:
 - 1. Center-Pivot Sets: BHMA A156.4, Grade 1, with exposed parts of cast-aluminum alloy.
- D. Deadlocks: Manufacturer's standard deadbolt operated by exterior cylinder and interior thumb turn, with minimum 1-inch- (25-mm-) long throw bolt; BHMA A156.5, Grade 1.
 - 1. Cylinders: BHMA A156.5, Grade 1, six-pin mortise type.
 - a. Keying: Integrate into building master key system.
 - 2. Deadbolts: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.
 - 3. Two-Point Locking for Sliding Doors: Mechanism in stile of active door leaf that automatically extends second lockbolt into overhead carrier assembly and threshold.
 - 4. Include locking devices for sidelites, to prevent manual break out.
- E. Weather Stripping: Manufacturer's standard replaceable components.
 - 1. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2.6 FABRICATION

- A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
 - 1. Form aluminum shapes before finishing.
 - 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 - 3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws finished to match framing.
 - a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - b. Reinforce members as required to receive fastener threads.
 - 4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
 3. Form profiles that are sharp, straight, and free of defects or deformations.
 4. Provide components with concealed fasteners and anchor and connection devices.
 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
 6. Fabricate exterior components to drain water passing joints and condensation and moisture occurring or migrating within system to the exterior.
 7. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
 8. Allow for thermal expansion of exterior units.
- C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.
- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."
- F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.
1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors and breakaway sidelites.
- G. Activation and Safety Devices:
1. General: Factory install devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.
 2. Install photoelectric beams in vertical jambs of sidelites, with dimension above finished floor as follows:
 - a. Top Beam: 48 inches (1219 mm).
 - b. Bottom Beam: 24 inches (610 mm).

2.7 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 shipping.
- C. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
 3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
 4. Level recesses for recessed thresholds using nonshrink grout.
- C. Door Operators: Connect door operators to electrical power distribution system as indicated in Division 16 Sections.
- D. Access-Control Devices: Connect access-control devices to access-control system as specified in Division 16 Sections.
- E. Activation and Safety Devices: Install and adjust devices to provide detection field and functions indicated.
- F. Glazing: Install glazing as specified in Division 08 Section "Interior Glazing."
- G. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide weathertight installation.
1. Set framing members and flashings in full sealant bed.
 2. Seal perimeter of framing members with sealant.
- H. Signage: Apply signage on both sides of each door and breakaway sidelight as required by referenced door standards.
- I. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 FIELD QUALITY CONTROL

- A. Inspection: Engage Installer's certified inspector to test and inspect automatic entrances and prepare test and inspection reports.
1. Certified inspector shall test and inspect each automatic entrance to determine compliance of installed systems with applicable BHMA standards.
 2. Inspection Report: Certified inspector shall submit report in writing to Architect and Contractor within 24 hours after inspection.
- B. Work will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING

- A. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure; comply with requirements in BHMA A156.10.
- B. Lubricate operating hardware and other moving parts as recommended by manufacturer.
- C. Readjust door operators and controls after repeated operation of completed installation equivalent to 3 days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.
- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 CLEANING AND PROTECTION

- A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
 - 1. Comply with requirements in Division 08 Section "Interior Glazing" for cleaning and maintaining glass.

3.6 DEMONSTRATION

- A. Engage a certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrances.

END OF SECTION 08460

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 08801 – INTERIOR GLAZING

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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Doors.
 - 2. Glazed entrances.
 - 3. Interior borrowed lites.
 - 4. Glazed interior partitions.
 - 5. Glazed elevator hoistway and cab.
 - 6. Glazed ornamental guardrails.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications."
 - 2. Division 5 Section "Ornamental Handrails and Railings."
 - 3. Division 6 Section "Interior Architectural Woodwork."
 - 4. Division 8 Section "Automatic Entrance Doors."
 - 5. Division 8 Section "Steel Doors and Frames."
 - 6. Division 10 Section "Commercial Toilet Accessories" for mirrors.
 - 7. Division 14 Section "Hydraulic Elevators."
- C. The interior borrowed lites work specified in this section shall be performed under a single subcontract as specified in Section 08110 STEEL DOORS AND FRAMES.
- D. The glass and steel guardrail work specified in this section shall be performed under a single subcontract as specified in Section 05720 ORNAMENTAL HANDRAILS AND RAILINGS
- E. The elevator car enclosure work specified in this section shall be performed under a single subcontract as specified in Section 14240 HYDRAULIC ELEVATORS

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
 - 1. Glass shall be of specified types, free from flaws and complying with grade requirements. All panels of each type of glass shall be produced by the same manufacturer. Each shipment of glass shall bear a manufacturer's statement indicating strength, grade, thickness, type, and quality of the contents.
 - 2. Glass shall be annealed, heat strengthened, fully tempered, or laminated, as recommended by the glass manufacturer, to ensure against heat breakage and to assure adequate glass performance at the specified design loads. The glass manufacturer's recommendations shall be accompanied by design load and thermal stress analysis calculations. Use of tempered glass shall be limited to areas where design pressures are beyond the capacity of heat strengthened glass or where required for safety glazing.
 - 3. Unless otherwise indicated, glass lights shall be of uniform appearance in order to maintain visual uniformity throughout the work. Glass required by code to meet safety glass requirements is excepted from this requirement.
 - 4. Glass thickness of all vertical lights shall be the same and shall be based on design requirements for the most severe condition.
 - 5. Sizes of glass shall be taken from the actual frames or from guaranteed dimensions provided by the frame supplier.
 - 6. Tolerances between frame and edges of glass shall be those recommended by the glass manufacturer.
 - 7. The work shall conform to requirements of CPSC 16 CFR 1201.
 - 8. Glass 1/4" thick and thicker shall be factory graded and cut.
 - 9. Sealants shall be supplied by a single manufacturer when available. After acceptance by the Commissioner, all sealant of each type shall be produced by the accepted manufacturer.

- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: As indicated, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
 - b. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2- Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick or of thickness indicated.
 2. For laminated-glass lites, properties are based on products of construction indicated.

1.5 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.

- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Samples: For the following products, in the form of 12-inch-square Samples for glass.
 - 1. Glass, 3 samples each designated type, displaying safety glass labeling when applicable, 12" x 12".
 - 2. Non-structural glazing gasket, 12" x 12" corner.
 - 3. Structural silicone glazing sealant, glass, and aluminum, 12" x 12".
 - 4. Extruded silicone glazing strips: 12" length.
- D. Shop Drawings:
 - 1. Design Data with recommended glass types, strengths, and thicknesses indicating design loads
 - 2. Recommended glazing materials and details, showing glass clearances, setting blocks, shims, preformed spacers, structural seals, tapes, gaskets and sealants.
- E. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- F. Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- B. Qualification Data: For installers.
- C. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- D. Product Test Reports: For each of the following types of glazing products:
 - 1. Clear float glass.
 - 2. Coated float glass.
 - 3. Laminated glass.
 - 4. Glazing sealants.
 - 5. Glazing gaskets.
- E. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. **Source Limitations for Glazing Accessories:** Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- C. **Glass Product Testing:** Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. **Glass Testing Agency Qualifications:** An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- D. **Safety Glazing Products:** Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- E. **Glazing Publications:** Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. **GANA Publications:** GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
- F. **Mockups:** Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 05721 "Ornamental Railings to match glazing systems required for Project, including glazing methods.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer.

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm

2.2 MANUFACTURERS

- A. Subject to compliance with requirements provide products from the following manufacturers:
 - 1. AFG
 - 2. Guardian.
 - 3. Interpane.

4. J.E. Berkowitz.
5. Oldcastle.
6. Pilkington.
7. PPG.
8. Viracon.

2.3 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- C. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 3. For uncoated glass, comply with requirements for Condition A.
 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- D. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
 1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - a. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.
 2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.

2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 1. Neoprene, ASTM C 864.
 2. EPDM, ASTM C 864.
 3. Silicone, ASTM C 1115.

4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

2.5 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 1. Single-Component Neutral- and Basic-Curing Silicone Glazing Sealants:
 - a. Products: Subject to compliance with requirements, provide the following:
 - 1) Dow Corning Corporation; 790.
 - 2) GE Silicones; SilPruf LM SCS2700.
 - 3) Tremco; Spectrem 1 (Basic).
 - 4) GE Silicones; SilPruf SCS2000.
 - 5) Pecora Corporation; 864.
 - 6) Pecora Corporation; 890.
 - 7) Polymeric Systems Inc.; PSI-641.
 - 8) Sonneborn, Div. of ChemRex, Inc.; Omniseal.
 - 9) Tremco; Spectrem 3.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 100/50.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
 2. Neutral-Curing Silicone Glazing Sealants:
 - a. Products: Subject to compliance with requirements, provide the following:
 - 1) Dow Corning Corporation; 791.
 - 2) Dow Corning Corporation; 795.
 - 3) GE Silicones; SilPruf NB SCS9000.

- 4) GE Silicones; UltraPruf II SCS2900.
 - 5) Pecora Corporation; 865.
 - 6) Pecora Corporation; 895.
 - 7) Pecora Corporation; 898.
- b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 50.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
3. Class 25 Neutral-Curing Silicone Glazing Sealant:
- a. Products: Subject to compliance with requirements, provide the following:
 - 1) Dow Corning Corporation; 799.
 - 2) GE Silicones; UltraGlaze SSG4000.
 - 3) GE Silicones; UltraGlaze SSG4000AC.
 - 4) Polymeric Systems Inc.; PSI-631.
 - 5) Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
 - 6) Tremco; Proglaze SG.
 - 7) Tremco; Spectrem 2.
 - 8) Tremco; Tremsil 600.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 25.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 - 1. Type 1, for glazing applications in which tape acts as the primary sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges and corners.

2.9 MONOLITHIC-GLASS TYPES

- A. Glass Type GL-2: Clear tempered pattern glass, for use in interior partitions and architectural woodwork.
 - 1. Product: Vivid Glass "VFI-Kalahari", or approved equal.
 - 2. Minimum thickness: 6.0 mm.
- B. Glass Type GL-3: Clear fully tempered float glass, for use in interior windows, doors, partitions and ornamental railings unless otherwise indicated.
 - 1. Minimum thickness: 6.0 mm.
 - 2. Provide safety glazing labeling.
- C. Glass Type GL-3.1: Clear fully tempered float glass with reflective mirror film on entire public side, for use in interior windows at CBP Rooms 163 and 245 doors.

1. Minimum thickness: 6.0 mm.
 2. Provide safety glazing labeling.
- D. Glass Type GL-3.2: Clear fully tempered float glass with translucent frosted film applied between 27 inches and 75 inches above the finish floor elevation, for use in office and conference room sidelights.
1. Minimum thickness: 6.0 mm.
 2. Provide safety glazing labeling.

2.10 LAMINATED-GLASS TYPES

- A. Glass Type GL-4: Decorative glass composed of clear laminated glass with triple layer custom graphic between two plies of float glass, for use in interior partitions.
1. Product: Vivid Glass Vivigraphic View "VGV3506-00-GG", or approved equal matching graphic pattern design and layout provided by Architect and Architect's control sample.
 2. Minimum thickness of Each Glass Ply: 3.0 mm.
 3. Minimum interlayer Thickness: 0.060 inch.
 4. Provide safety glazing labeling
- B. Glass Type GL-5: Clear laminated glass with two plies of float glass, for use on elevator cabs and hoistways and interior partitions.
1. Minimum thickness of Each Glass Ply: 6.0 mm.
 2. Interlayer Thickness: 0.060 inch.
 3. Provide safety glazing labeling.
- C. Glass Type GL-6: Clear laminated glass with two plies of float glass, for use in automatic entrances.
1. Minimum thickness of Each Glass Ply: 12.0 mm.
 2. Interlayer Thickness: 0.060 inch.
 3. Provide safety glazing labeling.
- D. Glass Type GL-6.1: Translucent laminated glass with two plies of float glass, for use in automatic entrances where indicated.
1. Minimum thickness of Each Glass Ply: 12.0 mm.
 2. Interlayer Thickness: 0.060 inch.
 3. Interlayer Color: White, matching Vanceva Color No. 0099.
 4. Provide safety glazing labeling

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Presence and functioning of weep system.
 3. Minimum required face or edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08801

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09130 - ACOUSTICAL
SUSPENSION 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 SYSTEM DESCRIPTION

- A. Suspended ceiling system consisting of main tees and cross tees equipped with panel centering device, snapped together to form modules for the installation of lay-in acoustical panels, air diffusers and light fixtures.

1.3 QUALITY ASSURANCE

- A. Subcontractor qualifications: Installer shall have successful experience in installation of ceiling suspension systems on projects with requirements similar to requirements specified.
- B. Requirements of regulatory agencies: Codes and regulations of authorities having jurisdiction.
- C. Source quality control: Manufacturer will provide test certification for suspension system as required to meet performance standards specified by various agencies.

1.4 REFERENCES

- A. ASTM C635, Standard Specifications for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- B. ASTM C636, Recommended Practice for Installation of Metal Suspension System for Acoustical Tile and Lay-in Panels.
- C. CISCA Ceiling Systems Installation Handbook.

1.5 SUBMITTALS

- A. Samples: Submit data for suspension system main tees and cross tees for review of finish color and appearance.
- B. Shop drawings:

1. Reflected ceiling plans: Submit ceiling suspension system layout to indicate ceiling modules and related lighting and mechanical systems.
 2. Assembly drawings: Indicate module dimensions, accessory attachments and installation of related components.
- C. Manufacturer's data:
1. System details: Submit manufacturer's descriptive literature or standard drawings showing details of system with project conditions clearly identified, and manufacturer's recommended installation instructions.
 2. Color chart: Submit manufacturer's standard color chart for selection of color.
- D. Maintenance materials: Provide 5 percent of amount of main tees and cross tees installed.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.7 EXTRA MATERIALS

- A. Section 01631 – Products and Substitutions: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery of materials: Deliver materials in original, unopened packages clearly labeled with manufacturer's name, item description, part number, type and class, as applicable.
- B. Inspection: Promptly inspect delivered materials; file freight claims for damage during shipment and order replacement material, as required.
- C. Storage: Store in manner that will prevent warpage, scratches, or damage of any kind. Prevent interference to/by other trades and any other adverse job conditions due to storage locations or methods.
- D. Handling: Handle in such manner to insure against racking, distortion or physical damage of any kind.

1.9 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Building conditions: Building shall be enclosed with all windows and exterior doors in place and glazed, and the roof watertight before installation of suspension system.
 - 2. Interior temperature/humidity in building: Climatic conditions in areas to receive ceiling suspension systems shall range from 60 °F to 85 °F and relative humidity of not more than 80% shall be maintained before installation of components.
- B. Coordination with other work:
 - 1. General: Coordinate with other work supported by or penetrating through the ceiling, including mechanical and electrical work and partition systems.
 - 2. Mechanical work: Ductwork above suspension system shall be complete and permanent heating and cooling systems operating.
 - 3. Electrical work: Installation of conduit above suspension system shall be complete before installation of suspension system.
- C. Protection: Protect completed work above suspension system from damage during installation of suspension system components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Armstrong Ceilings

- 2. USG Interiors
- 3. Certain Teed Ceilings
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas to receive materials for conditions which will adversely affect installation. Provide written report of discrepancies.
- B. Do not start work until unsatisfactory conditions are corrected.
- C. Work to be concealed: Verify work above ceiling suspension system is complete and installed in manner which will not affect layout and installation of suspension system components.
- D. Beginning of installation shall signify acceptance of conditions in areas to receive ceiling suspension system.

3.2 PREPARATION

- A. Field dimensions must be verified prior to installation.

3.3 INSTALLATION

- A. Standard reference: Install in accordance with ASTM C636, CISCA installation standards, and any other applicable code requirements.
- B. Manufacturer's reference: Install in accordance with manufacturer's current printed recommendations.
- C. Hanger Wires:
 - 1. Spacing: Space hanger wires on main tees a maximum of 48"o.c., attaching hangers directly to structure above, or as needed to support loads.
 - 2. Limitations: Do not support wires from mechanical and/or electrical equipment, piping or other equipment occurring above ceiling.
- D. Light fixture clip: Snap over main tees and cross tees at each corner of light fixture.

3.4 CLEANING

- A. Suspension: Remove infill material and perform any necessary cleaning maintenance with nonsolvent-based commercial cleaner.
- B. Touch up all minor scratches and spots, as acceptable, or replace damaged sections when touch-up is not permitted.
- C. Painting: Repainting of suspension member shall be with a high-quality solvent base paint and applied as recommended by paint manufacturer.
- D. Removal of debris: Remove all debris resulting from work of this section.

3.5 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09130

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

SECTION 09310 - TILE

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. Porcelain Tile.
 - 2. Rock Mosaic
 - 3. Glass Tile.
 - 4. Waterproof membrane for thin-set tile installations.
 - 5. Metal edge strips installed as part of tile installations.

1.3 REFERENCES

- A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for Installation of Ceramic Tile
- B. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.4 SUBMITTALS

- A. Section 01300 - Submittals: Submittal procedures.
- B. Product Data: Submit instructions for using grouts and adhesives.
- C. Samples: Submit tile illustrating pattern and color.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 – Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.

- b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01700 – Contract Closeout: Closeout procedures.
- B. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.
- B. Maintain one copy copies of each document on site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.9 MOCKUP

- A. Section 01400 - Quality Control –Testing Services: Requirements for mockup.
- B. Construct mock-up with finish grout, and specified accessories.
- C. Locate where directed by Architect.
- D. Incorporate accepted mockup as part of Work.

1.10 PRE-INSTALLATION MEETING

- A. Section 01300 - Submittals: Preinstallation meeting.

- B. Convene minimum one week before starting Work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Section 01631 – Products and Substitutions: Product storage and handling requirements.
- B. Protect adhesives and grouts from freezing or overheating.

1.12 ENVIRONMENTAL REQUIREMENTS

- A. Section 01631 – Products and Substitutions.
- B. Do not install adhesives and grouts in unventilated environment.
- C. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.13 EXTRA MATERIALS

- A. Section 01700 - Contract Closeout Requirements: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. American Olean
 - 2. Crossville
 - 3. Dal Tile
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 BASE/PATTERN

- A. Base shall be as shown on the Drawings.
- B. Pattern shall be as shown on the Drawings.

2.3 ADHESIVE MATERIALS

- A. Manufacturers
 - 1. Adhesive: LATICRETE International, Inc.
 - 2. Other acceptable manufacturers offering equivalent products:
 - a. Mappi
 - b. PCI
 - 3. Substitutions: Under provisions of Section 01631.
- B. Adhesive: "LATICRETE 125 Sound & Crack Adhesive" as manufactured by LATICRETE International, Inc.

2.4 GROUT MATERIALS

- A. Manufacturers
 - 1. Grout: LATICRETE International, Inc.
 - 2. Other acceptable manufacturers offering equivalent products:
 - a. Mappi
 - b. PCI
 - 3. Substitutions: Under provisions of Section 01631.
- B. Grout: Grouting materials shall be Spectralock 2000 IG Grout as manufactured by LATICRETE International, Inc.

2.5 MORTAR MIX AND GROUT MIX

- A. Mix and proportion pre-mix setting bed and grout materials in accordance with manufacturer's instructions.

2.6 ACCESSORIES

- A. Tile Substrate: Wonder-Board® as supplied by American Olean Tile Company.
- B. Waterproofing Membrane:
 - 1. REDGARD Waterproofing and Anti-Fracture Membrane as manufactured by Custom Building Products.
 - 2. Pro-Red® Waterproofing Membrane 963 as manufactured by C-Cure.
- C. Floor Metal Edge Protection and Transitions: Schluter Schiene in aluminum finish. Height to match tile and setting- bed thickness.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Section 01300 - Submittals: Coordination and project conditions.
- B. Verify surfaces are ready to receive work.

3.2 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install cementitious backer board. Tape joints and corners, cover with skim coat of dry-set mortar to feather edge.
- E. Prepare substrate surfaces for adhesive installation.

3.3 INSTALLATION

- A. Install tile, thresholds, and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base and wall joints.
- D. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
 - 1. Porcelain Tile: 1/16 inch inch.
- E. Form internal angles coved and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control joints free of adhesive or grout. Apply sealant to joints.
- I. Allow tile to set for a minimum of 48 hours prior to grouting.

- J. Grout tile joints.
 - K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
 - L. Installation - Floors - Thin-Set Methods:
 - 1. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
 - a. Where waterproofing membrane is indicated, install in accordance with TCA Handbook Method F122, with latex-portland cement grout.
 - 2. Over wood substrates, install in accordance with TCA Handbook Method F142, with standard grout, unless otherwise indicated.
 - M. Installation - Wall Tile:
 - 1. Over cementitious backer units install in accordance with TCA Handbook Method W244, using membrane at toilet rooms, kitchens, and locker rooms.
 - 2. Over gypsum wallboard on wood or metal studs install in accordance with TCA Handbook Method W243, thin-set with dry-set or latex-portland cement bond coat, unless otherwise indicated.
 - a. Where waterproofing membrane is indicated other than at showers and bathtub walls, install in accordance with TCA Handbook Method W222, one coat method.
 - 3. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.
- 3.4 CLEANING
- A. Section 01710 – Clean Up: Final cleaning.
 - B. Clean tile and grout surfaces.
- 3.5 PROTECTION OF INSTALLED CONSTRUCTION
- A. Section 01700 – Contract Closeout: Protecting installed construction.
 - B. Do not permit traffic over finished floor surface for 4 days after installation.
- 3.6 SCHEDULE
- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09310

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 09402 – 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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thin-set, epoxy-resin terrazzo flooring and base.
 - 2. Precast epoxy-resin terrazzo units.
- B. Related Requirements:
 - 1. Division 7 Section "Joint Sealants" for sealants installed with terrazzo.
 - 2. Division 9 Section "Acrylic Flake Flooring Systems" for decorative resinous flooring systems applied as self-leveling slurries or as troweled or screeded mortars.

1.3 DEFINITIONS

- A. Aggregate: Marble chips or other types of aggregate.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 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 certifications and test reports necessary to show compliance with the Contract Documents
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 3. Product Data for Credit IEQ 4.3: For sealers, documentation including printed statement of VOC content.
 4. Product Data for Credit IEQ 4.3: For terrazzo flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
- C. Shop Drawings:
1. Show layout of the following:
 - a. Divider strips.
 - b. Control-joint strips.
 - c. Accessory strips.
 - d. Abrasive strips.
 2. Show large scale details of the following:
 - a. Stair treads, risers, and landings.
 - b. Edge configurations.
 - c. Floor electrical devices.
 3. Show terrazzo patterns.
- D. Samples for Verification: :
1. Terrazzo: For each type, provide three (3) 8" x 8" samples 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.
 2. Accessories: Three (3) 12" 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.

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. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
- D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

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, available products that may be incorporated into the Work include, but are not limited to, 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.
2. Thickness: 3/8 inch nominal.
3. Custom Mix Color and Pattern: Match Architect's samples based on formulated design-mixes as prepared by Terrazzo & Marble Supply Companies:
 - a. TER-1 (TM#05-1116) – Igloo: Terroxy WB Urethane, 25% MOP #1, 25% Crystal Glass #1, 25% Arctic White Glass #1, 25% Persian Cream #1.
 - b. TER-2 (TM#04-1041) – Dauphin Grey: Terroxy WB Urethane, 20% MOP #1, 60% Rebel Grey #0, 20% Rebel Grey #1.
 - c. TER-3 (TM#10-1451) - Slate Gray #2013: Terroxy WB Urethane, 40% It Blue Bardiglio #1, 60% One Sided Mirror #1, Glass Filler no Atf.
 - d. TER-4 (TM#10-804) – Reliance Navy #6601: Terroxy WB Urethane, 15% Midnight Blue #1, 10% Ash Gray Glass #1, 10% Crystal Glass #1, 20% Georgia White #0,1, 10% It. Blue Bardiglio #0,1, 20% Black Stallion #0,1, 15% Single Sided Mirror #0,1.

B. Materials:

1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate-crack preparation and reflective-crack reduction.
 - a. Reinforcement: Fiberglass scrim.
 - b. Joint filler: 2 component 100 percent solids flexible epoxy.
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) Bond strength to concrete: 300psi.
 - 2) Hardness: 60 to 85 per ASTM D 2240, Shore D.
 - 3) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
 - 4) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
 - 5) 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 twenty percent.
- 5. Divider-strip adhesive: epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer.
- 6. Finishing Grout: Resin based.

2.3 PRECAST EPOXY-RESIN TERRAZZO

- A. Precast Terrazzo Units: Comply with NTMA's written recommendations for fabricating precast terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges to 1/8-inch radius.
 - 1. Stair treads and landings.
 - 2. Color, Pattern, and Finish: Match Architect's samples for adjacent poured-in-place terrazzo flooring.

2.4 STRIP MATERIALS

- A. Thin-Set Divider Strips: L-type angle.
 - 1. Material: White-zinc alloy in color(s) selected, as indicated.
 - 2. Top Width: 1/4 inch.
 - 3. Strip Height shall be suitable thickness of terrazzo topping, with allowance for grinding.
- 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.
 3. Nosings for terrazzo stair treads and landings.
- D. Abrasive Strips: Three-line abrasive inserts at nosings. Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
1. Width: 1/2 inch.
 2. Depth: As required by terrazzo thickness.
 3. Length: 4 inches less than stair width.
 4. Color: As selected by Architect from full range of industry colors.

2.5 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to epoxy-resin manufacturer.
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. Anchoring Devices:
1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and required for secure attachment to substrate.
 2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
- C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- E. 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.
- F. 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 indicated.
1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
 2. Acid-Base Properties: With pH factor between 7 and 10.
 3. 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. Start of Work shall indicate acceptance of the substrate.

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.
- 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. Install divider strips in indicated pattern and at terminal edges of terrazzo. Set accurately, securely, straight, and to required levels. Create tight butt joints where strips adjoin.
 - b. Install control-joint strips back to back directly above concrete-slab control joints and/or in locations indicated.
 - c. 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. Abrasive Strips: Install with surface of abrasive strip positioned 1/16 inch higher than terrazzo surface.
- I. Finishing: Grind with 120 or finer grit stones until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure.

3.4 PRECAST TERRAZZO INSTALLATION

- A. Install precast terrazzo units using method recommended by NTMA and manufacturer unless otherwise indicated.
- B. Do not install units that are chipped, cracked, discolored, or not properly finished.
- C. Seal joints between units with joint compound matching precast terrazzo matrix.

3.5 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 Architect.

3.6 PROTECTION FROM TRAFFIC

- A. Before foot traffic is permitted, cover floors with kraft paper with taped joints. Lay 3/4" plywood walkways over paper in areas used for wheeled traffic. Remove

protection after completion of all work or when so authorized by Owner's Representative.

3.7 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.
- 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.

END OF SECTION 09402

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09511 - ACOUSTIC
PANEL CEILINGS**

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 DESCRIPTION OF WORK

- A. Acoustic ceiling panel installation.

1.3 SYSTEM DESCRIPTION

- A. Firecode Panels: Suspended fire rated ceiling system consisting of Acoustone Glacier acoustical panels, ceiling suspension system, air diffusers and light fixtures.

1.4 DELIVERY AND STORAGE

- A. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements.
- B. Storage time of ceiling material at the jobsite should be as short as possible, and environmental conditions should be as near as possible to those specified for occupancy. Cartons should be removed from pallets and stringers to prevent distortion of material.
- C. Damaged or deteriorated materials shall removed from the premises. Immediately before installation, panels shall be stored for a sufficient time to stabilize them at temperature and humidity conditions ambient during installation and anticipated for occupancy.

1.5 QUALITY ASSURANCE

- A. Subcontractor qualifications: Installer shall have successful experience in the installation of suspended ceiling systems on projects with requirements similar to requirements specified.
- B. Requirements of regulatory agencies: Codes and regulations of authorities having jurisdiction.
- C. Source quality control:

1. Test reports: Manufacturer shall provide test certification for minimum requirements as tested in accordance with applicable industry standards and/or to meet performance standards specified by various agencies.
2. Changes from system: System performance following any substitution of materials or change in assembly design shall be certified by the manufacturer.

1.6 REFERENCES

- A. ASTM C636: Manufacturing and Installation of Suspended Ceilings.
- B. CICA Ceiling Systems Installation Handbook.

1.7 SUBMITTALS

- A. Samples: Submit representative sample of color and finish of all exposed materials.
- B. Manufacturer's data: Submit manufacturer's catalog cuts or standard drawings showing details of system with project conditions clearly identified and manufacturer's recommended installation instructions.
- C. Maintenance materials: Submit one percent of amount of ceiling components installed.

1.8 PROJECT CONDITIONS

- A. Environmental requirements for interior installation: Climatic condition range of 60°-85° F.
- B. Coordination with other work:
 1. Mechanical work: Ductwork above ceiling shall be complete, and permanent heating and cooling systems operating to climate conditions prior to installation of ceiling components.
 2. Electrical work: Installation of conduit above ceiling shall be complete before installation of ceiling components.
- C. Protection: Protect completed work above ceiling system from damage during installation of ceiling components.

1.9 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
- 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.10 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Armstrong Ceilings
 - 2. USG Interiors
 - 3. Certain Teed Ceilings
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

PART 3 - EXECUTION**3.1 INSPECTION**

- A. Examine areas to receive ceiling panels for conditions that will adversely affect installation. Provide written report of discrepancies.
- B. Do not start work until unsatisfactory conditions are corrected.
- C. Work to be concealed: Verify work above ceiling is complete and installed in manner that will not affect layout and installation of ceiling panels.
- D. Beginning of installation shall signify acceptance of conditions in areas to receive ceiling panels.
- E. Fire-rating requirements: Construction above fire-rated assembly shall meet requirements of UL Designs.

3.2 PREPARATION

- A. Field dimensions must be verified prior to installation.

3.3 INSTALLATION

- A. Standard reference: Install ceiling panels in accordance with ASTM C636 and CICA Ceiling Systems Installation Handbook.
- B. Manufacturer's reference: Install ceiling panels in exposed grid systems, supported on all edges, in accordance with manufacturer's current printed recommendations.
- C. Drawing Reference: Install ceiling panels in accordance with the Drawings.

3.4 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09511

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 09514 - ACOUSTICAL
METAL PAN CEILINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes torsion-spring acoustical metal pans and associated concealed suspension system for interior ceilings.
- B. Related Sections:
 - 1. Division 9 Section "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and concealed suspension systems.
 - 2. Divisions 13, 15, and 16 Sections for light fixtures, sprinklers, and air-distribution components.

1.3 DEFINITIONS

- A. LR: Light Reflectance Coefficient.
- B. NRC: Noise Reduction Coefficient.

1.4 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 95 °F to 40°F.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Samples for Verification: For each component indicated and for each finish required, prepared on Samples of size indicated below:

1. Metal Pans: Set of 12-inch-square samples of each type, finish, color, pattern, and texture. Samples to include pan corners showing pan edge profiles in two directions.
 2. Suspension System Members, Moldings and Trim: Set of 12-inch-long Samples of each type, finish, and color.
 3. Sound Absorber: Match size of Sample metal pan.
- D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
1. Ceiling suspension members.
 2. Method of attaching hangers to building structure.
 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 4. Ceiling perimeter and penetrations through the ceiling; and trim and moldings.
 5. Minimum Drawing Scale: $1/8 = 1$ foot.
- E. Field quality-control reports.
- F. Maintenance Data: For finishes to include in maintenance manuals.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Source Limitations for Acoustical Metal Pan Ceilings: Obtain each combination of acoustical metal pans and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.
- B. Surface-Burning Characteristics: Complying with ASTM E 1264 for flame spread 25 + smoke developed 50 materials as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for sound absorption.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of typical ceiling area as shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- D. Preinstallation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical metal pans, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Handle acoustical metal pans, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical metal pan ceilings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use and as per manufacturers' recommendations.

1.11 COORDINATION

- A. Coordinate layout and installation of acoustical metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.12 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Metal Pans: Full-size units equal to 2 percent of quantity installed.
 2. Suspension System Components: Quantity of each grid and molding and trim equal to 2 percent of quantity installed.

1.13 WARRANTIES

- A. Manufacturer: All materials supplied by the ceiling manufacturer shall be guaranteed against manufacturing defects for one (1) year.
- B. Installer: All work shall be guaranteed for one (1) year from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 ACOUSTICAL METAL CEILING PANS

- A. Acoustical Metal Pan Standard: Provide manufacturer's standard acoustical metal pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, acoustical ratings, and light reflectances unless otherwise indicated.
- B. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with pitting, seam marks, roller marks, roughness, stains, or discolorations.
 - 1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209 (ASTM B 209M); alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Sound-Absorbent Fabric Layer: Provide fabric layer, sized to fit concealed surface of pan, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84.
 - 1. Bond fabric layer to panels in the factory with manufacturer's standard nonflammable adhesive.
- D. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84, and to comply with the following requirements:
 - 1. Spacer Grids: Provide manufacturer's standard aluminum grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.

2.2 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING

- A. Aluminum Metal Pans:
 - 1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.
 - b. Ceilings Plus..
 - c. Chicago Metallic.
 - d. Hunter Douglas Architectural Products, Inc.
 - e. Simplex Ceilings, a division of Intalite Inc.
 - f. USG Interiors, Inc.
 - g. Spitz Industries:
- B. Classification: Units complying with ASTM E 1264 for Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing.
 - 1. Pattern: Perforated, regularly spaced small round holes between 0.060" and 0.100" in diameter, arranged in 45 degree diagonal alignment to pan edge with uniform perforations spaced at between 0.120" to 0.22" on center, and between 16 and 21 percent open area as selected from manufacturer's full range.

- C. Pan Fabrication: Units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 - 1. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted concealed suspension grid by torsion springs.
- D. Pan Thickness: Not less than 0.040 inch.
- E. Pan Edge Detail: Square.
- F. Pan Joint Details:
 - 1. Transverse: Narrow reveal, 3/8".
 - 2. Longitudinal: Butt, not greater than 1/16".
- G. Pan Size: As indicated on Drawings.
- H. Pan Face Finish: Painted to match Architect's bright-reflective metallic finish sample.
- I. LR: Not less than 0.75.
- J. NRC: Not less than 0.80.

2.3 METAL SUSPENSION SYSTEMS

- A. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635, Table 1, Direct Hung will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.
- D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

2.4 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 shipping.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and Coordination Drawings.

3.3 INSTALLATION

- A. Install acoustical metal pan ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Attach hangers to structural members or bottom flutes of composite roof structure.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- D. Install acoustical metal pans in coordination with suspension system.
1. For torsion-spring-hinged pans, position pans according to manufacturer's written instructions.
 2. For snap-in pans, fit adjoining units to form flush, tight joints.
 3. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 4. Fit adjoining units to form flush, tight joints.
 5. Install directionally patterned or textured metal pans in directions indicated.
 6. Install sound-absorbent fabric layers in perforated metal pans.
 7. Install sound-absorbent pads in perforated metal pans over metal spacer grids.
- E. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas.
- F. Install hold-down clips where indicated.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings after removing strippable, temporary protective covering, if any.

Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 09514

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 09522 – WOOD
GRILLE CEILINGS**

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. Wood grille ceilings.
 - 2. Concealed suspension system.
 - 3. Acoustic blanket.
- B. Related Requirements:
 - 1. Section 09130 "Acoustical Suspension System" for concealed ceiling suspension systems.
 - 2. Section 09511 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels.
 - 3. Section 09514 "Acoustical metal Pan Ceilings" for torsion-spring acoustical metal pans and associated concealed suspension system.
 - 4. Divisions 13, 15, and 16 Sections for light fixtures, sprinklers, and air-distribution components.

1.3 REFERENCES

- A. AWI Quality Standards (Architectural Woodwork Institute).
- B. ASTM E84 (Method of test for surface burning characteristics of building materials).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

2. Include data for acoustical blanket material indicating compliance with contract requirements for fire resistance and acoustical performance.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Certificates: Chain-of-custody certificates indicating that paneling complies with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
3. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.

C. Shop Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension members.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items including lighting fixtures, diffusers, speakers, sprinklers, access panels, and special moldings.
4. Ceiling perimeter and penetrations through the ceiling; and trim and moldings.
5. Minimum Drawing Scale: $1/8" = 1 \text{ foot}$.

D. Samples for Verification:

1. Three (3) 12-inch-square samples of each grille type, indicating full range of finish, color, and texture.
2. Three (3) 12-inch-long samples of each edge trim type, indicating full range of finish, color, and texture
3. Suspension System Members: Set of 12-inch-long Samples of each type, finish, and color.
4. Acoustical Batts: Match size of Sample grilles.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Manufacturer.
- B. Product Certificates: For each type of product.
- C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- D. Evaluation Reports: For fire-retardant-treated paneling, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** The manufacturer must be a firm with a minimum of five (5) years of experience and a successful record of in service performance in the actual production of similar products.
- B. **Installer Qualifications:** Installer shall be a firm with not less than two (2) years of successful experience in installation of suspended wood ceilings of similar requirements to this project.
- C. **Pre-Installation Conference:** Conduct conference at site with direct sales representative of the ceiling manufacturer present.
- D. **Mockups:** Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. The ceiling grille panels shall be delivered to the project site in original, unopened packages. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. Care in handling must be exercised to avoid damage. All shipments to the job site shall be made on wooden pallets.
- B. The ceiling grille panels shall be stored flat and level in a fully enclosed space. For a minimum of seventy-two (72) hours immediately prior to ceiling installation, the Flat Veneer Panels shall be stored in the room in which they will be installed. The temperature and humidity of the room shall closely approximate those conditions that will exist when the building is occupied. The ceiling grille panels shall be stored off the floor.

1.9 FIELD CONDITIONS

- A. **Environmental Limitations:** Do not deliver or install paneling until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period. Plenums have proper ventilation and there shall be no excessive build up of heat in the ceiling areas
- B. Mechanical, electrical, and other utility service installations above the ceiling plane shall have been completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

1.10 COORDINATION

- A. Coordinate layout and installation of wood grille ceilings and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.11 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Wood Grille Panels: Full-size units equal to 2 percent of quantity installed.
 - 2. Wood Perimeter Trim: Full-size lengths equal to 2 percent of quantity installed.
 - 3. Suspension System Components: Quantity of each grid and trim equal to 2 percent of quantity installed

1.12 WARRANTIES

- A. Manufacturer: All materials supplied by the ceiling manufacturer shall be guaranteed against manufacturing defects for one (1) year. Because of differing site conditions, wood stains and colorings can vary with age and shall be excluded from this warranty.
- B. Installer: All work shall be guaranteed for one (1) year from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 PANELING FABRICATORS

- A. Source Limitations: Engage a qualified fabricator to assume undivided responsibility for production of ceiling.
- B. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Rulon Company
 - 2. Armstrong World Industries, Inc.
 - 3. Ceilings Plus
 - 4. Norton Industries, Inc.
 - 5. 9wood, Inc.

2.2 WOOD GRILLE CEILING

- A. Certified Wood: Wood components of wood grille ceiling shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

- B. Wood grille strips: FAS prime grade, all-natural FSC Certified Ash Wood strips shall be manufactured without finger-joints
 - 1. Thickness: 3/4 inch.
 - 2. Depth: 2 5/16 inch.
- C. Fire Performance Characteristics: Class A Interior Finish designation per ASTM E 84, with a flame-spread index of 25 or less and a smoke-developed index of 450 or less and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Panel Assemblies: Assemble panels as shown by gluing and concealed fastening. Wood strips shall be evenly spaced at seven (7) strips per foot of panel width and shall be fastened together with black dowels and woodbackers. The dowels and woodbackers shall be positioned 2-1/2" from the ends and 12" on center unless otherwise indicated, with interconnecting male-to-female dowel attachment and with overlapping woodbackers.
 - 1. Panels containing linear lights or speakers shall have portions of the blades and dowels removed in the shop to accommodate the installation of the lights and speakers in the field.
- E. Where indicated, provide perimeter wood trim to match wood grille strips

2.3 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 5 to 10 percent.
- C. Acoustic Blanket: 1 inch-thick, 1.5 lb/c.f. density, consisting of nonwoven, inorganic sound-absorbent material with abuse-resistant black facing.
 - 1. Fire Resistance: Class A, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84
 - 2. Noise Reduction Coefficient: 0.70 minimum.
- D. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - 1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.

2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.5 METAL SUSPENSION SYSTEMS

- A. Suspension Systems: Provide manufacturer's standard system complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635, Table 1, Direct Hung will be less than yield stress of wire, but provide not less than 0.135-inch-diameter wire.
 3. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

2.6 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop cut openings, to maximum extent possible, to receive other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.7 SHOP FINISHING

- A. General: Finish paneling at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Finish: Urethane Grade, Formaldehyde Free, Satin Clear sealers.

1. Grade: Same as item to be finished.
2. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition ceiling panels to average prevailing humidity conditions in installation areas.
- B. Before installation, examine shop-fabricated work for completion and complete work as required, including removal of packing.
- C. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wood grille ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical

- or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 8. Do not attach hangers to steel deck tabs.
 - 9. Attach hangers to structural members or bottom flutes of composite roof structure.
 - 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 - 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- D. Install wood grille panels and perimeter trim in coordination with suspension system.
- 1. Install ceiling level, true, and straight with no distortions. Install level and to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/8 inch in 96-inch horizontal variation from a true plane.
 - 2. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 - 3. Install sound-absorbent fabric layers in areas indicated. Lay fabric directly on ceiling system and close major openings to form complete coverage in required areas.
- E. Install hold-down clips where indicated

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective ceiling panels, where possible, to eliminate defects. Where not possible to repair, replace panels. Adjust for uniform appearance.
- B. Clean panels on exposed surfaces. Touch up shop-applied finishes to restore soiled areas.

END OF SECTION 09522

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09650 - RESILIENT
TILE 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 SECTION INCLUDES

- A. Resilient vinyl tile flooring.
- B. Static –dissipative vinyl composition flooring tile.
- C. Resilient base.

1.3 SUBMITTALS

- A. Submit manufacturer's product literature and samples under provisions of Section 01300 - Submittals.
- B. Include duplicate samples of flooring material, color and patterns.
- C. Submit manufacturer's printed installation instructions under provisions of Section 01300 - Submittals.
- D. Submit manufacturer's notarized certificate under provisions of Section 01300 - Submittals that products meet or exceed specified requirements.

1.4 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's maintenance instructions under provisions of Section 01700 - Contract Closeout.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in vinyl resilient flooring with five years experience.
- B. Applicator: Company specializing in installation of vinyl resilient flooring with three years documented experience.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver resilient vinyl tile and accessories to the project site in original factory containers, each carton clearly marked as to manufacturer, pattern, size, gauge, and lot number.
- B. Deliver adhesive to be used for resilient vinyl tile and accessories to the project site in original factory containers, each container clearly marked as to manufacturer.
- C. Store materials to prevent damage.

1.7 PROJECT CONDITIONS

- A. Maintain minimum 70 degrees F air temperature at flooring installation area for three days prior to, during and for 48 hours after installation.
- B. Store flooring materials in area of application. Allow three days for materials to reach equal temperature as area.
- C. Prevent exposure to installation to excessive heat or direct sunlight until adhesive has attained final set.

1.8 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.9 WARRANTY

- A. Provide manufacturer's warranty under provisions of Section 01740 Warranties.
- B. Warranty: Include one year warranty that products are free from defects in materials and workmanship.

1.10 EXTRA MATERIALS

- A. Section 01700 - Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Mannington
 - 2. Armstrong
 - 3. Johnsonite
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 MATERIALS - BASE

- A. As specified in Section 09678 - Resilient Base and Accessories.

2.3 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that concrete subfloors on or below grade are installed over a suitable moisture retardant membrane.
- B. Ensure concrete floors are dry and exhibit neutral alkalinity, carbonization, or dusting. Maximum Moisture Emission: Three lb./1,000 sq ft/24 hours.
- C. Ensure floor surfaces are smooth and flat with maximum variation of 1/8 inch in 10 feet.
- D. Ensure floor surfaces are clean and free from dust, paint, oil, grease, curing agents, parting compounds, surface hardeners, sealers, solvents, old adhesives, and other extraneous substances.
- E. Ensure contact wall surfaces to 1/2 inch below top of base are clean and free from dirt, paint, oil, grease, wall covering, old adhesives, and other extraneous substances.
- F. Beginning of installation means acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Remove subfloor ridges and humps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Clean floor; apply, trowel, and float filler to leave smooth, flat, hard surface. Prohibit traffic until filler is cured.

3.3 INSTALLATION - FLOORING

- A. Install flooring in accordance with manufacturer's printed instructions.
- B. Use adhesive recommended by floor tile manufacturer.
- C. Clean substrate. Spread adhesive evenly in quantity recommended by flooring material manufacturer to ensure adhesion over entire area of installation. Use recommended notched trowel.
- D. Set flooring in place, roll and cross roll with 150 lb. sectional roller while adhesive is still wet to ensure full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- F. Terminate resilient flooring at center line of door openings where adjacent floor finish is dissimilar.

- G. Install reducer strips at unprotected or exposed edges where flooring terminates.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Continue flooring through areas to receiver moveable type partitions without interrupting floor pattern.

3.4 INSTALLATION - BASE

- A. As specified in Section 09678 - Resilient Base and Accessories.

3.5 PROTECTION

- A. Prohibit traffic on finished floor for 48 hours after installation.

3.6 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage, while adhesive is still wet.
- B. Clean floor and base surfaces in accordance with manufacturer's instructions.

3.7 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09650

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09672 – ACRYLIC FLAKE
FLOOR COATINGS**

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 SECTION INCLUDES

- A. Sikafloor® 207 primer
- B. Sikafloor® 510 Polyaspartic base coat binder
- C. Sikafloor® 510 Polyaspartic sealer topcoat

1.3 REFERENCES

- A. ASTM C 307 - Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
- B. ASTM C 413 - Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing.
- C. ASTM C 579 - Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- D. ASTM D 696 - Coefficient of Linear Thermal Expansion of Plastics.
- E. ASTM D-790 – Flexural Strength/Flexural Modulus of Elasticity
- F. ASTM D-1644 – Determination of Solids Content
- G. ASTM D-1044 – Abrasion Resistance by Tabor Abrasor
- H. ASTM D 2240 - Rubber Property - Durometer Hardness.
- I. ASTM D 4258 - Surface Cleaning Concrete for Coating.
- J. ASTM D 4259 - Abrading Concrete.
- K. ICRI Guideline 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays

1.4 SUBMITTALS

- A. Comply with Section 01300 - Submittals.
- B. Product Data: Submit manufacturer's product data, including physical properties and colors available.
- C. Manufacturer: Submit Manufacturer's current ISO 9001 Certificate of Registration.
- D. Product Samples: Submit Architectural Standard samples representative of the final finish, as applied. The Standard shall be approved in writing by the Architect and shall be the final standard of acceptance of the finish.
- E. Maintenance Instructions: Submit manufacturer's maintenance instructions, including maintenance procedures and materials, procedures for stain removal and surface repair, and recommended schedule for cleaning.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Applicator: Use applicator experienced in application of specified materials for a minimum of 5 Five years on projects of similar size and complexity. Provide list of completed projects including project name and location, name of architect, name of material manufacturer, and approximate quantity of materials applied.
 - 2. Applicator's Personnel: Employ only persons trained for application of specified materials.
- B. Pre-application Meeting: Convene a pre-application meeting 2 Two weeks before start of application of floor coating. Require attendance of parties directly affecting work of this section, including Contractor, Architect, applicator, and manufacturer's representative. Review surface preparation, priming, application, curing, protection, and coordination with other work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture. Do not store in direct sunlight or high heat conditions.

- B. Storage:
 - 1. Store materials in accordance with manufacturer's instructions.
 - 2. Keep containers sealed until ready for use.
 - 3. Do not subject material to excessive heat or freezing; do not apply material that has been subjected to excessive heat or freezing. Material subjected to excessive heat or freezing shall be separated from inventory and destroyed by mixing all three components. The solid reacted product shall be disposed of in environmentally sound and regulatory compliant manner.
 - 4. Shelf life: One [1] year after date of manufacture, in unopened containers, under normal conditions.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.
- D. Condition materials for use to 70°F – 80°F for 24 hours prior to application.

1.7 SITE CONDITIONS

- A. Do not apply materials if floor or air temperature is below 65°F.
- B. Do not apply materials if relative humidity is above 85 percent or within 5° of dew point at time of application.
- C. Utilities, including electric, water, heat and finished lighting to be supplied by General Contractor
- D. Maintain room temperature between 65° - 85° for 48 hours before, during and 48 hours after installation, or until cured.
- E. At the time of application ensure the minimum substrate temperature is above 65°F (18°C) and the substrate temperature is 5°F (3°C) above the measured dew point at the time of application.
- F. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.
- G. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.8 WARRANTY

- A. Provide a warranty covering materials and workmanship for a period of ONE [1] year after date of installation.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Available Manufacturers: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Sika Flooring
 - 2. BASF Building Systems
 - 3. Dura- Flex Inc.
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 MATERIALS

- A. Sikafloor® 207 epoxy binder/coating.
 - 1. Description: Two-component, 100% solids, low VOC epoxy coating.
 - 2. VOC content: ASTM D-2369-07, less than 22 g/l VOC
 - 3. Compressive Strength: ASTM C 597: 10,400 psi (77.1 MPa)
 - 4. Tensile Strength: ASTM C 307, 6400 psi (44.1 MPa)
 - 5. Hardness: ASTM D 2240, Shore D: 80 - 84
 - 6. Impact Resistance (ASTM D-2794 – 160 in-lbs. (8.1 N-m)
 - 7. Slip Resistance - Equivalent to ASTM D-2047 Passes
 - 8. Bond Strength: >400 psi (2.76 MPa) (100%
- B. Sikafloor® 510: Two-component, clear, solvent-free, high solids, low-viscosity, high strength, polyaspartic resin system. Finished applied nominal thickness of 3/32 (2.3 mm)
 - 1. Density (ASTM C-905) - 1.08
 - 2. Tensile Strength (ASTM C-307) 6,500 psi
 - 3. Elongation (ASTM D 638) 10%
 - 4. Bond Strength (ASTM D-1583) 500 psi (3.5 MPa) (substrate failure)
 - 5. Hardness, Shore D (ASTM D-2240) 75
 - 6. Coefficient of Friction (ASTM D-1894-61T)
- C. Primer. Apply primer coat at 6 – 8 mils WFT (200 - 265 sq. feet per gallon)
 - 1. Allow to cure fully before application of base coat.

- D. Base coat: Apply base coat at 12 - 15 mils WFT
 - 1. Broadcast color vinyl chip to excess in wet film.
 - 2. Sweep and vacuum excess chips after cure.
 - 3. Color: Sikafloor® Vinyl Flake Color Blend as Specified
 - 4. [Refer to appropriate Sikafloor® quartz color blend chart]
- E. Sealer coat: Apply sealer coat at 14 -16mils WFT
 - 1. Optional: Apply second sealer coat to achieve surface texture as approved by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive epoxy flooring system. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.
- B. Conduct quantitative anhydrous calcium chloride testing in accordance with ASTM-F1869. Maximum acceptable test result is 3 pounds per 1,000 ft² per 24 hours. If in excess of stated value, use Sikafloor EpoCem 81/82 or Sikafloor Vapor Block.
- C. Do not apply epoxy flooring system to concrete less than 60 days old. Consult Technical Service prior to application when concrete has not cured for 60 days.
- D. Do not apply epoxy flooring system to sand-cement setting beds, regardless of condition. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.
- E. Do not apply to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.
- F. Application to glazed or vitrified brick and tile, structural wood, steel shall be approved only with the Manufacturer's written recommendation

3.2 SURFACE PREPARATION

- A. Prepare concrete surfaces in accordance with manufacturer's instructions and ASTM D 4258.

- B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants.
- C. Remove sealers, finishes, and paints.
- D. Remove unsound concrete by scarifying, sand blasting, shot blasting, or high pressure water blasting.
- E. Chemical Surface Preparation:
 - 1. Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer's warranty.
- F. Mechanical Surface Preparation:
 - 1. Mechanically abrade concrete surface in accordance with manufacturer's instructions.
 - 2. Leave concrete surface with an aggressive texture.
 - 3. Remove concrete dust.
 - 4. Conform to ASTM D-4259.
 - 5. Surface profile shall conform to IRCI Guideline 03732 CSP 3, minimum

3.3 CONTROL JOINTS, CRACKS

- A. Provide repair and treatment of control joints and surface cracks utilizing manufacturer's standard materials and installation details.

3.4 APPLICATION

- A. Repair concrete substrate as required using SikaQuick® 1000 cementitious repair/resurfacer in accordance with Manufacturer's instructions.
- B. Do not add thinners to materials. No thinners shall be approved or allowed.
- C. For coverage rates, consult data sheet for epoxy flooring system
- D. Finish surface to be smooth, with uniform texture, free of surface defects, and without porous areas.
- E. Follow Manufacturer's recommendations on terminations and connections to walls, drains, doorways, columns and floor-to-floor transitions.

3.5 CLEANUP

- A. Remove masking, draping, and other protection from adjacent surfaces.

- B. Remove remaining materials and debris from job site and dispose of them in accordance with local rules and regulations. Leave area in clean condition free of debris.

3.6 PROTECTION

- A. Protect epoxy flooring system floor resurfacer during curing from traffic and chemical spillage. Based on air temperature of 73°F/23°C
 1. Foot Traffic (final coat): 6 - 8 hours.
 2. Medium Wheeled Loads: 1 day.

3.7 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09672

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09678 - RESILIENT
BASE & ACCESSORIES**

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 SECTION INCLUDES

- A. Resilient base.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Product Data: Provide data on specified products, describing physical characteristics; sizes, patterns and colors available.
- C. Submit samples of base material.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01631 – Products and Substitutions.
- B. Protect materials from damage.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.

- b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.7 EXTRA MATERIALS

- A. Section 01700 - Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Johnsonite
 - 2. Roppe
 - 3. Mannington
 - 4. Armstrong Flooring
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 MATERIALS

- A. Resilient base at **carpet areas** to be **flat base**.
- B. Resilient base at **hard surface floors** to be **coved base**
- C. Adhesive: As recommended by the base manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION - BASE

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.2 CLEANING

- A. Clean work under provisions of 01710 – Cleaning Up.
- B. Remove access adhesive from base, and wall surfaces without damage.

3.3 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09678

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09680 - SHEET
CARPET**

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 SECTION INCLUDES

- A. Surface preparation.
- B. Commercial carpet system on floor surfaces.
- C. Accessories.

1.3 REFERENCES

- A. ASTM E-84 - Standard Test Method for Surface Burning Characteristics of Building Materials (tunnel test).
- B. HUD/FHA UM-44d - Standards for Carpet and Carpet Certification Program.

1.4 SUBMITTALS

- A. Submit manufacturer's certification that the commercial carpet meets or exceeds all codes and traffic ratings for the intended application.
- B. Submit manufacturer's installation instructions under provisions of Section 01300 - Submittals.
- C. Submit shop drawings that indicate seaming plan, method of joining seams, and direction of carpet under provisions of Section 01300 - Submittals.

1.5 OPERATION AND MAINTENANCE

- A. Submit operation and maintenance data under provisions of Section 01700 – Contract Closeout. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.6 QUALITY ASSURANCE

- A. Manufacturer's quality assurance test results shall be available for inspection and evaluation.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Store materials a minimum of one day prior to installation in area of installation to achieve temperature stability.
- B. Keep materials dry during delivery and storage.

1.8 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.9 WARRANTY

- A. Submit manufacturer's warranties under provisions of Section 01740. List exclusions and details of the extent of coverage.

1.10 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply two percent (2%) of each size, color, and surface finish specified.

PART 2 - PRODUCTS

2.1 CARPET MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Masland
 - 2. Bentley Prince Street
 - 3. Shaw Contract Group
 - 4. Atlas
 - 5. Milliken Contract
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.
- E. Special Product Requirements: Recommended R-Value of sheet carpet (including backing/ pad) to be no greater than 2.00 sq ft-F/Btuh. Documentation of this requirement must be included with submittal.

2.2 ADHESIVE MANUFACTURERS

- A. Acceptable adhesive manufacturer's:
 - 1. Advanced Adhesive Tech. (AAT)
 - 2. Adhesive Industry MFG. Co. (AIM)
 - 3. The W.W. Henry Co.
 - 4. Para-Chem Southern
 - 5. XL, Corp.

2.3 ACCESSORIES

- A. Base: As specified in Section 09678 – Resilient Base & Accessories.

PART 3 - EXECUTION

3.1 CARPET - CUTTING AND SEAMING

- A. When more than one width of carpet is required, precut the carpet to the proper length allowing flash up at walls and through doorway.
- B. Position first two pieces of carpet, and cut seam by row cutting and trace cutting to it for the second piece in a manner that will produce a tight,

uniform seam requiring only minimal amount of adjusting with a knee kicker.

- C. If row cutting the carpet for seaming is impractical, use a chalkline the entire length to mark your cut on the secondary backing side of both pieces of carpet to be seamed. Then proceed with the aid of a straight edge in cutting the carpet to produce a tight, uniform seam.
- D. The preferred method of seaming the carpet is with a non-releasable backed low profile hot melt seaming tape, before application of adhesive to cushion.
- E. If the carpet seams are of the length which makes it impractical to apply hot melt seaming tape before the application of adhesive to the cushion, it can be inserted after the first width of carpet is folded back into the adhesive.
- F. It is recognized that some boarder and inset work can not be easily seamed with hot melt tape. In which case all seams must be carefully sealed with a carpet seam sealer adhesive/cement.
- G. Apply an approved manufacturer's premium soft-set permanent adhesive to the surface of the cushion according to their current guidelines, paying close attention to coverage rates and open times.
- H. Finish wall trim, door jambs, etc. and repeat the proceeding steps for additional widths of carpet.
- I. Roll the completed carpet installation with a light roller, or use a carpet tube to help bed the carpet and push out any vapor bubbles.
- J. Install cove base in accordance with the manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.

3.3 CLEANING

- A. Clean and vacuum carpet surfaces.

3.4 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09680

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09685 - CARPET
TILE**

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 carpet tile, fully adhered carpet for direct-glued installation and accessories.

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM D2859 - Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
- B. Carpet and Rug Institute:
 - 1. CRI 104 - Standard for Installation of Commercial Carpet.
- C. National Fire Protection Association:
 - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Heat Energy Source.

1.4 SUBMITTALS

- A. Section 01300 - Submittals: Submittal procedures.
- B. Shop Drawings: Indicate layout of joints, direction of carpet pile, and location of edge moldings.
- C. Product Data: Submit data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples:
 - 1. Submit two carpet tiles illustrating color and pattern design for each carpet color selected. Matching roll carpet samples.

- E. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01700 – Contract Closeout: Closeout procedures.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01631 – Products and Substitutions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01631 – Products and Substitutions.
- B. Store materials in area of installation for 48 hours prior to installation.

1.10 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply 20 carpet tiles of each color and pattern selected or 2% extra materials (whichever is the greater quantity).

PART 2 - PRODUCTS

2.1 CARPET MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Masland Contract
 - 2. Milliken Contract
 - 3. Shaw Contract
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.
- E. Special Product Requirements: Recommended R-Value of carpet tile (including backing/pad) to be no greater than 2.00 sq ft-F/Btuh. Documentation of this requirement must be included with submittal.

2.2 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by flooring material manufacturer.
- B. Contact Adhesive: Recommended by carpet manufacturer.
- C. Base: As specified in Section 09678 – Resilient Base & Accessories.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Section 01040 - Coordination: Coordination and project conditions.
- B. Verify floor surfaces are smooth and flat within tolerances and are ready to receive work.

3.2 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Clean substrate.

3.3 INSTALLATION

- A. Install carpet tile in accordance with CRI 104.
- B. Do not mix carpet from different cartons unless from same dye lot.
- C. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- D. Install carpet tile in square pattern, with pile direction parallel or alternating to next unit as directed by the Architect, set parallel to building lines.
- E. Locate change of color or pattern between rooms under door centerline.
- F. Fully adhere carpet tile to substrate.
- G. Adhere carpet tile with self-stick adhesive backing by removing protective membrane and pressing tile back onto clean and dry substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

- A. Section 01710 – Clean Up: Final cleaning.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean and vacuum carpet surfaces.

3.5 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09685

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 09720 - WALL
COVERING**

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 SCOPE

- A. Provide wallcovering as shown and specified and in accordance with the Contract Documents.

1.3 SUBMITTALS

- A. Samples: Submit sample of each type and color to be installed for the Architect's approval.
- B. Certification of Compliance: Submit certificate from manufacturer that wallcovering used meets architectural specification requirements.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in manufacturer's cartons, properly labeled and identified.
- B. Store wallcovering in undamaged condition as packaged by manufacturer.
- C. Take care to prevent damage during delivery, handling and storage.
- D. Store all materials flat in a clean, dry storage area where temperature shall be maintained above 40 degrees F with normal humidity. Do not store materials in an upright position.

1.5 JOB CONDITIONS

- A. Areas to receive wallcovering shall have a constant temperature of at least 55 degrees F for three days before and all during application period.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.

- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.7 GENERAL WARRANTY

- A. All products shall be guaranteed against manufacturing defects for a period of five years. If defects become evident during this period, manufacturer shall replace and assume installation cost.

1.8 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. MDC Wall coverings
 - 2. Maharam
 - 3. Wolf Gordin
 - 4. Designtex
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide

either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 ACCESSORIES

- A. Adhesive: As recommended by manufacturer with mildewcide.
- B. Primer: As recommended by manufacturer.
- C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall covering manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine all surfaces to receive wallcovering before beginning work to determine that they are sound, dry, clean and ready to receive final finish.
- B. Correct defects that could affect quality of finished work.
- C. Plaster and masonry surfaces shall not contain more than 5.5 percent moisture.
- D. Starting wallcovering work shall be construed as evidence of acceptance of conditions under which work will be done.

3.2 SURFACE PREPARATION

- A. Remove all loose paint and other wallcoverings.
- B. For new drywall construction, a coat of Genon Wall Prep shall be applied to the surface before application of wallcovering, for ease of subsequent removal.
- C. Glossy surfaces shall either be sanded to dull the surface or an application of Genon Right Arm Primer shall be applied prior to the installation of wallcovering.
- D. Remove mildew from walls and treat surface to inhibit further mildew growth.
- E. Surfaces which are in question as to condition shall have three test strips installed to ascertain any remedial work to be performed.
- F. Gypsum wallboard shall have all nails and screws recessed with all joints and depressions taped and spackled, sanded and primed with one coat of primer.

3.3 INSTALLATION

- A. Follow manufacturer's directions for mixing and applying adhesive and primer.
- B. Before cutting, examine pattern and color and determine that they match approved samples. Examine patterned material for repeat in design.
- C. Mix paste thoroughly. Apply paste on back of material with brush or roller in a thin, even coat over entire panel.
- D. Use panels in exact order as they are cut from roll.
- E. Trim on selvage of each panel deep enough to ensure color conformity using a straight edge on a cutting table or use the wall cutting procedures (without scoring the substrate) acceptable to the Architect.
- F. Install panels on the hanging surface, reversing every other panel of non-match patterns unless otherwise instructed by the manufacturer.
- G. Fill in over doors and windows with panels cut in consecutive order from the roll.
- H. Smooth fabric to hanging surface with stiff-bristled sweep brush or a flexible broad-knife to eliminate air bubbles and ensure adhesion.
- I. Vertical joints shall not occur less than six inches from outside or inside corners.
- J. Where applicable, install wallcovering before installation of plumbing, casing, bases, cabinets, etc.
- K. Remove excess paste from seam before making next seam. Use sponge or cloth dampened with clean water; wipe clean with dry towel.
- L. Any variation in color and/or pattern match shall be immediately communicated to the manufacturer's representative for his inspection before proceeding further with installation.

3.4 CLEAN-UP

- A. Upon completion of the work, remove surplus materials, rubbish and debris resulting from the operations under this Section, including equipment and implements of service and leave the entire structure and site insofar as the work of this Section is concerned in a neat, clean and acceptable condition.

3.5 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 09720

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
 - 1. Surface preparation, and finish coats specified in this section are in addition to surface treatment specified under other sections. This contractor to clean and prep for finish coats; only finish coats included in
 - 2. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.
 - 1. Painting includes field-painting exposed bare and concealed pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- C. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, miscellaneous metals, hollow metal doors and frames and similar items.
- D. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
 - 1. Prefinished or factory-finished items not to be painted include (but are not limited to) acoustic materials, architectural woodwork and casework, elevator entrance doors and frames, finished mechanical and electrical equipment, light fixtures, switchgear, and distribution cabinets.
 - 2. Concealed surfaces not to be painted include wall or ceiling surfaces in generally inaccessible areas such as furred areas, elevator shafts and pipe spaces.
 - a. Finished metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and brass are not to be painted, unless otherwise indicated.
 - 3. Operating parts not to be painted include moving parts of operating equipment, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, and sprinkler heads.

4. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 ACTION SUBMITTALS

- A. Product data for each paint system specified, including block fillers and primers.
 1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
 2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
 3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. LEED Submittals:
 1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
- 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 (200 mm) 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.
- D. Manufacturer's Instructions: Submit manufacturer's instructions including technical data sheets, material safety data sheets, mixing instructions, application requirements, special procedures, and conditions requiring special attention.
- E. 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.
- F. Mock-Ups: Prior to application of the exterior work, prepare a mock-up for the finish and application required to verify selection made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Prepare mock-up to comply with the following requirements, using materials indicated for final unit of work. Locate mock-ups on site in location as directed by the Architect. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work. Obtain the Architect's acceptance of mock-up before start of final unit of work.
 1. Retain and maintain mock-up during construction in undisturbed condition as a standard for judging completed unit of work.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.
- B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the 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.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.5 JOB CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of the following:
1. Benjamin Moore and Co.
 2. Edison Coatings, Inc.
 3. Glidden Professional division of Azko Nobel Paints, LLC.
 4. Keim Mineral Coatings of America, Inc.
 5. M.A.B. Paints.
 6. Pratt & Lambert.
 7. Sherwin-Williams Company.
 8. Silicote USA LLC.

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility:
1. Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the 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.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- C. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.
- D. Colors: Provide color selections made by the Architect from the manufacturer's full range of standard colors.
- E. No lead or mercury is permitted in any coating used on this project.

2.4 PRIMERS

- A. Primers: Provide the manufacturer's recommended factory-formulated coating material that is compatible with the other specified system components indicated in the painting schedules included at the end of this specification section.

2.3 UNDERCOAT MATERIALS

- A. Undercoat Materials: Provide the manufacturer's recommended factory-formulated coating material that is compatible with the other specified system components indicated in the painting schedules included at the end of this specification section.

2.4 FINISH PAINT MATERIAL

- A. Finish Paint: Provide the manufacturer's recommended factory-formulated coating material that is equivalent to the specified finish paint material indicated in the painting schedules included at the end of this specification section.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Notify Owner and Architect in writing of conditions detrimental to proper and timely completion of the work. Surfaces receiving paint must be thoroughly dry before paint is applied.
 1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

- C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
 2. Cementitious Materials: Prepare concrete, concrete block and cement plaster surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 3. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated and previously painted metal surfaces; remove oil, grease, dirt, loose mill scale, rust and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).
 - a. Blast steel surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
 - d. On previously painted surfaces, remove existing paint and smooth edges sufficient to obtain a uniform surface upon repainting.
 4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue. Store materials not in actual use in tightly covered containers.
 2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
 3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 1. Paint colors, surface treatments, and finishes are to match or blend with existing adjacent surfaces.
 - 2. Provide finish coats that are compatible with primers used.
 - 3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
 - 4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
 - 5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convactor covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 - 6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
 - 8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
 - 10. Sand lightly between each succeeding enamel or varnish coat.
 - 11. Omit primer on metal surfaces that have been shop-primed and touch-up painted, unless otherwise indicated.
- C. 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. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.
 - 1. Brushes: Use brushes best suited for the material applied.
 - 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

PAINTING

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- E. Minimum Coating Thickness: Apply materials no thinner than the manufacturers recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- F. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces.
- G. Mechanical items to be painted include, but are not limited to, the following:
 1. Piping, pipe hangers, and supports, including exposed, uninsulated piping.
 2. Heat exchangers.
 3. Tanks.
 4. Ductwork.
 5. Insulation.
 6. Supports.
 7. Motors and mechanical equipment.
 8. Accessory items.
- H. Electrical items to be painted include, but are not limited to, the following:
 1. Conduit and fittings.
 2. Switchgear (if not factory finished).
- I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 CLEANING

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

- A. General: Provide the following paint systems for the various substrates indicated.
- B. Concrete: System based on the products of Keim Mineral Coatings of America, Inc.
 - 1. Concrete Cleaner: Silicic acid based cleaner diluted with water. Basis of Design: "KEIM Concrete Cleaner".
 - 2. Water Repellent: Solvent-free silane based water repellent with 100% active ingredients. Basis of Design: "KEIM Silan 100".
 - 3. Silicate Stain, Base Coat: Sol silicate based mineral stain with less than 1g/l VOC. ASTM E 96 Vapor Permeability – 77 perms, ASTM G 154 Accelerated Weathering – no fading, cracking, peeling, ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration. Basis of Design: "KEIM Concretal Lasur".
 - 4. Silicate Stain, Top Coat: Sol silicate based mineral stain with less than 1g/l VOC. ASTM E 96 Vapor Permeability – 77 perms, ASTM G 154 Accelerated Weathering – no fading, cracking, peeling, ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration. Basis of Design: "KEIM Concretal Lasur".
 - 5. Dilution for Silicate Stain: Sol silicate dilution designed for the sol silicate stain system. Less than 1g/l VOC. Basis of Design: "KEIM Concretal Dilution"

3.7 INTERIOR PAINT SCHEDULE

- A. General: Provide the following paint systems for the various substrates, as indicated.
- B. Gypsum Drywall Partitions: System based on the products of Glidden Professional Division of Azko Nobel Paints.
 - 1. Satin / Eggshell Acrylic Latex: Latex primer and two satin / eggshell latex based acrylic enamel finish coats.
 - a. Primer: 1030 ULTRA-HIDE PVA Interior Primer Sealer.
 - b. Finish: 1412 ULTRA-HIDE Acrylic Latex Eggshell Enamel.
 - c. Gloss Range: Satin / Eggshell finish shall have gloss range of 20-30 percent specular light reflection when tested in accordance with ASTM D523. Designation may be satin with some manufacturers.
 - 2. Epoxy Coating: Primer and two gloss epoxy polyamide finish coats.

- a. Primer: 3210 ULTRA-HIDE Aquacrylic GRIPPER Stain Killer Primer Sealer.
 - b. Finish: 4508 TRU-GLAZE Epoxy Polyamide Gloss Epoxy.
- C. Concrete Masonry: System based on the products of Glidden Professional Division of Azko Nobel Paints.
 - 1. Satin / Eggshell Acrylic Latex: Acrylic latex filler coat and two satin / eggshell latex based acrylic enamel finish coats.
 - a. Filler: 3010 ULTRA-HIDE Acrylic Latex Block Filler.
 - b. Finish: 1412 ULTRA-HIDE Acrylic Latex Eggshell Enamel.
 - 2. Epoxy Coating: 100% acrylic block filler and two gloss epoxy polyamide finish coats.
 - a. Filler: 4000 BLOXFIL Heavy Duty Acrylic Block Filler.
 - b. Finish: 4508 TRU-GLAZE Epoxy Polyamide Gloss Epoxy.
- D. Concrete: System based on the products of Keim Mineral Coatings of America, Inc.
 - 1. Concrete Cleaner: Silicic acid based cleaner diluted with water. Basis of Design: "KEIM Concrete Cleaner".
 - 2. Water Repellent: Solvent-free silane based water repellent with 100% active ingredients. Basis of Design: "KEIM Silan 100".
 - 3. Silicate Stain, Base Coat: Sol silicate based mineral stain with less than 1g/l VOC. ASTM E 96 Vapor Permeability – 77 perms, ASTM G 154 Accelerated Weathering – no fading, cracking, peeling, ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration. Basis of Design: "KEIM Concretal Lasur".
 - 4. Silicate Stain, Top Coat: Sol silicate based mineral stain with less than 1g/l VOC. ASTM E 96 Vapor Permeability – 77 perms, ASTM G 154 Accelerated Weathering – no fading, cracking, peeling, ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration. Basis of Design: "KEIM Concretal Lasur".
 - 5. Dilution for Silicate Stain: Sol silicate dilution designed for the sol silicate stain system. Less than 1g/l VOC. Basis of Design: "KEIM Concretal Dilution"
- E. Steel, Galvanized or Non-galvanized:
 - 1. Primer coat - recommended by the finish coat manufacturer.
 - 2. Second and third coats – semi-gloss latex paint, 100% acrylic, non-blocking, pencil hardness of H or harder per ASTM D 3363:
 - a. "Pitt-Tech 474 Series" (PPG)
 - b. "M29 DTM" (Moore)
 - c. "Pro Classic Waterborne B31 Series" (S-W)
- F. Aluminum:
 - 1. Primer coat - recommended by the finish coat manufacturer.

2. Second and third coats – flat latex paint, 100% acrylic, non-blocking, pencil hardness of H or harder per ASTM D 3363:
 - a. “Pitt-Tech 712 Series” (PPG)
 - b. “M29 DTM” (Moore)
 - c. “Pro Classic Waterborne B31 Series” (S-W)

END OF SECTION 09900

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 10110
DISPLAY CASES**

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: Recessed Display Cases.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - 2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

1.4 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit product data and installation instructions.
- C. Shop Drawings: Submit shop drawings for each type of display case required, showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.
- D. Samples: Submit selection and verification samples of face, core, backing material and trim for finishes, colors and textures. Submit manufacturer's color charts.
- E. Quality Assurance/Control Submittals: Submit the following:
 - 1. Certificates: Product certificates signed by manufacturer certifying materials comply with specifications.
- F. Closeout Submittals: Submit the following:
 - 1. Operation and Maintenance Data: Submit operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced in performing work of this section.
- B. Regulatory Requirements: Conform to applicable code for flame/smoke rating in fabric panels in accordance with ASTM E84.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Deliver materials wrapped in moving blankets and/or corrugated product and secured to freight trailer with straps to ensure minimal movement
- C. Deliver factory built units completely assembled in 1 piece without joints whenever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable at the factory, disassemble for delivery, and make final joints at the jobsite.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- E. After opening and inspecting boards for damage, return them to their original crates or cartons for storage and do not uncrate until boards are to be installed.
 - 1. When uncrated, do not allow units to lean at an angle against a wall or other objects for any length of time.
 - 2. Store units in as close to a vertical position as possible.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with manufacturer's recommendations for stabilizing area to the approximate normal occupied conditions of interior temperature and humidity.
- B. Existing Conditions:
 - 1. Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
 - 2. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Poblocki Sign Co
 - 2. Helmut Guenschel
 - 3. Marsh Industries
 - 4. Nelson- Harkins Industries
 - 5. Platinum Visual Systems Inc.
- C. Substitutions: Under provisions of Section 01631.

2.2 DISPLAY CASE PRODUCTS

- 1. Recessed Wall Display Cases w/ hinged glass doors
 - a. Case shall have operable locking hinged glass doors with 15/16" thick regular float tempered safety glass with painted or clear anodized aluminum with metal upper and lower holding rails. Frameless glass construction with non intermediate vertical support. Structural component shall not be visible, fasteners shall be concealed and locking is provided by means of 5-pin tumbler cylindrical locks.
 - b. Metal case finish is factory primed and painted with two component polyurethane or clear anodized aluminum.
 - c. Case includes painted or clear anodized metal exterior trim and painted 3/4" thick backs, sides and removable display decks, with removable 1/2" thick interior panels wrapped in manufactures standard linen fabric (color to be selected).
 - d. Three (3) 1/4" thick tempered regular float glass shelves behind each door mounted on concealed standards with brackets.
 - e. Case ceiling consists of painted 3/4" thick removable ceiling panels with LED flush mounted puck lights (quantity as required to adequately illuminate case) prewired to one (1) transformer.
 - f. Size: As indicated on Drawings

2.3 PRODUCT SUBSTITUTIONS

- A. Substitutions: Under provisions of Section 01631.

2.4 FABRICATION

- A. Shop Assembly: Provide factory assembled Display Cases.

2.5 SOURCE QUALITY

- A. Source Quality: Obtain materials from a single manufacturer.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. Verify that interior temperature and humidity approximate normal conditions of building occupancy.
- C. Verify that wall surfaces are prepared and ready to receive units.

3.3 INSTALLATION

- A. Deliver Display Cases set up, made in One (1) piece.
- B. Follow manufacturer's instructions for storage and handling of units before installation.
- C. Install level and plumb, in accordance with manufacturer's recommendations.
- D. Site Tolerances: In accordance with manufacturer's standards.

3.4 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas.
- B. Repair or replace damaged installed products.
- C. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

- D. Remove construction debris from project site and legally dispose of debris.
- E. At completion of work, clean glass surfaces, back panels and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

3.5 PROTECTION

- A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 10155 – TOILET
COMPARTMENTS**

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 SECTION INCLUDES

- A. Metal toilet compartments, headrail braced.

1.3 REFERENCES

- A. ANSI A117.1 - Safety Standards for the Handicapped.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, and door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit three samples of partition panels, illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:

- a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
 - C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.
- 1.6 REGULATORY REQUIREMENTS
 - A. Conform to ANSI A117.1 code for access for the handicapped.
- 1.7 FIELD MEASUREMENTS
 - A. Verify that field measurements are as indicated on shop drawings.
- 1.8 COORDINATION
 - A. Coordinate work under provisions of Section 01300.

PART 2 PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
 - A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
 - B. Approved manufacturers:
 - 1. Accurate Partitions Corporation
 - 2. AAMCO (All American Metal Corp)
 - 3. American Sanitary Partition Corporation
 - 4. Ampco Products, Inc.
 - 5. Flush-Metal Partition Corp.
 - 6. Global Steel Products Corp.
 - 7. Hadrian Inc.
 - 8. Knickerbocker Partition Corporation
 - 9. Metpar Corp
 - 10. The Mills Company
 - 11. Monarch Toilet Partition, Inc.
 - 12. Partition Manufacturers of America, Inc.
 - 13. Sanymetal.
 - 14. Weis/Robert Partitions, Inc.
 - C. Substitutions: Under provisions of Section 01631.

2.2 MATERIALS

- A. All stainless steel toilet partitions shall be 40 Series, floor supported with headrail as manufactured by General Partitions Mfg. Corp., Erie, Pennsylvania.
- B. Panel — Double-Wall Construction — Shall be 1in. thick with two sheets of Stainless Steel, bonded together before attaching die drawn stainless steel molding on all four sides of panels. Mitered stainless steel reinforcements fused to corners for added structural strength. Filler shall be General's Ribcore sound-deadening insulation.
- C. Doors — To be same construction as panels. 40 Series — Pilasters — Shall be 1 1/4in. thick with two sheets of Stainless Steel, bonded before attaching die drawn stainless steel molding to sides. Same construction as panel.
- D. Pilasters are to be anchored to floor with heavy-gauge angle. Top of pilasters to be securely braced with extruded aluminum headrail with integral crown loafer rail.
- E. Headrail — To be 1 7/8in. x 1 5/32in. x 1/16in. with integral crown loafer rail, extruded aluminum heat-treated and anodized with necessary fittings.
- F. Hardware — Concealed latch (No. 2000D), coat hook (No. 6200D), hinge brackets (No. 1250D), and door stop keeper (No. 2060D) heavy cast non-ferrous alloy, chrome-plated. Concealed hinge (No. 1000D), works on opposing nylon cams under spring tension. Top pivot pin, mounted within door having bearing points above and below hinge bracket.
- G. Fittings — Wall connection brackets for panels and pilasters to be high strength heavy chrome plated. Pilaster trim to be 3in. high. .031 stainless steel. All hardware and fittings to be secured with vandal-proof sex bolts or No. 14 screws of proper lengths.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01300 - Submittals.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attached panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets with tamper proof through bolts and nuts. Locate head rail joints at pilaster center lines.
- E. Anchor urinal screen panels to walls with continuous panel brackets and vertical upright consisting of pilaster anchored to floor.
- F. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- G. Field touch-up of scratches or damaged finish will not be permitted.
- H. Replace damaged or scratched materials with new materials.

3.3 ERECTION TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- C. Adjust hinges to position doors in partially closed position when unlatched. Return out swinging doors to closed position.
- D. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10155

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 10262 - WALL
PROTECTION**

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 WORK INCLUDED

- A. Furnish and install complete Wall Protection systems.
- B. Full height stainless steel corner guards.

1.3 REFERENCES

- A. Publications listed herein are part of this specification to the extent referenced. The criteria established in the specifications shall take precedence over the standards referenced herein. (Sample reference standards are given below.)
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
 - b. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

1.4 SYSTEM DESCRIPTION

- A. Corner Guards shall be flush mounted. Flush-mounted corner guards shall be standard.
 - 1. P.V.C. covers shall be textured, high-impact snap on cover having a maximum nominal wall thickness of 0.078", and shall have an ASTM D-256 impact resistance of 27.9 ft/lbs. per inch-notch.
 - 2. P.V.C. covers shall have an ASTM E-84, U.L.-723 and NFPA 255 flame spread of less than 25, and shall be self-extinguishing in accordance with ASTM D-635.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Furnish assemblies from one (1) manufacturer with a minimum of ten (10) years of experience in the fabrication of wall protection systems.

- B. Installer: Firm with not less than three (3) years of successful experience in the installation of systems similar to those required by this project and acceptable to the manufacturer of the system.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.7 SUBMITTALS

- A. Submit manufacturer's specifications and technical data, including Material Safety Data Sheets, installation instructions, as required, and catalog cuts and templates where required to explain construction and to provide for incorporation into the project.
- B. Submit certificates, copies of specified independent test reports or research reports showing compliance with fire resistance rating, flame and smoke development requirements and other specified performance requirements.
- C. Submit shop drawings showing complete fabrication details for wall protection, including required anchorage to surrounding construction.
- D. Submit three (3) 6" samples of the specified system.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Provide temporary protective cover on finished surfaces.
- B. Deliver joint covers to job site in new, clean, unopened crates of sufficient size and strength to protect materials during transit.

- C. Store components in original containers in a clean, dry location.

1.9 WARRANTY

- A. Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than one (1) year when installed in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Construction Specialties Inc
 - 2. InPro Corporation
 - 3. Arden Architectural Specialties
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 MATERIALS

- A. P.V.C. shall be rigid, high-impact type. P.V.C. sheet shall be flexible.
- B. Aluminum shall be ASTM B 221, alloy 6061-T6 for extrusions ASTM B 209, alloy 6061-T6 for plate.
- C. Galvanized sheet shall be ASTM A 525, G90 steel
- D. Paint Grip Steel shall be phosphatized, sheet.
- E. Stainless Steel shall be ASTM A 666, type 304.
- F. Fasteners, accessories and other materials required for complete installation to manufacturer's instructions.

2.3 FABRICATION

- A. Fabricate corner guards and wall protection materials as detailed. Provide anchors and accessories necessary for complete installation. Mounting Brackets and End Returns shall be injected molded.
- B. Shop assemble components and package with anchors and fittings.
- C. Provide components in single lengths where possible; minimize site splicing.
 - 1. Corner guards shall be provided in 4'0", standard lengths.
 - 2. Wall protection materials shall be provided cut to length.

2.4 FINISHES

- A. Stainless Steel: shall be provided with a satin finish.
- B. Phosphatized Steel (Paintloc): shall be ready to paint.
- C. P.V.C. shall be provided with an embossed Finish. Color shall be as selected from manufacturer's standard colors.
- D. Aluminum shall be clear anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Install corner guards and wall protection in accordance with the governing regulations, the industry standards applicable to the work and the manufacturer's written installation instructions.
- B. Manufacturer shall provide location drawings identifying placement of materials, shall use a mark system for correlating materials to drawings.
- C. Work shall be aligned plumb, level, and, as required, flush with adjacent surfaces.
- D. Work shall be rigidly anchored to substrate.
 - 1. Fasteners for corner guard retainers shall be spaced as recommended by the manufacturer in the details and in the installation instructions and shall be installed using hardware suitable for the conditions, which shall be provided by the manufacturer.
 - 2. The P.V.C. corner guard covers shall be snapped into place.
 - 3. Retainers for P.V.C. handrails, and bumper and crash rails shall be installed using hardware suitable for the conditions, which shall be provided by the manufacturer.

4. Flush mount systems retainers shall fasten directly to the metal stud through the unexposed extruded aluminum retainer only. Fastening retainer through the outside flange and drywall shall not be acceptable.
5. The void between flush mount corner guards and the wall shall be filled with grout.
6. Installed fasteners for handrail mounting brackets and end returns shall be concealed.

3.2 ADJUSTING AND PROTECTION

- A. Inspect system components for proper fit.
- B. Adjust, repair or replace components not conforming to requirements. Repair or replacement of an individual unit shall be as approved by the Architect.
- C. Advise contractor of procedures required to protect installation from damage by work of other Sections.
- D. Finished units shall be without damage. Units damaged during shipping or construction shall be repaired by the contractor at the expense of the party damaging the material, in accordance with the contract requirements.

3.3 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF DOCUMENT 10262

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 10270 - ACCESS
FLOORING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Access-flooring panels.
 - 2. Understructure.
 - 3. Floor panel coverings.
- B. Related Requirements:
 - 1. Section 16060 "Grounding and Bonding" for connection to ground of access-flooring understructure.

1.3 COORDINATION

- A. Coordinate location of mechanical and electrical work in underfloor cavity to prevent interference with access-flooring pedestals.
- B. Mark pedestal locations on subfloor using a grid to enable mechanical and electrical work to proceed without interfering with access-flooring pedestals.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.3: For floor panel coverings, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
 - 2. Product Data for Credit IEQ 4.4: For particleboard used in steel-encapsulated, wood-core panels, documentation indicating that product contains no urea formaldehyde.

- C. Shop Drawings: Include layout of access-flooring system and relationship to adjoining Work based on field-verified dimensions.
 - 1. Details and sections with descriptive notes indicating materials, finishes, fasteners, typical and special edge conditions, accessories, and understructures.
- D. Samples for Initial Selection: For each type of product and exposed finish.
- E. Samples for Verification: For the following products:
 - 1. Floor Covering: Full-size units.
 - 2. Exposed Metal Accessories: Approximately 10 inches in length.
 - 3. One complete full-size floor panel, pedestal, and understructure unit for each type of access-flooring system required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of access-flooring system.
- C. Product Test Reports: For each type of flooring material and exposed finish, for tests performed by a qualified testing agency.
- D. Manufacturer's installation instructions.
- E. Manufacturer's recommended care and maintenance procedures.

1.6 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. Flooring Panels: 10 percent of total, minimum 5.
 - 2. Pedestals: 10 percent of total, minimum 5.
 - 3. Stringers: 10 percent of total, minimum 5.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 FIELD CONDITIONS

- A. Area to receive and store access floor materials shall be enclosed and maintained at ambient temperatures between 35° to 95° F and relative humidity levels between 20% to 80%:

- B. All floor panels shall be stored at ambient temperature between 50° to 90° F for at least 24 hours before installation begins.
- C. All areas of installation shall be enclosed and maintained at ambient temperature between 50° to 90° F and at relative humidity levels between 20% to 80%, and shall remain within these environmental limits throughout occupancy

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide access-flooring systems capable of complying with the following performance requirements according to testing procedures in CISCA's "Recommended Test Procedures for Access Floors":
 - 1. Concentrated Loads: 1000 lbf with the following deflection and permanent set:
 - a. Top-Surface Deflection: 0.10 inch.
 - b. Permanent Set: 0.010 inch.
 - 2. Ultimate Loads: 2000 lbf.
 - 3. Rolling Loads: With local or overall deformation not to exceed 0.040 inch.
 - a. CISCA Wheel 1: 10 passes at 800 lbf.
 - b. CISCA Wheel 2: 10,000 passes at 600 lbf.
 - 4. Stringer Load Test: 450 lbf at center of span with a permanent set not to exceed 0.010 inch.
 - 5. Pedestal Axial Load Test: 5000 lbf.
 - 6. Pedestal Overturning Moment Test: 1000 lbf x inches.
 - 7. Uniform Load Test: 350 lbf/sq. ft. with a maximum top-surface deflection not to exceed 0.040 inch and a permanent set not to exceed 0.010 inch.
 - 8. Drop Impact Load Test 150 lb.
- B. Fire Performance:
 - 1. 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: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Combustion Characteristics: ASTM E 136.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain access-flooring system from single source from single manufacturer.

2.3 FLOOR PANELS

- A. Floor Panels, General: Provide modular panels interchangeable with other field panels without disturbing adjacent panels or understructure.
 - 1. Size: Nominal 24 by 24 inches.
- B. Cementitious-Core Steel Panels: Fabricated from cold-rolled steel sheet, with the die-cut flat top sheet and die-formed and stiffened bottom pan welded together, and with metal surfaces protected against corrosion by manufacturer's standard factory-applied finish. Fully grout internal spaces of completed units with manufacturer's standard cementitious fill.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ASM Modular Systems, Inc.
 - b. Bergvik North America, Inc.
 - c. Camino Modular Systems, Inc.
 - d. Computer Environments, Inc.
 - e. Haworth, Inc.
 - f. Tate Access Floors, Inc.

2.4 UNDERSTRUCTURE

- A. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel.
 - 1. Base: Square or circular base with not less than 16 sq. in. of bearing area.
 - 2. Column: Of height required to bring finished floor to elevations indicated. Weld to base plate.
 - 3. Provide vibration-proof leveling mechanism for making and holding fine adjustments in height over a range of not less than 2 inches and for locking at a selected height, so deliberate action is required to change height setting and prevent vibratory displacement.
 - 4. Head: Designed to support the panel system indicated.
 - a. Provide sound-deadening pads or gaskets at contact points between heads and panels.
- B. Stringer Systems: Modular steel stringer systems designed to bolt to pedestal heads and form a grid pattern. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.

2.5 FABRICATION

A. Fabrication Tolerances:

1. Size: Plus or minus 0.020 inch of required size.
2. Squareness: Plus or minus 0.015 inch between diagonal measurements across top of panel.
3. Flatness: Plus or minus 0.035 inch, measured on a diagonal on top of panel.

B. Panel Markings: Clearly and permanently mark floor panels on their underside with panel type and concentrated-load rating.

C. Bolted Panels: Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.

D. Cutouts: Fabricate cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with structural performance requirements.

1. Number, Size, Shape, and Location: As indicated.
2. Grommets: Where indicated, fit cutouts with manufacturer's standard grommets; or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding with tapered top flange. Furnish removable covers for grommets.

2.6 ACCESSORIES

A. Service Outlets: Standard UL-listed and -labeled assemblies, for recessed mounting flush with top of floor panels; for power, communication, and signal services; and complying with the following requirements:

1. Structural Performance: Cover capable of supporting a 800-lbf concentrated load.
2. Cover and Box Type: Hinged polycarbonate cover with opening for passage of cables when cover is closed and including frame and steel box or formed-steel plate for mounting electrical receptacles.
3. Location: In center of panel quadrant unless otherwise indicated.
4. Receptacles and Wiring: Electrical receptacles and wiring for service outlets are specified elsewhere.

B. Steps: Provide steps of size and arrangement indicated with floor coverings to match access flooring. Apply nonslip aluminum nosings to treads unless otherwise indicated.

C. Railings: Standard extruded-aluminum railings at ramps and open-sided perimeter of access flooring where indicated. Include handrail, intermediate rails, posts, brackets, end caps, wall returns, wall and floor flanges, plates, and anchorages where required.

1. Provide railings that comply with structural performance requirements specified in Section 05521 "Pipe and Tube Railings.
- D. Panel Lifting Device: Panel manufacturer's standard portable lifting device for each type of panel required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris that might interfere with attachment of pedestals.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 6 inches.
- B. Locate each pedestal, complete any necessary subfloor preparation, and vacuum subfloor to remove dust, dirt, and construction debris before beginning installation.

3.3 INSTALLATION

- A. Install access-flooring system and accessories under supervision of access-flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.
- B. Mechanical Attachment of Pedestals: Attach pedestals to subfloor with post-installed mechanical anchors.
- C. Adjust pedestals to permit top of installed panels to be set flat, level, and to proper height.
- D. Stringer Systems: Secure stringers to pedestal heads according to access-flooring manufacturer's written instructions.
- E. Install flooring panels securely in place, properly seated with panel edges flush. Do not force panels into place.

- F. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than 1/8 inch where panels abut vertical surfaces.
 - 1. To prevent dusting, seal cut edges of steel-encapsulated, wood-core panels with sealer recommended in writing by panel manufacturer.
- G. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location or as required to prevent contamination of subfloor under already-installed access flooring.
- H. Grounded Flooring Access Panel Systems: Ground flooring system as recommended by manufacturer and as needed to comply with performance requirements for electrical resistance of floor coverings.
 - 1. Panel-to-Understructure Resistance: Not more than 10 ohms as measured without floor coverings.
- I. Underfloor Dividers: Scribe and install underfloor-cavity dividers to closely fit against subfloor surfaces, and seal with mastic.
- J. Closures: Scribe closures to closely fit against subfloor and adjacent finished-floor surfaces. Set in mastic and seal to maintain plenum effect within underfloor cavity.
- K. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area as installation of floor panels proceeds.
- L. Install access flooring without change in elevation between adjacent panels and within the following tolerances:
 - 1. Plus or minus 1/16 inch in any 10-foot distance.
 - 2. Plus or minus 1/8 inch from a level plane over entire access-flooring area.

3.4 PROTECTION

- A. After completing installation, vacuum access flooring and cover with continuous sheets of reinforced paper or plastic. Maintain protective covering until time of Substantial Completion.
- B. Replace access-flooring panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.

END OF SECTION 10270

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 10430 – PANEL SIGNAGE

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. Wayfinding Panel signs and associated supports and hangers.
- 2. Room-identification signs.
- 3. Regulatory signs

B. Related Requirements:

- 1. Section 01500 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
- 2. Section 06100 "Rough Carpentry" for blocking associated with wall mount signs.
- 3. Section 14240 "Hydraulic Elevators" and Section 14310 "Escalators" for code-required conveying equipment signage.
- 4. Section 15075 "Plumbing Identification" for labels, tags, and nameplates for plumbing systems and equipment.

- C. The Drawings show design intent and are not intended to cover every detail of materials, parts, construction, mounting or installation. Furnish all required engineering, materials, parts, construction, mounting, and installation necessary to complete the entire work, whether or not said details are shown or specified, at no additional cost to the Project.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 REFERENCES

- A. U.S. Access Board's "Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines".
- B. Federal Aviation Administration Advisory Circular 150/5360-12E "Airport Signing and Graphics".

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
- C. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Provide location plans for all signs.
 - 4. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size for room identification signs and one/eighth full size for way-finding panel signs.
- D. Samples:
 - 1. Materials:
 - a. Aluminum sheet, with specified finishes, 12" x 12".
 - b. Aluminum tube, with specified finish, 12" long.
 - c. Sign face color samples on specified material, 4" x 4".
 - 2. Panel Signs: One (1) full-size prototype of each:
 - a. Sign Type 1.2
 - b. Sign Type.2.1
 - c. Sign Type 3.1
 - d. Sign Type 6.1
 - 3. The prototypes are to utilize the same materials and installation methods intended for the final signs and, once accepted, will serve as the standard for materials, workmanship and appearance throughout the project and shall be fully installed in their proper locations.
 - 4. Room-Identification Signs: Three (3) Full-size Samples of each:
 - a. Sign Type 4.1
 - b. Sign Type 4.2
 - c. Sign Type 4.3.
- E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.
- F. Delegated-Design Submittal: For panel signs.
 - 1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by a qualified professional engineer licensed in the State of Minnesota.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 COORDINATION

- A. Coordinate sign installations with shop drawings and Manufacturer's data for other construction components that may affect or may be affected by the work, including but not limited to:
 - 1. Ceilings.
 - 2. Wall panel system.
 - 3. Baggage handling equipment.
 - 4. Structural steel canopy work.
 - 5. Hollow metal frames and sidelights.
 - 6. Interior glazing.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 years experience performing the Work required by this section on Projects similar in size and scope to this Project.
- B. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Sole Suppliers: Sign products of similar types shall be supplied by one manufacturer.
 - 1. Panel signs.
 - 2. Room Identification signs.

1.10 DELIVERY, STORAGE AND HANDLING.

- A. Signs and materials shall be delivered to the Project tagged or labeled bearing Manufacturer's name with material or sign identification number and installation location as shown on the Drawings. Signs and materials shall be stored in strict accordance with the Manufacturer's written directions.
 - 1. Finished surfaces shall be adequately protected during all phases of the Work to prevent damage by scratches, stains, discoloration, or other causes. Damage to any surface during fabrication, handling, shipment, storage, and erection shall be remedied by the Contractor at his own expense.

2. Before delivery to the site, tag or label each sign with identifying number and installation location as shown on the Drawings. Labeling shall be both on the sign and the protective covering. Labels on the signs shall be hidden when the sign is installed (unless otherwise specified) or shall be removed without damage to the sign at time of installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design sign structure and anchorage of sign type(s) 1.1, 1.2, 1.3, 2.1, 2.2, 2.3 and 6.1.
- B. Loads: Signs shall withstand loads across the total sign area equivalent to specified wind pressures:
 1. Interior signs: 5 miles per hour.
 2. Exterior signs: 100 miles per hour in any direction
- C. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for signs.
- E. Color, finish, material and process shall match for all work.

2.2 SIGNS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Ace Sign Systems, Inc.
 2. Advance Corporation; Braille-Tac Division.

3. Architectural Graphics Inc.
 4. ASI Sign Systems, Inc.
 5. Bunting Graphics, Inc.
 6. InPro Corporation.
 7. Nelson-Harkins Industries.
 8. Nordquist Sign Company, Inc.
 9. Poblocki Sign Company, LLC.
 10. Seton Identification Products.
 11. Vomar Products, Inc.
 12. Western Remac Inc..
- B. Panel Sign Types 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 3.1, and 6.1: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Solid-Sheet Sign and Back: Aluminum sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph below and as follows:
 - a. Thickness: 0.25 inch or as indicated.
 - b. Surface-Applied Graphics: Applied vinyl film.
 2. Graphics: Characters and symbols die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.
 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
 4. Support beams and brackets:
 - a. Material: Aluminum.
 - b. Material Thickness: 0.090".
 - c. Profile: as indicated.
 - d. Corner Condition in Elevation: Square.
 - e. Finish and Color: Clear, brushed finish.
 5. Mounting: As indicated.
 6. Sign Face Surface Finish: Baked-Enamel or Powder-Coat Finish in Color No. 1:
 - a. Match Pantone Color No. 5395 U.
 7. Applied Graphics: White die-cut vinyl.
 8. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
- C. Room-Identification Sign Types 4.1, 4.2, 4.3 and 5.1: Provide smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Sign faces to be milled polycarbonate with painted background and contrasting copy and graphics. Material as best suited to furnish the finish and strength required to comply with ADA regulations and requirements.
 - a. Thickness: 0.25 inch.
 - b. Color(s):
 - 1) Field and exposed edges: Color No. 1 - match Pantone Color No. 5395 U.
 - 2) Letters and Graphics: White.
 - c. Installed dimensional tolerances: 1/16 of an inch
2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
3. Mounting: Surface mounted with approved two-sided tape or adhesive.
4. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color. Flat faces of the raised letters and symbol graphics to be evenly and opaquely colored using silkscreen tipping with enamel ink suitable for printing on the sign face finish.
5. Braille to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and color. Contractor to translate sign copy to appear in Braille.

2.3 PANEL-SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Aluminum Pipe: ASTM B 429 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.
- E. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish nonferrous-metal or stainless-steel devices unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant Allen-head slots unless otherwise indicated.
 4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
- B. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.
1. 3M VHB Tape, or equivalent.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

- A. General: Provide sign assemblies according to requirements indicated.
1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace signs for stability and for securing fasteners.
 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

- B. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
- C. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.
- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

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 signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to accessibility standard.
- C. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
 - 3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 - 4. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
 - 5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive

PANEL SIGNAGE

Bid Package 2B – Issue for Bid

10430 - 9

symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.
- E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10430

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 10505 - METAL
LOCKERS**

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 SECTION INCLUDES

- A. Locker units with hinged doors.
- B. Metal bases, tops, and filler panels.

1.3 REFERENCES

- A. ASTM A446/A446M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- B. ASTM A526/A526M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

1.4 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Product Data: Provide data on locker types, sizes and accessories.
- C. Shop Drawings: Indicate locker plan layout, numbering plan, and combination lock code or, key codes.
- D. Samples: Submit two samples of each color; applied to specified base metal.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.

- 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
 - C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.
- 1.6 SUBMITTALS FOR INFORMATION
- A. Section 01300 - Submittals: Procedures for submittals.
 - B. Manufacturer's Installation Instructions: Indicate component installation assembly.
- 1.7 MOCK-UP
- A. Section 01400 - Quality Control – Testing Services: Requirements for mock-up.
 - B. Provide mock-up of one full size locker, with sloped top, in selected colors; in accordance with Section 01400.
 - C. Locate where directed.
 - D. Mock-up may remain as part of the Work.
- 1.8 DELIVERY, STORAGE, AND PROTECTION
- A. Section 01631 – Products and Substitutions: Transport, handle, store, and protect products.
 - B. Protect locker finish and adjacent surfaces from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Republic Storage Systems Co.
 - 2. Lyon Workspace Products Inc.
 - 3. DeBourgh Co.
 - 4. Penco Products

- C. Substitutions: Under provisions of Section 01631.

2.2 GENERAL

- A. Material: All major steel parts shall be made of mild cold rolled steel, free from imperfections and capable of taking a high grade enamel finish.
- B. Finish: Before enamel is applied, the surfaces of the steel shall be thoroughly cleaned and phosphatized in a seven stage process. All parts shall then be finished with a heavy coat of enamel baked on at 300 degrees for 30 minutes.
- C. Trim and Accessories: Trim and accessories such as recess trim, sloping tops, closed bases, zee bases and fillers of all types shall be provided for a complete installation. All items are to be finished to match lockers using the same process outlined above.
- D. Hinges: Shall be 2" high, 5-knuckle, full loop, tight pin style, to be securely welded to the frame and riveted to the inside of the door flange. Lockers shall be attached with two rivets. Locker doors 42" high and less shall have two hinges. Doors over 42" high shall have three hinges. An extra hinge shall be provided on 24" wide Heavy Duty Ventilated single and double tier doors.
- E. Pre-locking Device: All "tiered" lockers, except Single Point, shall be equipped with a positive automatic pre-locking device whereby the locker may be locked while the door is open and then closed without unlocking and without damaging the locking mechanism.
- F. Construction: Lockers shall be built on the unit principle - each locker shall have an individual door and frame, individual top, bottom, back and shelves with common intermediate uprights separating compartments.
- G. Number plates: Each locker door shall have a polished aluminum number plate with black numerals not less than 1/2" high for easy readability. Each number plate shall be attached with two blind rivets.
- H. Interior equipment: Single tier lockers shall have one hat/book shelf. Other tiered lockers shall not have shelves. All single, double and triple tier lockers shall have one double prong (single prong in 9" width) back hook and two single prong wall hooks in each compartment. All hooks shall be made of steel, formed with ball points, and zinc-plated with two bolts or rivets. Lockers under 20" high shall not be equipped with hooks.

2.3 HEAVY DUTY CORRIDOR LOCKERS

- A. Door Frames: Shall be 16 gauge formed into deep 1" face channel shapes with a continuous vertical door strike integral with the frame on

both sides of the door opening. Cross frame members of 16 gauge channel shapes, including intermediate cross frame on double, triple and four tier lockers shall be securely welded to vertical framing members to ensure a square and rigid assembly.

- B. Doors: Single doors shall be formed from 14 gauge cold rolled sheet steel. Formations shall consist of a full channel shape on the lock side of adequate depth to fully conceal the lock bar, channel formations on the hinge side and right angle formations across the top and bottom. Doors shall be of flush design without louvers or perforations. The top and bottom flanges of all doors shall be perforated for ventilation through Republic's Verti-Vent System.
- C. Latching: Shall be a one-piece, pre-lubricated, spring steel latch completely contained within the lock bar, under tension, to provide a rattle-free operation. The lock bar shall be of pre-painted, double-channel steel construction. The lock bar shall be securely contained in the door channel by self-lubricating polyethylene guides that isolate the lock bar from metal-to-metal contact with the door. There shall be three latching points for lockers over 42" in height and two latching points for all tiered lockers 42" and under in height. The lock bar travel shall be limited by contacting resilient high-quality elastomeric cushioning devices concealed inside the lock bar.
- D. Recessed Handle: A non-protruding 14 gauge lifting trigger shall be provided for actuating the lock bar when opening the door. It shall be contained in a formed 20 gauge stainless steel pocket with the exposed portion encased in a molded ABS thermoplastic cover that provides isolation from metal-to-metal contact. The trigger is to be integral part of the steel slide plate that transfers the lifting force to the lock bar. The stainless steel pocket shall contain a recessed mounting area for the various lock types available and also mounting for the number plate.
- E. Frame Hooks - Silencers: Frame hooks to accept latching shall be of heavy gauge steel, set close in and welded to the door frame. Continuous vertical door strike shall protect frame hooks from door slam damage. A soft rubber silencer shall be provided and securely installed on each frame hook.
- F. Body: All locker body components except exposed end uprights shall be made of 24 gauge cold rolled steel. Tops, bottoms and shelves shall be flanged on all four sides. Backs shall be flanged on two sides, uprights shall be offset at the front and flanged at the rear to provide a double lapped rear corner. Exposed end uprights for non-recessed lockers shall be 16 gauge steel.
- G. Assembly: Assembly of all locker components shall be accomplished by the use of low round head, slotless, fin neck machine screws with external tooth lock washer nuts producing a strong mechanical lock that opposes loosening.

- H. Size/ Style: All lockers to be 18" W x 24" D x 72" H- single tier style with full louvers and sloped hoods. All lockers to be mounted on a 4" high base platform as provided by manufacture. Refer to drawings for quantities and layout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01040 - Coordination: Verification of existing conditions before starting work.
- B. Verify that prepared bases are in correct position and configuration.
- C. Verify bases and embedded anchors are properly sized.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on prepared base.
- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, sloped tops, and bases.
- G. Install accessories.
- H. Replace components that do not operate smoothly.

3.3 CLEANING

- A. Section 01700 - Contract Closeout: Cleaning installed work.
- B. Clean locker interiors and exterior surfaces.

END OF SECTION 10505

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 10811 – COMMERCIAL
TOILET ACCESSORIES**

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 SECTION INCLUDES

- A. Toilet and washroom accessories.
- B. Grab bars.
- C. Mirrors.
- D. Attachment hardware.

1.3 REFERENCES

- A. ANSI A117.1 - Safety Standards for the Handicapped.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- C. Samples: Submit samples of each component, illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.5 REGULATORY REQUIREMENTS

- A. Conform to ANSI A117.1 code for access for the handicapped.

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on product data.

1.7 COORDINATION

- A. Coordinate work under provisions of Section 01040 – Coordination.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved manufacturers:
 - 1. Bobrick Inc.
 - 2. Bradley Corporation.
 - 3. AJ Washroom Accessories.
 - 4. American Specialties, Inc.
- C. Substitutions: Under provisions of Section 01631
- D. Refer to drawings for locations and quantity.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01040 – Coordination.
- B. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.
- C. Verify exact location of accessories for installation.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions and ANSI A117.1.
- B. Install plumb and level, securely and rigidly anchored to substrate.

3.4 SCHEDULE

- A. Refer to drawings for Toilet Accessory Schedule- interior systems restroom sheets. All scheduled toilet accessories are to be Contractor-Furnished and Contractor-Installed unless otherwise notes. Refer to drawings for locations and quantities.

END OF SECTION 10811

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 11132 – PROJECTION
SCREENS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Manually operated projection screens.
 - 2. Electrically operated projection screens and controls.
- B. Related Sections:
 - 1. Section 05500 "Metal Fabrications" for metal support framing for projection screens.
 - 2. Section 06100 "Rough Carpentry" for wood backing for screen installation.
 - 3. Section 09511 "Acoustical Panel Ceilings" for ceiling system into which projection screens are recessed.

1.3 DEFINITIONS

- A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:
 - 1. For manually operated projection screens:

- a. Drop lengths.
- b. Anchorage details.
- c. Accessories.

2. For electrically operated projection screens and controls:

- a. Location of screen centerline relative to ends of screen case.
- b. Location of wiring connections for electrically operated units.
- c. Location of seams in viewing surfaces.
- d. Drop lengths.
- e. Anchorage details, including connection to supporting structure for suspended units.
- f. Details of juncture of exposed surfaces with adjacent finishes.
- g. Accessories.
- h. Wiring diagrams..

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For projection screens to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Projection Screens: Obtain each type of projection screen from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Environmental Limitations: Do not deliver or install projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 COORDINATION

- A. Coordinate layout and installation of projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, fire-suppression system, and partitions.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED PROJECTION SCREENS

- A. General: Manufacturer's standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.
 - 1. Screen Mounting: Top edge securely anchored to a 3-inch-diameter, rigid steel roller; bottom edge formed into a pocket holding a tubular metal slat, with ends of slat protected by plastic caps, and with a saddle and pull attached to slat by screws.
- B. Surface-Mounted, Metal-Encased, Manually Operated Screens: Units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet not less than 0.027 inch thick or from aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish. Provide units with matching end caps and concealed mounting.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Da-Lite Screen Company; Model C.
 - b. Draper Inc.; Silhouette/Series M.
 - c. Stewart Filmscreen Corporation; Luxus Communicator.

2.2 ELECTRICALLY OPERATED PROJECTION SCREENS

- A. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation.
 - 1. Controls: Remote, three-position control switch installed in recessed device box with flush cover plate matching other electrical device cover plates in room where switch is installed.
 - a. Provide power supply for low-voltage systems if required.
 - 2. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
 - 3. End-Mounted Motor: Instant-reversing, gear-drive motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Locate motor in its own compartment.

4. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch-diameter metal rod with ends of rod protected by plastic caps.

2.3 FRONT-PROJECTION SCREEN MATERIAL

- A. Multipurpose Reflective Viewing Surface: Peak gain not less than 1.8, and half-gain angle of at least 25 degrees from the axis of the screen surface.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Da-Lite Screen Company; Pearlescent.
 - b. Draper Inc.; M2500.
 - c. Stewart Filmscreen Corporation; Ultramatte 200.
- B. Material: Vinyl-coated, glass-fiber fabric.
- C. Flame Resistance: Passes NFPA 701.
- D. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.
- E. Seamless Construction: Provide screens, in sizes indicated, without seams.
- F. Edge Treatment: Black masking borders.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FRONT-PROJECTION SCREEN INSTALLATION

- A. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.
- B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.

1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.
 - a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.
3. Test manually operated units to verify that screen-operating components are in optimum functioning condition.

3.3 PROJECTION SCREEN SCHEDULE

- A. Electrically Operated, Front-Projection Screen Type PS-1: Suspended, without ceiling closure.
 1. Screen Surface: Multipurpose reflective.
 2. Viewing Surface Size: 72 by 96 inches.
- B. Manually Operated, Front-Projection Screen Type PS-2: Surface mounted, metal encased.
 1. Screen Surface: Multipurpose reflective.
 2. Viewing Surface Size: 54 by 72 inches.

END OF SECTION 11132

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 12360 – QUARTZ
SURFACING COUNTERTOPS**

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 WORK INCLUDES

- A. Quartz surfacing countertops as shown on the Drawings and specified herein.

1.3 REFERENCES

- A. ASTM International:
 - 1. C97 Absorption and Bulk Specific Gravity of Dimension Stone.
 - 2. C99 Modulus of Rupture of Dimension Stone.
 - 3. C170 Compressive Strength of Dimension Stone.
 - 4. C370 Moisture Expansion.
 - 5. C501 Relative Resistance to Wear of Unglazed Tile to Taber Abraser.
 - 6. C482 Bond Strength of Ceramic Tile to Portland Cement.
 - 7. C484 Thermal Shock Resistance of Grazed Ceramic Tile.
 - 8. C531 Linear Shrinkage and Coefficient of Thermal Expansion of Chemical - Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concrete.
 - 9. C648 Breaking Strength of Ceramic Tile.
 - 10. C1026 Resistance of Ceramic Tile to Freeze Thaw Cycling.
 - 11. C1028 Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces
 - 12. by the Horizontal Dynamometer Pull Meter Method.
 - 13. E84 Surface Burning Characteristics of Building Materials.
 - 14. E662 Smoke Density.
- B. American National Standards Institute (ANSI)
 - 1. ANSI Z124.6 Stain Resistance
 - 2. A108.5 Installation of Ceramic Tile with a Dry Set Portland Cement Mortar Latex Portland Cement Mortar.
 - 3. A108.10- Installation of Grout in Tile work.
 - 4. A118.4 - Latex-Portland Cement Mortar.
 - 5. A118.6- Ceramic Tile Grouts.
 - 6. A136.1- Lasers

1.4 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- B. Samples: Submit minimum 6"x6" samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.
- C. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
- D. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

1.5 QUALITY ASSURANCE

- A. Mockup:
 - 1. Construct mockup (if requested by Architect) 3'-0" feet wide, full depth with backsplash, skirt. In addition, include plumbing fixtures and trim.
 - 2. Approved mockup shall remain as part of the work.
- B. Delivery, Storage and Handling:
 - 1. Packaging, Shipping, Handling and Unloading; Observe manufacturer's recommendations and handle in a manner to prevent breakage. Brace parts if necessary. Transport in the near vertical position with finished face toward finished face. Do not allow finished surfaces to rub during shipping and handling.
- C. Storage and Protection:
 - 1. Store in racks in near vertical position. Prevent warpage and breakage. Store Inside away from direct exposure to sunlight. Store between 25 and 130 °F.
- D. LEED Credit Qualifications and Procedures: Provide materials compliant with the following requirements:
 - 1. Low Emitting Materials: Certify materials as necessary to achieve LEED EQ Credit Point 4.1, 4.2, 4.3 and 4.4.

1.6 WARRANTY

- A. Closeout Submittals:
 - 1. Provide manufacturer's completed warranty form.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Cambria
 - 2. Viatera by LG Hausys America Inc.
- C. Substitutions: Under provisions of Section 01631.
- D. Basis-of-Design Product: The design is based on the products named in the Material Schedule. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.

2.2 MATERIALS

- A. Material:
 - 1. Homogeneous mixture containing 93% pure quartz with additions of high performance polyester resin, pigments and special effects.
- B. Thickness:
 - 1. As indicated on drawings.
- C. Identification:
 - 1. Material shall be labeled with manufacturer's identifying mark.
- D. Performance:
 - 1. Moisture Absorption: typical results 0.02%; ASTM C97
 - 2. Modulus of Rupture: typical results 6,800 psi; ASTM C99
 - 3. Compressive Strength: typical results 24,750 psi; ASTM C170
 - 4. Moisture Expansion: typical results <0.01; ASTM C370
 - 5. Abrasion Resistance: typical results 223; ASTM C501
 - 6. Bond Strength: typical results 205 psi; ASTM C482
 - 7. Thermal Shock: passes 5 cycles: ASTM 484
 - 8. Coefficient of Thermal Expansion: typical results 1.2×10^{-5} inch/°F; ASTM C531
 - 9. Breaking Strength of Tile: typical results 3,661 lbf; ASTM C648
 - 10. Resistance to Freeze Thaw Cycling: unaffected 15 cycles; ASTM C1026
 - 11. Coefficient of Friction Pull Method: .75 avg. dry / .55 avg. wet; ASTM C1028
 - 12. Surface Burning Characteristics: typical results 17; ASTM E84
 - 13. Smoke Density: flaming 196, non-flaming 69; ASTM E662
 - 14. Stain Resistance: Unaffected; ANSI Z124.6

2.3 ACCESSORIES

- A. Mounting Adhesive:
 - 1. Provide structural grade '50 year' silicone or epoxy adhesive.
 - 2. Acceptable silicone manufactures:
 - a. Dow Corning
 - b. GE Sealants
 - c. 3M
 - 3. Acceptable epoxy manufactures:
 - a. Cambria Two Part Acrylic Adhesive.
 - b. Akemi North America.
 - c. Bonstone Material Corporation.
 - d. Tenax USA.
- B. Quartz Surface Adhesive:
 - 1. Provide epoxy or polyester adhesive of a type recommended by manufacturer for application and conditions of use.
 - 2. Acceptable manufacturers:
 - a. Cambria Two Part Acrylic Adhesive.
 - b. Akemi North America.
 - c. Bonstone Material Corporation.
 - d. Tenax USA.
 - 3. Adhesive which will be visible in finished work shall be tinted to match quartz Surface.
- C. Fasteners as recommended by countertop manufacturer.
- D. Joint Sealant:
 - 1. Clear sealant of type recommended by manufacturer for application and use.
 - 2. Acceptable manufacturers:
 - a. Dow Corning.
 - b. GE Sealants.
 - c. 3M
- E. Solvent: Denatured alcohol for cleaning quartz surfacing to assure adhesion of adhesives and sealants.
- F. Cleaning Agents: Mild soap and water.

2.4 ACCESSORIES

- A. Fabricator:
 - 1. Fabricator shall be by a certified Fabricator, certified in writing by Manufacturer.
- B. Layout:

1. Layout surface to minimize joints and avoid L-shaped pieces of quartz surfacing. Layout and fabricate with 'hairline' joints.
- C. Inspection of Materials:
 1. Inspect materials for defects prior to fabrication.
- D. Tools: Cut and polish with water cooled powered tools.
- E. Cutouts:
 1. Cutouts shall have a minimum of 3/8 inch (10mm) radius.
 2. Where edges of cutouts will be exposed in finished work; polish edges.
- F. Laminations:
 1. Laminate layers of quartz surfacing as required to create built up edges following procedures recommended by the manufacturer.

PART 3 EXECUTION

3.1 INSTALLER

- A. Installation shall be by a certified Installer, certified in writing by Manufacturer.

3.2 PRE-INSTALLATION EXAMINATION

- A. Site Verification:
 1. Verify dimensions by field measurements prior to installation.
 2. Verify that substrates supporting quartz surfaces are plumb, level and flat to within 1/8 inch in 10 feet and that all necessary supports and blocking are in place.
 3. Base Cabinets shall be secured to adjoining units and back wall.
- B. Inspection of Quartz Surfaces:
 1. Inspect materials for defects prior to installation.

3.3 PREPARATION

- A. Prepare Surface:
 1. Clean surfaces prior to installation.
- B. Protection of Quartz Surfaces:
 1. Protect finished surfaces from scratches. Apply masking where necessary.
 2. Take necessary precautions to prevent dirt grit dust and debris from other trades from contacting the surface.

3.4 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions and approved shop drawings.
- B. Preliminary Installation:
 - 1. Position materials to verify the correct size.
 - 2. If size adjustments, or additional fabrication is necessary, use water cooled tools. Protect jobsite and surface from dust and water . Perform work away from installation site if possible.
 - 3. Allow gaps for expansion of not less than 1/8 inch(1.5mm) per ten feet when installed between walls or other fixed structure.
- C. Permanent Installation:
 - 1. After verification of fit and finish, clean substrate; remove loose and foreign matter which may interfere with adhesion. Clean quartz surface backside & joints with denatured alcohol.
 - 2. Horizontal surface: Apply continuous bead of mounting adhesive around perimeter of structural substrate and supports.
 - 3. Vertical surface: Apply continuous bead of mounting adhesive around perimeter. In addition, apply ¼ inch mounting adhesive bead every 8 inches on vertical center.
 - 4. Fasteners, Grout and Hardware – provide as required for installation.
 - 5. Install quartz surfacing plumb, level, square and flat to within 1/8 inch in ten Feet, non-cumulative.
 - 6. Align adjacent pieces in same plane.
- D. Joints:
 - 1. Joints Between Adjacent Pieces of Quartz Surfacing:
 - a. Joints shall be flush, tight fitting, level and neat.
 - b. Securely join adjacent pieces with Cambria Two Part Acrylic Adhesive.
 - c. Fill joints level to polished surface.
 - d. Secure adjacent quartz surfaces with vacuum clamps until adhesive hardens.
 - 2. Joints Between Quartz Surface and back splash
 - a. Seal joints with '50' year silicone sealant.

3.5 REPAIR

- A. Repair or replace damaged material in a satisfactory manner.

3.6 CLEANING

- A. Remove masking, excessive adhesive and sealants. Clean exposed surfaces with denatured alcohol.

3.7 PROTECTION

- A. Protect installed fabrications with non-staining sheet coverings.

3.8 SCHEDULES

- A. Refer to Millwork Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 12360

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 12484 – ENTRANCE
FLOOR MATS AND FRAMES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Entrance mats in recessed frames.

1.3 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes. Include installation instructions indicating method of installation and substrate preparation.
- B. Shop Drawings: Show the following:
 - 1. Layout, profiles and product components including anchorage, accessories, finish colors, patterns and textures.
 - 2. Divisions between mat sections.
 - 3. Perimeter floor moldings.
 - 4. Items penetrating floor mats and frames, including the following:
 - a. Door control devices.
 - b. Piping.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated.
 - 1. Floor Mat: 12-inch-square, assembled sections of floor mat.
 - 2. Frame Members: 12-inch-long sample of each type and color.
 - 3. Accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Certified test reports indicating compliance with specified performance characteristics and physical properties.
- B. Manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Entrance Tiles: Full-size units equal to 25 percent of amount installed for each size, color, and pattern indicated, but no fewer than 2 units.

1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.
- B. Accessibility Requirements: Provide installed floor mats that comply with Article 302 in the U.S. Access Board's "Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines", July 23, 2004 edition.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. Coordinate size and location of recesses in concrete with installation of finish floors to receive floor mats and frames.

PART 2 - PRODUCTS

2.1 ENTRANCE MATS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

ENTRANCE FLOOR MATS AND FRAMES
 Bid Package 2B – Issue for Bid
 12484 - 2

1. Balco, Inc.
2. Crown Mats and Matting, Inc.
3. C/S Group.
4. Mats, Inc.
5. Musson, R. C. Rubber Co.
6. Plastex Matting, Inc.
7. Tepromark International, Inc.

B. Vinyl Foot Grille:

1. 3/8-inch-thick, with an embossed non-skid surface and carpet strips, welded in a non-hinged, semi-open, grille design to allow dirt, grit, and water to drop through.
2. Color: As selected by Architect from manufacturer's full range.
3. Mat Size: As indicated.

C. Recessed Frames:

1. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
2. Color: As selected by Architect from manufacturer's full range.

2.2 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.3 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.

2.4 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.
 - 1. For installation in terrazzo flooring areas, provide allowance for grinding and polishing of terrazzo without grinding surface of recessed frames. Coordinate with other trades as required.
 - 2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth.

3.3 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12484

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 12491 - HORIZONTAL
LOUVER BLINDS**

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 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

1.3 SYSTEM DESCRIPTION

- A. Horizontal metal slat louver blinds installed at window openings, manual control of raising and lowering by cord; blade angle adjustable by control wand.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300 - Submittals:
 - 1. List of proposed products and product data.
 - 2. Shop drawings showing window openings, dimensions, and attachment method.
 - a. Curved or sloped ceiling conditions: Include details for additional supports as necessary for mounting of blind brackets and hardware at sloped windows and/or curved ceiling condition.
 - 3. Samples for selection by Architect:
 - a. Slat Finish
 - b. Metal finishes.
 - 4. Window Schedule listing rooms, field verified window dimensions, quantities, type, and color.
 - 5. Manufacturer's installation and maintenance instructions.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
- 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with three years documented experience.

1.7 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01631 – Products and Substitutions.
- B. Deliver blinds wrapped and crated in a manner to prevent damage to components or marring of surfaces.
- C. Store and protect products under provisions of Section 01631 – Products and Substitutions.
- D. Store in a clean, dry area, laid flat and blocked off ground to prevent sagging, twisting, or warping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:

HORIZONTAL LOUVER BLINDS
 Bid Package 2B – Issue for Bid
 12491-2

- B. Approved Manufacturers:
 - 1. Levolor
 - 2. Draper
 - 3. Hunter Douglas
- C. Substitutions: Under provisions of Section 01631.
- D. Size: Refer to Drawings for size and locations.

2.2 MATERIALS

- A. Riviera DustGuard 1" Blind manufactured by Levolor.
- B. Materials:
 - 1. Headrail: .025" thick Tomized steel. "U" shaped, 1" high x 1-9/16" wide. All hardware enclosed in the headrail.
 - 2. Guardian Tilter: .042" Tomized steel housing with a self-lubricating nylon, automatically disengaging worm and gear mechanism to eliminate overdrive.
 - 3. Tilt Wand: Transparent with a hexagonal cross section 5/16" across flats.
 - 4. Cord Lock: .042" thick Tomized steel. Crashproof.
 - 5. Drums and Cradles: Provided with each ladder. Drums shall be .031" thick Tomized steel. Cradles are .042" thick Tomized steel.
 - 6. Installation Brackets: .048" thick Tomized steel with a rivet-hinged safety locking front cover to permit removal of headrail without lateral movements.
 - 7. Ladders (slat supports): Distance between slats shall not exceed 19.5 mm.
 - 8. Slat: 5000 series magnesium aluminum alloy only, not to include reprocessed metals. Slat shall be nominally 1" wide and the thickness of the slat shall be nominally .0085".
 - a. Finish: DustGuard, color as selected by the Architect from the manufacturers standards finishes.
 - b. Slat Design: Unperforated.
 - 9. Bottomrail: .031" thick Tomized steel.
 - 10. Guide Cables or wires as required to enable blinds to follow window orientation on sloped windows.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Do not commence fabrication until field measurements are confirmed.
- C. Ensure structural supports are correctly placed.

- D. Beginning of installation means installer accepts existing substrate.

3.2 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with concealed fasteners.

3.3 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

3.4 ADJUSTING

- A. Adjust work under provisions of Section 01700 – Contract Closeout.
- B. Adjust blinds for smooth operation.

3.5 CLEANING

- A. Clean work under provisions of 01710 – Clean Up.

3.6 SCHEDULE

- A. Refer to Room Finish Schedule and drawing set for a listing of rooms requiring work of this section.

END OF SECTION 12491

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 12493 -
BLACKOUT SHADES**

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: Manually operated, roll-up, fabric opaque window shade system for complete blackout of window opening including side and bottom channels, headbox, opacity plates, manual operator, and mounting hardware.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300 - Submittals:
 - 1. List of proposed products and product data.
 - 2. Shop drawings showing window openings, dimensions, and attachment method.
 - a. Curved or sloped ceiling conditions: Include details for additional supports as necessary for mounting of shade brackets and hardware at sloped windows and/or curved ceiling condition.
 - 3. Samples for selection by Architect:
 - a. Fabrics.
 - b. Metal finishes.
 - 4. Window Shade Schedule listing rooms, field verified window dimensions, quantities, type of shade, fabric, and color.
 - 5. Manufacturer's installation and maintenance instructions.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.

- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with three years documented experience.

1.6 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.

1.8 WARRANTY

- A. Provide under provisions of Section 01700 - Contract Closeout: 5 years warranty against defects in materials and workmanship for clutch operating mechanism.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. MechoShade
 - 2. Draper
 - 3. Lutron

- C. Substitutions: Under provisions of Section 01631.
- D. Size: Refer to Drawings for size and locations.

2.2 OPAQUE WINDOW SHADE SYSTEM

- A. Type: Bead chain and clutch operated, roll-up, fabric, opaque window shade system; LightBloc FlexShade System as manufactured by Draper, Inc.
- B. Specialty sloped shades: Include side guide wires with roller tube (idler rollers) as required to map the movement of shades and precisely follow the window orientation on sloped windows. Refer to drawings for locations and slope angle.
- C. Method of installation: Mounted inside of window opening and extending from head to sill and jamb to jamb.
- D. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide preset limit stops to prevent shade from being raised or lowered too far.
 - 1. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester.
 - 2. Control loop: Stainless steel bead chain hanging at side of window.
 - 3. Chain location: Right hand side when facing window from interior.
- E. Roller: Fabricated from extruded aluminum or steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade size. Provide with roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin to allow easy installation and removal of roller.
- F. Headbox: Fabrication from 0.06 inch thick extruded aluminum sections with endcaps and opacity plates.
 - 1. Size: 4-1/8 inches high by 3-1/2 inches wide by length required for shade being provided.
 - 2. L-shaped removable front face and bottom cover and L-shaped back and top.
- G. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size and fasteners appropriate for installation conditions.
- H. Side Channels: Double chamber fabricated from 0.06 inch thick extruded aluminum sections. One chamber accepts fabric and contains groove for fabric retainer. Other chamber accepts fabric guide and channel locator.
- I. Sill channel: 0.06 inch thick extruded aluminum channel to receive slat bar and prevent light leakage.
- J. Slat bar: Extruded aluminum bar attached to bottom of shade. Bar does not retract into headbox.

- K. Channel locator: Injected molded nylon insert to align side and sill channels with headbox.
- L. Fabric guide: Plated steel transition for fabric rolling into side channel.
- M. Fabric retainer: System designed to prevent disengagement of fabric from side channels due to normal variations of air pressure caused by doors opening, HVAC systems, and temperature differences between room and window well. System consists of horizontal steel stays installed in shade, covered with fabric, and spaced at regular intervals. Grommets installed through stays are held within groove of side channel chamber.
- N. Opacity plates: Steel plates with rubber O rings installed on endcaps to eliminate light leakage.
- O. Exposed aluminum finish: White baked enamel paint.

2.3 FABRIC

- A. Material: Close woven fiberglass base textile with sun-resistant vinyl film bonded to each side, opaque with minimum tensile strength of 190 pounds for warp and 180 pounds for fill; SunBloc Series SB9000 as provided by Draper, Inc.
- B. Color and pattern: As selected by Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Field verify window dimensions prior to fabrication.
- B. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.2 INSTALLATION

- A. Install window shades at locations indicated on Drawings and approved Window Shade Schedule.
- B. Comply with shade manufacturer's written instructions.
- C. Install headbox, side channels, and sill channel with sealant specified in Section 07920 - Joint Sealers to eliminate light leaks at perimeter of shade system.
- D. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.3 PROTECTING

- A. Clean shade assemblies and protect from damage from construction operations. If damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

3.4 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 12493

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 12493 -
BLACKOUT SHADES**

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: Manually operated, roll-up fabric opaque window shade system for complete blackout of window opening including side and bottom channels, headbox, opacity plates, manual operator, and mounting hardware.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300 - Submittals:
 - 1. List of proposed products and product data.
 - 2. Shop drawings showing window openings, dimensions, and attachment method.
 - 3. Samples for selection by Architect:
 - a. Fabrics.
 - b. Metal finishes.
 - 4. Window Shade Schedule listing rooms, field verified window dimensions, quantities, type of shade, fabric, and color.
 - 5. Manufacturer's installation and maintenance instructions.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.

- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with three years documented experience.

1.1 EXTRA MATERIALS

- A. Section 01700 – Contract Closeout: Spare parts and maintenance products.
- B. Supply five percent (5%) of each size, color, and surface finish specified.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.

1.3 WARRANTY

- A. Provide under provisions of Section 01700 - Contract Closeout: 5 years warranty against defects in materials and workmanship for clutch operating mechanism.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufactures: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Approved Manufacturers:
 - 1. Draper
 - 2. MechoShade
 - 3. Lutron

- C. Substitutions: Under provisions of Section 01631.
- D. Size: Refer to Drawings for size and locations.

2.2 OPAQUE WINDOW SHADE SYSTEM

- A. Type: Bead chain and clutch operated, vertical roll-up, fabric, opaque window shade system; LightBloc FlexShade System as manufactured by Draper, Inc.
- B. Method of installation: Mounted inside of window opening and extending from head to sill and jamb to jamb.
- C. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide preset limit stops to prevent shade from being raised or lowered too far.
 - 1. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester.
 - 2. Control loop: Stainless steel bead chain hanging at side of window.
 - 3. Chain location: Right hand side when facing window from interior.
- D. Roller: Fabricated from extruded aluminum or steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade size. Provide with roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin to allow easy installation and removal of roller.
- E. Headbox: Fabrication from 0.06 inch thick extruded aluminum sections with endcaps and opacity plates.
 - 1. Size: 4-1/8 inches high by 3-1/2 inches wide by length required for shade being provided.
 - 2. L-shaped removable front face and bottom cover and L-shaped back and top.
- F. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size and fasteners appropriate for installation conditions.
- G. Side Channels: Double chamber fabricated from 0.06 inch thick extruded aluminum sections. One chamber accepts fabric and contains groove for fabric retainer. Other chamber accepts fabric guide and channel locator.
- H. Sill channel: 0.06 inch thick extruded aluminum channel to receive slat bar and prevent light leakage.
- I. Slat bar: Extruded aluminum bar attached to bottom of shade. Bar does not retract into headbox.
- J. Channel locator: Injected molded nylon insert to align side and sill channels with headbox.
- K. Fabric guide: Plated steel transition for fabric rolling into side channel.

- L. Fabric retainer: System designed to prevent disengagement of fabric from side channels due to normal variations of air pressure caused by doors opening, HVAC systems, and temperature differences between room and window well. System consists of horizontal steel stays installed in shade, covered with fabric, and spaced at regular intervals. Grommets installed through stays are held within groove of side channel chamber.
- M. Opacity plates: Steel plates with rubber O rings installed on endcaps to eliminate light leakage.
- N. Exposed aluminum finish: White baked enamel paint.

2.3 FABRIC

- A. Material: Close woven fiberglass base textile with sun-resistant vinyl film bonded to each side, opaque with minimum tensile strength of 190 pounds for warp and 180 pounds for fill; SunBloc Series SB9000 as provided by Draper, Inc.
- B. Color and pattern: As selected by Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Field verify window dimensions prior to fabrication.
- B. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.2 INSTALLATION

- A. Install window shades at locations indicated on Drawings and approved Window Shade Schedule.
- B. Comply with shade manufacturer's written instructions.
- C. Install headbox, side channels, and sill channel with sealant specified in Section 07920 - Joint Sealers to eliminate light leaks at perimeter of shade system.
- D. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.3 PROTECTING

- A. Clean shade assemblies and protect from damage from construction operations. If damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

3.4 SCHEDULE

- A. Refer to Room Finish Schedule for a listing of rooms requiring work of this section.

END OF SECTION 12493

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 12494 – MOTORIZED
ROLLER SHADES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Motor-operated Roller Shades, Controls, Mounting Brackets and Hardware.
- B. Related Sections include the following:
 - 1. Division 16 - Electrical: Electric service for motors, motor controls, internal communication, low voltage wiring and data transfer, and connection to Internet.

1.3 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
 - 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

2. Curved or sloped ceiling conditions: Include details for additional supports as necessary for mounting of shade brackets and hardware at sloped windows and curved ceiling condition.
- C. Samples for Initial Selection: For each finish product specified, one set of shade cloth options representing manufacturer's full range of available colors and patterns.
1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
1. Shadeband Material: Not less than 12 inches square. Mark inside face of material if applicable.
 2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long.
 3. Installation Accessories: Full-size unit, not less than 10 inches long.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.
 1. Include methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.6 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. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

- B. Shadecloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience in manufacturing products comparable to those specified in this section and minimum of five projects of similar scope and size.
- B. Installer Qualifications: Fabricator of products, or Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Requirements for Roller Shade Installer/Contractor:
 - 1. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
 - 2. Roller Shade Installer/Contractor shall list all components and systems included in their bid, including but not limited to, the prime manufacturer of the motor control and automated equipment and shall be financially responsible for any change orders and/or back charges required by the BMS, AV, or Lighting Control Systems contractors to interface with the automatic solar tracking system and the motorized roller shade system.
- D. Mockup: Prepare a mockup of one roller shade assembly for evaluation of mounting, appearance and accessories, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 3. Do not proceed with remaining work until mock-up is accepted by Architect

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient

temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.11 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace shade system components that fail in materials or workmanship within specified warranty periods.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; excessive wear; unusual deterioration or aging of materials; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Periods:
 - a. Motorized Roller Shade Hardware and Shadecloth: 15 years.
 - b. Roller Shade Motors and Motor Control Systems: 10 years.
 - c. Roller Shade Installation: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Draper Inc.
 - 2. Lutron Electronics Co., Inc.
 - 3. MechoShade Systems, Inc.
 - 4. Nysan Solar Control Inc.; Hunter Douglas Company.
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MOTOR-OPERATED, SINGLE-ROLLER SHADES

- A. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without

malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components: Listed and labeled as defined in NFPA 70, either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
2. Electric Motor: Tubular, asynchronous (non-synchronous) motors, with built-in reversible capacitor, temperature Class A, thermally protected, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor enclosed in roller.
 - a. Electrical Characteristics: Single phase, 110 V, 60 Hz. Maximum current draw for each shade motor of 0.9 amps @ 110 V.
 - b. Use motors rated at the same nominal speed for all shades in the same room.
 - c. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly. Spring assisted lift systems shall not be accepted.
3. Motor Control System: Provide motor control system with the following performance capabilities:
 - a. Noise criteria: Maximum 50dBa measured at five feet from unit.
 - b. Upper and lower stopping points (operating limits) of shade bands shall be programmable into motors via a hand held removable program module / configurator.
 - c. Intermediate stopping positions for shades shall allow for up to three (3) repeatable and precise aligned positions.
 - d. Up to 103 available alignment points including 3-user programmable predefined intermediate positions, for a total of 5-defined and aligned positions. All shades on the same switch circuit with the same opening height shall align at each intermediate stopping position.
 - e. Two inherent methods of control:
 - 1) Cost effective, low voltage, hardwired dry-contact for local switch or 3rd party control operation.
 - 2) Expandable to 2-way communication network with IQ/485-NI to support whole building low-voltage control and integration.
 - f. Uniform or Regular Modes of Operation:
 - 1) Uniform mode shall allow for shades to only move to intermediate stop positions.
 - 2) Regular mode shall allow for shades to move to both intermediate stop positions, plus any position desired between the upper and lower limits as set by the installer.
 - g. Wall Switches:
 - 1) IQ-Switch: in 5 button, single gang, low voltage.
 - h. Expandable IQ-485-NI: Shall allow addressability of each motor or group of motors on a two-way addressable communication

network for whole building or overlapping multi-level control.

System Features include:

- 1) 5 @ IQ, Local or Master ports
 - 2) 1 @ Photocell input for automated control of shades. One photocell per elevation.
 - 3) Software Addressable IQ Ports support Multi-Level control with 8 addresses per port
 - 4) IQ-485 MS Bus, 485 shall allow up to 65000 addresses controlling up to 500,000 motors per network
 - 5) Shall allow for variety of switch and other user interface options including RF and Ethernet (IP)
 - 6) Shall support 3rd party control integration via RS232 and Ethernet (IP).
- i. Capable of accepting input from building automation control system.

B. Rollers: Extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without excessive deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Direction of Shadeband Roll: Reverse, from front of roller.
2. Shadeband-to-Roller Attachment: Removable spline fitting integral channel in tube. Shade band shall be made removable / replaceable without having to remove shade roller from shade brackets. Any use of: adhesive, adhesive tapes, staples, and/or rivets shall not be accepted

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
3. Provide and install steel mounting supports as necessary to allow plumb and level installation of shade hardware at sloped windows and curved roof condition. Shades on south elevation to be installed in 'stepped' configuration in order to conform with curved roof condition.

D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.

E. Shadebands:

1. Shadeband Material: Light-filtering fabric.

2. Shadeband Bottom (Hem) Bar: Extruded aluminum, continuous for entire width of shade band and with the following characteristics:
 - a. Capability for use with guide cables as required.
 - b. Suitable for both vertical-drop and sloped shades in order to maintain uniform appearance of shades

2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Visually Transparent Single-Fabric Shadecloth woven from opaque, non-raveling yarn, stain and fade resistant.
 1. Source: Roller-shade manufacturer.
 2. Type: Woven PVC-coated fiberglass and PVC-coated polyester.
 3. Weave: Basketweave.
 4. Thickness: 0.025 inch, minimum.
 5. Weight: 12.0 oz./sq. yd., minimum.
 6. Roll Width: as indicated on drawings.
 7. Openness Factor: 2 – 3 percent.
 8. Color: As selected by Architect from manufacturer's full range meeting specified requirements.

2.4 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams.

2.5 ACCESSORIES

- A. Static guide cables and idler cables (as needed) to enable shades to follow window orientation on sloped windows.
- B. Safety brackets to be used per manufacturer's recommendations where high-bay or monumental shade conditions exist.
- C. Photo cell per orientation, to be externally mounted and integrated with shade control system.

2.6 SCHEDULE

- A. Roller Shade Schedule: Refer to the Drawings for locations.
 - 1. Shade Type WT-1: Motorized interior solar roller shades on South elevation as shown on referenced Drawings, and related motor control requirements systems. Shades shall have capability of being controlled by AV, BMS or Lighting System via RS-232, RS-485 or dry contact closures. Include the following as scheduled and as indicated on the Drawings:
 - a. Safety brackets where required per manufacturers guidelines for high-bay or monumental shade conditions.
 - b. Sun-activated controller (SAC) with externally-mounted photo cell to integrate with shade motor control system.
 - 2. Shade Type WT-2: Motorized interior solar roller shades on East elevation as shown on Drawings, and related motor control systems. Shades shall have capability of being controlled by AV, BMS or Lighting System via RS-232, RS-485 or dry contact closures. Include the following as scheduled and as indicated on the Drawings:
 - a. Guide cables and idler rollers (as needed) for application to sloped windows.
 - b. Sun-activated controller (SAC) with externally-mounted photo cell to integrate with shade motor control system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50

mm) to interior face of glass. Allow proper clearances for window operation hardware.

- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

3.4 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.5 TESTING

- A. Test electrically operated shades for proper operation. Repair or replace units, which do not perform correctly.
- B. Test sun-activated control sensors for proper operation. Repair or replace units, which do not perform correctly.

3.6 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 12494

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 12500- PUBLIC
AREA FURNITURE**

PART 1 :GENERAL

1.1 DESCRIPTION

- A. This section includes loose Seating, Tables, and Miscellaneous Furniture and Accessories for the public portion of the new passenger terminal.
- B. Client is eligible for GSA pricing. However, all items do not need to be purchased under these contracts.
- C. All furniture with wood/ veneer components to be **FSC certified**.
- D. Products shall be furnished, delivered and installed. Refer to furniture plans for locations, quantities, and layouts.
- E. Products are to be standard catalogued items for which printed literature, specifications, and certified test results are available. If a product is custom/ or special – it must be accompanied by a detailed line drawing with dimensions.
- F. Products shall be new and in current production. Products shall not be made obsolete within 5 years after purchase, to be available to the Client for additional purchases during that time period.
- G. Used, refurbished, shopworn, demonstrator, prototype, modified, or discontinued products are not acceptable.
- H. Refer to the General Services Administration contract for additional details concerning procurement, processes and procedures as it relates to this package.
- I. Should technical specifications and drawings contradict, contractor shall provide the greater quantity and/or quality and refer questions to designer.
- J. Electronic drawings will be provided to the vendor upon signing of the appropriate file release form.
- K. Vendor to provide final estimate before ordering to allow Client to add or deduct product as necessary to meet given budget.

1.2 SUBMITTALS

- A. Product Data: Provide product data for all specified furniture.
- B. Samples: Submit samples of finish, color, and texture.
- C. Shop drawings: Provide installation drawings as required.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
 - 2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.
- C. All wood and veneer components to be **FSC certified**- sufficient documentation must accompany submittal.
- D. Product Cost Data: Submit cost of products to verify compliance with project sustainable design requirements. Exclude cost of labor and equipment to install products.
 - 1. Provide cost data for the following products:
 - a. Products with recycled material content.
 - b. Local and regional products.

1.4 QUALITY ASSURANCE

- A. All products shall be standard manufacturer's products unless otherwise specified.

1.5 QUALIFICATIONS

- A. Manufacturer:
 - 1. The furniture manufacturer shall be a company specializing in the manufacture of commercial office furniture for a minimum of five (5) years.
 - 2. The systems furniture manufacturer shall provide to the Client certification that each member of the Vendor's workforce is fully qualified to install the furniture proposed.
- B. Vendor:

1. The installing Vendor's local office shall have been established for a minimum of five (5) years.
2. The Vendor shall be a company specializing in furnishing, delivering and installing commercial systems furniture, and shall have substantial experience with the manufacturer's products. Installation personnel shall be readily identifiable by uniform or other means acceptable to the Client.

1.6 REGULATORY REQUIREMENTS

- A. Fire Safety Characteristics: Provide material identical to that tested for the following fire performance characteristics, per test method indicated below, performed by UL or other testing and inspection organization acceptable to the Building Code Official. Identify components with appropriate markings of applicable testing and inspecting organizations placed out of general view (semi-concealed, but readily accessed without dismantling the component or assembly):
 1. Pass Critical Radiant Flux Test (Flame Spread Index) – Class 1 – NBS minimum 0.455 watts per cubic centimeter, per NFPA 258/ASTM E 648.
 2. Pass Smoke Chamber Test – 25 or less per UL 992.
 3. Pass Smoke Density no greater than 450 per NFPA 25/ASTM E 662.
- B. Electrical Components: UL Approved.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Products shall be new and shall be delivered in the manufacturer's original and unopened packaging or crating. Under certain pre-approved conditions, the Client may allow products to be delivered "blanket wrapped", if transported by manufacturer owned vehicles, and all products are clearly identified.
- B. Products shall be packaged to prevent damage during transit and storage.
- C. Vendor shall be responsible for the receipt, handling and storage of products and supplies necessary for a complete installation.
- D. Vendor shall comply with manufacturer's requirements for handling and shall take all necessary precautions to prevent damage.
- E. Vendor shall be fully responsible to completely remove all packaging, crating, and expended installation/cleaning supplies from property on a daily basis – none shall be allowed to accumulate on site. All expended materials shall be recycled or disposed of in a legal manner.

1.8 COORDINATION

- A. The Vendor and the Furniture manufacturer shall coordinate and cooperate with Client representatives and the Interior Designer.
- B. Vendor shall attend all project meetings as requested by the Client and/or Interior Designer.
- C. **All color and finish selections will be made post bid.** The finish and color selections will be issued as part of a master color document once all manufactures finish material submittals have been received and selected.

1.9 WARRANTY

- A. All products shall have a minimum of 10-year written non-prorated warranty, unless industry standards dictate otherwise, agreeing to replace without charge all defective materials, workmanship, and/or installation.
- B. Removal and replacement of defective or non-conforming product or installation shall be accomplished in a manner to minimize disturbance to Client functions.
- C. Each manufacturer must provide statement with bid describing and guaranteeing the warranties for all furniture products and components.

PART 2: SEATING

2.1 BENCH SEATING- GENERAL

- A. Acceptable Manufacturers and Products
 - 1. Cumberland: Alton Bench
 - 2. Substitutions: Under provisions of Section 01631.
- B. CH-1:
 - 1. Manufacturer: Cumberland
 - 2. Line: Alton Bench- 3 Seat
 - 3. Description: Bench w/ metal frame & upholstered seat
 - 4. Dimensions: 72" W x 18" D x 18"H
 - 5. Finishes: Metal Frame: Standard
Upholstered Seat: COM fabric \$50/yard

2.2 LOUNGE SEATING - PASSENGER WAITING

- A. Acceptable Manufacturers and Products
 - 1. Cumberland- Alia Metal Lounge Series
 - 2. Substitutions: Under provisions of Section 01631.
- B. CH-2:

1. Manufacturer: Cumberland
2. Line: Alia Metal - Wood Surround
3. Description: Lounge chair
4. Dimensions: 31" W x 32"D x 29"H
5. Finishes: Metal Frame: Standard
Veneer Back: Standard-tbd
Upholstered Seat & Back: COM fabric \$50/ yard

2.3 LOUNGE SEATING- 3rd Floor

- A. Acceptable Manufacturers and Products
 1. Davis- Palette Lounge Seating Series
 2. Substitutions: Under provisions of Section 01631.
- B. CH-3:
 1. Manufacturer: Davis
 2. Line: Palette Lounge Seating
 3. Description: (2) sets of two armless seat units connected by corner table (four armless seats total w/ corner table)
 4. Dimensions: Layout as shown on drawing
 5. Finishes: Metal Frame: Standard
Veneer Platform: Standard-tbd
Upholstered Seat & Back: COM fabric \$50/ yard
 6. Note: Ganging connectors as required

2.4 HOLD ROOM DINING CHAIR

- A. Acceptable Manufacturers and Products
 1. Davis – Prime Chair Series
 2. Substitutions: Under provisions of Section 01631.
- B. CH-4:
 1. Manufacturer: Davis
 2. Line: Prime Chair Series
 3. Description: Armless ribbed wood shell with upholstered seat, liner, four legs
 4. Dimensions: 19" W x 21" D x 32" H SH:18"
 5. Finishes: Metal Frame: Standard
Wood Finish: Standard beech – tbd
Upholstered Seat: Grade 2
 6. Note: : Glides to be included

PART 3: TABLES

3.1 OCCASIONAL TABLES- PUBLIC AREAS

- A. Acceptable Manufacturers and Products
 - 1. Bernhardt- Divide
 - 2. Substitutions: Under provisions of Section 01631.
- B. T-1:
 - 1. Manufacturer: Bernhardt
 - 2. Line: Divide
 - 3. Description: Wood Occasional table w/ tempered glass top
 - 4. Dimensions: 24" Dia.
 - 5. Finishes: Standard wood veneer w/ aluminum detail

3.2 HOLD ROOM DINING TABLE

- A. Acceptable Manufacturers and Products
 - 1. Davis- Veer Table Series
 - 2. Substitutions: Under provisions of Section 01631.
- B. T-2:
 - 1. Manufacturer: Davis
 - 2. Line: Veer Table Series – Indoor
 - 3. Description: Circular laminate round table w/ wood edge & stainless steel column base
 - 4. Dimensions: 42" Dia. x 29" H
 - 5. Finishes: HPL Table Top: Standard - tbd
Metal Base: Standard- tbd

PART 4 :MISCELLANEOUS FURNITURE & ACCESSORIES

4.1 WASTE RECEPTACLES

- A. Acceptable Manufacturers and Products
 - 1. Landscapeforms Inc- Lakeside Waste Receptacle
 - 2. Substitutions: Under provisions of Section 01631.
- B. M-1:
 - 1. Manufacturer: Landscapeforms Inc.
 - 2. Line: Lakeside Waste Receptacle
 - 3. Description: Steel freestanding w/ top opening, Cut grass design pattern
 - 4. Dimensions: 21" Dia. x 36" H (30 gallon capacity)
 - 5. Finishes: Metal: Standard – tbd
 - 6. Note: Includes removable black polyurethane liner

4.2 WASTE/ RECYCLING RECEPTACLES

- A. Acceptable Manufacturers and Products
1. Magnuson Group Inc, - Valuta Series
 2. Substitutions: Under provisions of Section 01631.
- B. M-2:
1. Manufacturer: Magnuson Group
 2. Line: Valuta Series
 3. Description: Recycling Receptacles- modular unit includes:
Waste (40 Gallon)
Paper (20 Gallon)
Cans/ Plastic/ Glass (20 Gallon)
 4. Dimensions: 20 Gallon Unit: 9" W x18" D x 33" H
40 Gallon Unit: 18" W x18" D x 33" H
Total Configuration: 36" W x18" D x 33" H
 5. Finishes: Powdercoat: Standard – tbd
 6. Note: Includes internal bag holding system & lettering
indentifying receptacle type & connecting
hardware as required for modular unit.

4.3 PLANTERS

- A. Acceptable Manufacturers and Products
1. Landscapeforms Inc- Plaza Planter
 2. Substitutions: Under provisions of Section 01631.
- B. M-3:
1. Manufacturer: Landscapeforms Inc.
 2. Line: Plaza Planter
 3. Description: Freestanding wood slat panel planter w/
metal corners and adjustable stainless steel
glides
 4. Dimensions: 48" Square x 32" H (Capacity 159 gallon)
 5. Finishes: Wood: Standard interior grade w/special stain-tbd
Metal Powdercoat Corners: Standard- tbd
 6. Note: Include coordinating molded fiberglass liner w/
drain hole on metal grid bottom.

4.4 ANTI- FATIGUE INDUSTRIAL MATS

- A. Acceptable Manufacturers and Products
1. Mats Inc.
 2. Substitutions: Under provisions of Section 01631.
- B. M-4A:

1. Manufacturer: Mats Inc.
2. Line: Comfort Stance II
3. Description: Anti- Fatigue Mat
4. Dimensions: 3' x 60' -Standard Roll
5. Finishes: Standard Vinyl Color: tbd

C. M-4B:

1. Manufacturer: Mats Inc.
2. Line: Comfort Stance II
3. Description: Anti- Fatigue Mat
4. Dimensions: 3' x 12' -standard
5. Finishes: Standard Vinyl Color: tbd

D. M-4C:

1. Manufacturer: Mats Inc.
2. Line: Comfort Stance II
3. Description: Anti- Fatigue Mat
4. Dimensions: 2' x 40' (Custom length)
5. Finishes: Standard Vinyl Color: tbd

4.5 AIRPORT SECURITY STANCHIONS

A. Acceptable Manufacturers and Products

1. Lavi Industries
2. Substitutions: Under provisions of Section 01631.

B. M-5:

1. Manufacturer: Lavi Industries
2. Line: Beltrac 3000 Series
3. Description: Security stanchion base, post, & slow retracting belt w/ standard 4- way connection point
4. Dimensions: Base: 14" Dia x 40"H
Post Dia: 2-3/4"
Belt Length: 7'-0"
5. Finishes: Belt: Standard Color selections
Base & Post: Aluminum: Standard - tbd
6. Note: Provide as layout/ quantity shown on drawings.

PART 5 : INSTALLATION & PROCEDURES

5.1 EXAMINATION

- A. Vendor shall perform field inspection of the project site to verify all conditions effecting the proposed installation.

- B. The vendor shall review the drawings, specifications, and other related documents.
- C. The vendor shall report any conditions that would adversely affect the installation. By proceeding with the installation the vendor is indicating acceptance of existing conditions.

5.2 PREPARATION

- A. The Prime Contractor shall pre-clean/prepare the work site floor surfaces prior to delivery of the systems furniture.
- B. Vendor shall verify appropriate cleaning procedures with the Prime Contractor; shall clean floor surfaces free of dust, debris, and loose particles immediately prior to installation of systems furniture, and shall maintain cleanliness throughout the entire installation.

5.3 INSTALLATION

- A. Vendor shall provide a written schedule indicating compliance with the project schedule.
- B. Vendor shall comply with all manufacturers' site preparation, handling, storage, and installation requirements.

5.4 PREPARTATION

- A. Vendor shall provide electrician to connect electrical on system panels, receptacles, etc. to building's electrical power and data.

5.5 CLEANING

- A. Vendor shall wipe down and inspect all components at time of installation, and immediately prior to acceptance inspection, to ensure the installation is complete and free from defects- ready for occupancy and in show room condition.
- B. Vendor shall repair all defects in a manner suitable to the Client, or shall replace the defective/damaged components promptly at the sole discretion of the Client.
- C. Vendor shall perform daily cleaning, inspection cleaning, final cleaning and other final procedures as required by the Client.
- D. Vendor shall provide maintenance instructions to the Client.

END OF SECTION

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MN**

**SECTION 12520 –
GATE SEATING**

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 SECTION INCLUDES

- A. Gate seating.

1.3 SYSTEM DESCRIPTION

- A. Public seating system designed for airports.

1.4 QUALITY ASSURANCE

- A. All products shall be standard manufacturer's products unless otherwise specified.
- B. Product Improvements: Equipment provided shall incorporate manufacturer's design improvements and materials current at time of shipment, provided that such improvement and material are consistent with the intent of these specifications.

1.5 SUBMITTALS

- A. Shop Drawings showing all equipment to be furnished with details of accessories to be supplied.
- B. Samples of material and color finish as requested by Architect.
- C. Installation, operation, and maintenance instructions.
- D. Written warranty to the Owner upon completion in compliance with Section 01740 - Warranties.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01361 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for local and regional materials and distance from Project site.
2. Indoor Air Quality Certificates:
 - a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.

1.7 QUALIFICATIONS

- A. Manufacturer:
 1. The furniture manufacturer shall be a company specializing in the manufacture of commercial office furniture for a minimum of five (5) years.
- B. Vendor:
 1. The installing Vendor's local office shall have been established for a minimum of five (5) years.
 2. The Vendor shall be a company specializing in furnishing, delivering and installing commercial systems furniture, and shall have substantial experience with the manufacturer's products. Installation personnel shall be readily identifiable by uniform or other means acceptable to the Client.

1.8 REGULATORY REQUIREMENTS

- A. Fire Safety Characteristics: Provide material identical to that tested for the following fire performance characteristics, per test method indicated below, performed by UL or other testing and inspection organization acceptable to the Building Code Official. Identify components with appropriate markings of applicable testing and inspecting organizations placed out of general view (semi-concealed, but readily accessed without dismantling the component or assembly):
 1. Pass Critical Radiant Flux Test (Flame Spread Index) – Class 1 – NBS minimum 0.455 watts per cubic centimeter, per NFPA 258/ASTM E 648.
 2. Pass Smoke Chamber Test – 25 or less per UL 992.
 3. Pass Smoke Density no greater than 450 per NFPA 25/ASTM E 662.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Products shall be new and shall be delivered in the manufacturer's original and unopened packaging or crating. Under certain pre-approved conditions, the Client may allow products to be delivered "blanket wrapped", if transported by manufacturer owned vehicles, and all products are clearly identified.

- B. Products shall be packaged to prevent damage during transit and storage.
- C. Vendor shall be responsible for the receipt, handling and storage of products and supplies necessary for a complete installation.
- D. Vendor shall comply with manufacturer's requirements for handling and shall take all necessary precautions to prevent damage.
- E. Vendor shall be fully responsible to completely remove all packaging, crating, and expended installation/cleaning supplies from property on a daily basis – none shall be allowed to accumulate on site. All expended materials shall be recycled or disposed of in a legal manner.

1.10 COORDINATION

- A. The Vendor and the Furniture manufacturer shall coordinate and cooperate with Client representatives and the Interior Designer.
- B. Vendor shall attend all project meetings as requested by the Client and/or Interior Designer.
- C. **All color and finish selections will be made post bid.** The finish and color selections will be issued as part of a master color document once all manufactures finish material submittals have been received and selected.

1.11 WARRANTY

- A. All products shall have a minimum of 10-year written non-prorated warranty, unless industry standards dictate otherwise, agreeing to replace without charge all defective materials, workmanship, and/or installation.
- B. Removal and replacement of defective or non-conforming product or installation shall be accomplished in a manner to minimize disturbance to Client functions.
- C. Each manufacturer must provide statement with bid describing and guaranteeing the warranties for all furniture products and components.
- D. Replacement materials: After completion of work, furnish accessory components as required. Furnish replacement materials from same production run as materials installed. Package replacement materials with protective covering and identified with appropriate labels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturers:
 - 1. Zoefitig – Infinite Upholstered with arms
 - 2. Arconas- Flyaway Series with arms
 - 3. Herman Miller- EamesTandem Sling Seating with arms
- B. Substitutions: Under provisions of Section 01631.
- C. Basis-of-Design Product: The design is based on the products as named below. Subject to compliance with requirements, provide either the named products or comparable products by one of the manufactures specified. Comparable products are subject to review and approval through the submittal process specified.
- D. Standard Gate Seating- Single Run
 - 1. Manufacturer: Zoefitig
 - 2. Line: Infinite Upholstered (PVC) with arms
 - 3. Style: Single straight Units
 - 4. Description: Vinyl upholstered seat and back on structural flexible polyurethane foam. Arms shall be located between each seat & at every row's end.
Free-standing adjustable glides with anti-slipfoot.
 - 5. Construction: Engineered metal replacement composite seat chassis, legs, and arms.
 - 6. Dimensions: D: 28" x H 34" x SH:17"
Overall Width: Varies per layout
 - 7. Finishes: Seat & Back: Vinyl (PVC) – Standard/ Grade 1
Frame & Legs: RAL finish- tbd
 - 8. Note: Refer to furniture plans for layout and quantity
- E. Standard Gate Seating- Back to Back Unit:
 - 1. Manufacturer: Zoefitig
 - 2. Line: Infinite Upholstered (PVC) with arms
 - 3. Style: Back to Back Units
 - 4. Description: Vinyl upholstered seat and back on structural flexible polyurethane foam. Arms shall be between each seat & at every row's end.
Free-standing adjustable glides with anti-slipfoot.
 - 5. Construction: Engineered metal composite seat chassis, legs and arms.
 - 6. Dimensions: D: 60" x H 34" x SH:17"
Overall Width: Varies per layout
 - 7. Finishes: Seat & Back: Vinyl (PVC) – Standard/ Grade 1
Frame & Legs: RAL finish- tbd
 - 8. Note: Refer to furniture plans for layout and quantity

- F. Separate quotes shall be given for each type of seating listed. All parts/pieces required for a complete product installation shall be included.

2.2 ALTERNATE PRICING

- A. The following product listed shall be provided as a seating alternate to the specified product listed above. A separate quote must be given for this product and it shall be identified as alternate product.
- B. Product:
 - 1. Zoeftig – Infinite Polyurethane (PU) seats, with arms
 - 2. Same layout/ configuration and components as original specification.
- C. Substitutions: Under provisions of Section 01631

PART 3 INSTALLATION & PROCEDURES

3.1 EXAMINATION

- A. Vendor shall perform field inspection of the project site to verify all conditions effecting the proposed installation.
- B. The vendor shall review the drawings, specifications, and other related documents.
- C. The vendor shall report any conditions that would adversely affect the installation. By proceeding with the installation the vendor is indicating acceptance of existing conditions.

3.2 PREPARATION

- A. The Prime Contractor shall pre-clean/prepare the work site floor surfaces prior to delivery of the systems furniture.
- B. Vendor shall verify appropriate cleaning procedures with the Prime Contractor; shall clean floor surfaces free of dust, debris, and loose particles immediately prior to installation of systems furniture, and shall maintain cleanliness throughout the entire installation.

3.3 INSTALLATION

- A. Vendor shall provide a written schedule indicating compliance with the project schedule.

- B. Vendor shall comply with all manufacturers' site preparation, handling, storage, and installation requirements.

3.4 CLEANING

- A. Vendor shall wipe down and inspect all components at time of installation, and immediately prior to acceptance inspection, to ensure the installation is complete and free from defects- ready for occupancy and in show room condition.
- B. Vendor shall perform daily cleaning, inspection cleaning, final cleaning and other final procedures as required by the Client.

END OF SECTION 12520

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 13700 – PART 1542 COMPUTER
CONTROLLED ACCESS
SYSTEM (CCAS) AND CCTV SYSTEM**

PART 1 - GENERAL

1.1 SUMMARY

- A. The scope of the work includes complete and integrated 49 CFR Part 1542 Computer Controlled Access System (CCAS). The integrated CCAS shall include access controls, CCTV and other systems as specified herein and indicated on the drawings.
- B. The work includes furnishing all labor, materials, tools, and equipment, and the performance of all operations necessary for coordinating, detailing, fabricating, inspecting, documenting, delivering, installing and testing the hardware, software and firmware for a complete and integrated CCAS in accordance with this section, including but not limited to the following:
 - 1. Operator Consoles and Photo Identification System.
 - a. Security Center Security Control Console (SCC) as indicated on drawings.
 - b. Photo Identification Subsystem (PIDS) Terminal and Badging.
 - 2. Paging and E-mail notifications
 - a. All alarms shall be transmitted via paging and e-mail system in addition to the SCC. The intent is to alert assigned personnel. Provide system necessary for remote notification as specified in paragraph 2.3.E.
 - 3. Data Processing Subsystem (DPS)
 - a. Fault Tolerant Servers, as indicated on the drawings and specified herein.
 - 4. Data Transmission Subsystem (DTS).
 - a. Network Based Intelligent Field Panels (IFPs).
 - 5. Controlled Access Subsystem (CAS).
 - a. Card Readers with PINpads.
 - b. Electronics Interface Boxes (EIB).
 - c. Exit Pushbuttons.
 - d. Interface with door locking sub-system.
 - e. Interface with delayed egress Panic Hardware.
 - f. Gate Control Panel for vehicle gates.
 - g. Signage.
 - 6. Intrusion Detection Subsystem (IDS).
 - a. Tamper Switches.
 - b. Door and Gate Position Switch (Balanced Magnetic Switch).
 - c. Duress Alarm Devices.
 - d. Vehicle Presence Sensor (ground loops).
 - 7. Surveillance and Assessment Subsystem (SAS).
 - a. Complete Integrated Video Management System.
 - b. Day / night IP Fixed Cameras.
 - c. Day / night IP Autodome PTZ Cameras.
 - d. Camera Mounting.
 - e. Camera Power Supply and Cabling.
 - f. Video Servers and Storage.

- g. Intelligent Video Analytics: Intelligent Video Analytics (IVA) is a separate system that is not required to be integrated with the Video Servers and Storage (NVR) and CCAS other than to transmit alarms to CCAS. References throughout the specifications for integration of the IVA apply only if the selected products normally offer those features.
- 8. Other CCAS Components.
 - a. Battery Backup Units (BBU).
 - b. Workstations.
 - c. Color Video Camera.
 - d. Photographic Lighting Unit.
 - e. Signature Input Unit.
 - f. ID Badge Printer.
 - g. ID Badges.
 - h. ID Badge Programmer.
 - i. ID Badge Encoder / Decoder.
 - j. Die Cutter.
 - k. Laminator.
 - l. Wireless transmitter / receiver.
- 9. Electrical Power Communication and Control Wiring and Conduit System.
 - a. Provide all conduit and wiring required to provide a complete and operational system.
- 10. Miscellaneous Provisions.
 - a. Nonstandard Test Equipment, Tools, Adaptors and Fittings.
 - b. Portable Intelligent Field Panel Analyzer shall include a laptop computer similar in capacity of administrative workstation.
- 11. Other Items.
 - a. Connections to existing perimeter gates as indicated on drawings.

1.2 RELATED WORK

- A. All Division 16 Electrical sections apply to the work specified in this section.
- B. The CCAS shall interface with the following Contract items to be provided in other sections:
 - 1. Network Electronics. (Provided under this contract).
 - 2. Uninterruptible Power Supplies. (Provided under this contract).

1.3 REFERENCES, CODES AND REGULATIONS

- A. It is not the intention of this section to provide all details of design and fabrication. The Contractor shall ensure that the equipment has been designed and fabricated in accordance with applicable engineering codes and standards. When specific requirements are stated in this section that exceed and / or overlap those requirements of the codes and standards referenced herein, this section shall govern.
- B. This section is based on the latest applicable codes and standards in force at the time the Specification is issued for bid. Should the applicable codes or standards listed herein be revised before or after the award of the Contract, the Contractor shall inform the Architect / Engineering (A/E) immediately, in writing, upon receipt of such information. Before adoption of any subsequent issue, the Contractor shall identify the changes in writing and shall not proceed with engineering, material and / or fabrication changes without A/E's written permission.

- C. Design, material, fabrication, testing, inspection, certification, documentation and operation shall conform to the following referenced codes, regulations, standards and specifications.
1. Regulations Transportation Security Administration 49 CFR:
 - a. Part 1520 - Protection of Sensitive Security Information.
 - b. Part 1540 - Civil Aviation Security.
 - c. Part 1542 - Airport Security.
 - d. Part 1544 - Aircraft Operator Security.
 2. Guidelines.
 - a. Recommended Security Guidelines for Airport Planning, Design and Construction - DOT/FAA/AR-00-52 June 2001.
 - b. RTCA/DO-230 Standards for Airport Security Access Control Systems.
 3. American National Standards Institute (ANSI):
 - a. C2 - National Electrical Safety Code.
 - b. C37.90A - Guide for Surge Withstand Capability Tests.
 - c. C62.41 - Guide for Surge Voltage in Low Voltage AC Power Circuits.
 - d. C63.12 - Recommended Practice on Procedures for Control of System Electromagnetic Compatibility.
 - e. X3.4 - American Standard Code for Information Interchange (ASCII).
 4. American Society of Testing and Materials (ASTM):
 - a. ASTM B 8 - Concentric-Lay Stranded Copper Conductors.
 - b. ASTM D 635 - Rate of Burning and / or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
 5. Federal Communications Commission (FCC):
 - a. FCC Rules and Regulations, Part 15 and 68.
 6. General Services Administration (GSA):
 - a. FS W-A-450B - Federal Specification (Interim): Components for Interior Security Alarm Systems.
 7. Institute of Electrical and Electronics Engineers (IEEE):
 - a. IEEE Transaction Volume COM-21 - Lightning Surges in Open Wire, Coaxial and Paired Cables.
 - b. IEEE C62-1990 - Guides and Standards for Surge Protection.
 - c. IEEE 802 - Standard for Local Area Networks.
 - d. IEEE 802.2 - Standards for Local Area Networks: Media Access Control (MAC) Bridges.
 - e. IEEE 802.3 - Ethernet local area network.
 - f. IEEE 802.11a - Wireless local area network.
 8. International Standards Organization (ISO):
 - a. ISO/IEC 8802-3 - Information Processing System - Local Area Networks - Part 3.
 - b. ISO/IEC 8802-4 - Information Processing System - Local Area Networks - Part 4.
 9. Insulated Cable Engineer Association (ICEA):
 - a. S-19-81 - Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 10. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250 (1985) - Enclosures for Electrical Equipment.
 11. National Fire Protection Association (NFPA):
 - a. NFPA 70 (1996) - National Electrical Code (NEC).
 12. Occupational Safety and Health Act (OSHA):
 - a. OSHA 2206 - General Industry Safety and Health Standards.
 13. Underwriters' Laboratories (UL):
 - a. UL 6 - Rigid Metal Electrical Conduit.

- b. UL 198 (1988) - Fuses.
- c. UL 294 (1987) - Standard for Access Control Systems.
- d. UL 437 - Key Locks.
- e. UL 512 (1987) - Fuse Holders.
- f. UL 634 (1985) - Connectors and Switches for Use with Burglar Alarm Systems.
- g. UL 639 (1986) - Intrusion Detection Units.
- h. UL 796 (1984) - Printed Circuit Boards.
- i. UL 1076 (1988) - Proprietary Burglar-Alarm Units and Systems.
- j. UL 1449 (1985) - Standard for Safety Transient Voltage Surge Suppressors.

14. Applicable Federal, state and local laws, regulations, ordinances and codes.

- D. In the event of conflicting requirements between the authorities cited above or between authorities cited and those specified, such disagreements shall be resolved by the A/E or Owner.
- E. Nothing in this section, including invocation of certain specific codes, standards or specifications, shall relieve the Contractor of the responsibility for compliance with the codes, standards or specifications which are generally recognized to be applicable to the work specified herein.

1.4 SYSTEM DESCRIPTION

- A. The Computer Controlled Access System (CCAS) as outlined in this section and detailed in Part 2 of this document is the key central component for managing physical security and the bridge between physical and logical security for this project. The system shall provide a variety of integral functions including the ability to regulate access and egress; provide identification credentials; monitor, track and interface alarms; and view, record and store digital surveillance video linked to CCAS events.
- B. The CCAS shall utilize a single seamlessly integrated relational database for all functions utilizing a fully multi-tasking multithreading Microsoft Windows 2000/2003 or Windows XP Operating System. CCAS software shall be written so that all modules (Access Control, Alarm Monitoring, ID / Credential Management, Visitor Management and Digital Video Management) are developed and built from a unified single 32-bit source code set.
- C. Upgrades or expansion of the CCAS to a larger size system in scale shall not require installation of a different and / or new CCAS application or require the administrator / operator to learn a different and / or new interface from the previous version.
- D. CCAS software shall be written using Unicode format. Unicode enables a single software product to be targeted across multiple platforms and languages without re-engineering and allows for data to be transported through different systems without corruption.
- E. CCAS software shall be written to Microsoft's published standards for User Interface Design, Secure Coding Practices and Database Implementation Guidelines (Microsoft⁷ Open Database Connectivity (ODBC) interface).

- F. CCAS software shall be written to ISO Standards on Software Development for C++ and C#.
- G. CCAS and its software shall seamlessly interface with and monitor intelligent system controllers, reader interface modules, I/O panels, burglar alarm panels, burglar alarm panel receivers, biometric devices, personal protection devices, intercom systems, fire alarm panels (secondary monitoring only), building management systems and digital video recorders approved for use by the CCAS manufacturer.
- H. The CCAS shall be able to communicate via RS-485, RS-232, TCP-IP/Ethernet and dial-up via modem.
- I. All tasks shall be accessible from any compatible client workstation on the network utilizing one or all of the following.
 - 1. Traditional client server architecture.
 - 2. N-tier architecture where the CCAS shall support the expansion of the system architecture and allow for end-user deployment based upon their system architecture needs. The CCAS shall allow but not require the separation of the database, application server, web server and client interface. The system shall require that all connections to the database are performed through a trusted link from the client or internet browser interface.
 - 3. Centralized distribution (publishing) of applications using Windows Terminal Server and Citrix on Windows, Unix, Linux or Apple Macintosh based systems through any compatible internet browser application and / or by means of a mobile computing platform using a wearable computer, Tablet PC or PDA device.
- J. The CCAS shall utilize an open architecture where all data must reside on a single database and must be accessible in real time to every / any CCAS workstation or web based client connected to the network. The system shall be configurable to support all of the following databases: Microsoft SQL Server 2000 Personal and Standard editions with SP3a, Microsoft SQL Server 2005 Standard and Enterprise editions and Microsoft SQL Server 2005 Express, Oracle Server 9.i. and Oracle Server 10g. Oracle data may reside on Windows or UNIX platforms.
- K. The system architecture shall support Microsoft Windows Clustering, Hot-Standby, Fault Tolerant Servers and Fault Tolerant Hot Standby Servers.
- L. The CCAS shall support an unlimited number of Access Control Readers, an unlimited number of Inputs / Outputs, an unlimited number of Client Workstations, and an unlimited number of Cardholders

1.5 SUBMITTALS

- A. The Contractor shall submit all items in accordance with the requirements of, Section 01300 - SUBMITTALS.
- B. Unless noted otherwise in General Conditions, within thirty (30) days of award of Contract, the Contractor shall submit manufacturer's specification or data sheets for all subsystem equipment to be utilized in the CCAS.
- C. The Contractor shall submit the following:
 - 1. Shop Drawings: Provide complete shop drawings which include the following:

- a. Indicate all system device locations on 1/8" scale architectural floor plans. No other system(s) shall be included on these plans.
 - b. Include full schematic wiring information on these drawings for all devices. Wiring information shall include cable type, conductor routings, quantities, and connection details at device.
 - c. Include a complete CCAS one-line, block diagram.
 - d. Include a statement of the system sequence of operation of each access control portal and overall system performance.
 - e. Include a statement indicating seamless integration of various systems.
2. Product Data: Provide complete product data that includes the following:
 - a. Manufacturer's technical data for all material and equipment at the system and sub system level to be provided as part of the CCAS.
 - b. A system description including analysis and calculations used in sizing equipment required by the CCAS. The description shall show how the equipment will operate as a system to meet the performance requirements of the CCAS. The following information shall be supplied as a minimum:
 - 1) Server(s) processor(s), disk space and memory size.
 - 2) Description of site equipment and its configuration.
 - 3) Network bandwidth, latency and reliability requirements.
 - 4) Backup / archive system size and configuration.
 - 5) Start up operations.
 - 6) System expansion capability and method of implementation.
 - 7) System power requirements and UPS sizing.
 - 8) Device / component environmental requirements (cooling and or heating parameters).
 - 9) A description of the operating system and application software.
 3. Contract Close-Out Submittals: Provide three sets of hard copy manuals and three sets electronic format manuals in PDF format including operating instructions, maintenance recommendations and parts list. Include wiring and connection diagrams modified to reflect as-built conditions as part of this submittal.
 4. Manuals: Final copies of the manuals shall be delivered within thirty (30) days after completing the installation test. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of the contractor responsible for the installation and maintenance of the system and the factory representatives for each item of equipment for each system. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation test shall include all modifications made during installation, checkout, and acceptance testing. The manuals shall consist of the following:
 - 1) Functional Design Manual: The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included.
 - 2) Hardware Manual: The manual shall describe all equipment furnished including:
 - a) General description and specifications.
 - b) Installation and check out procedures.

- c) Equipment layout and electrical schematics to the component level.
 - d) System layout drawings and schematics.
 - e) Alignment and calibration procedures.
 - f) Manufacturers' repair parts list indicating sources of supply.
 - 3) Software Manual: The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:
 - a) Definition of terms and functions.
 - b) System use and application software.
 - c) Initialization, start up, and shut down.
 - d) Reports generation.
 - e) Details on forms customization and field parameters.
 - 4) Operators Manual: The operators' manual shall fully explain all procedures and instructions for the operation of the system including:
 - a) Computers and peripherals.
 - b) System start up and shut down procedures.
 - c) Use of system, command, and applications software.
 - d) Recovery and restart procedures.
 - e) Graphic alarm presentation.
 - f) Use of report generator and generation of reports.
 - g) Data entry.
 - h) Operator commands.
 - i) Alarm messages and reprinting formats.
 - j) System permissions functions and requirements.
 - 5) Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- D. As-Built Drawings: During system installation, the Contractor shall maintain a separate hard copy set of drawings, elementary diagrams, and wiring diagrams of the CCAS to be used for record drawings. This set shall be accurately kept up to date by the Contractor with all changes and additions to the CCAS. Copies of the final as-built drawings shall be provided to the A/E in DXF or DWG format.

1.6 ABBREVIATIONS

- A. The following abbreviations are used in this document:
- ABA - American Banking Association
 - ANSI - American National Standards Institute
 - AOA - Air Operations Area
 - AOT - Accumulated Outage Time
 - ARFF - Airport Rescue and Fire Fighting
 - ASCII - American Standard Code for Information Interchange
 - ASTM - American Society for Testing and Materials
 - AWG - American Wire Gauge
 - BMS - Balanced Magnetic Switch
 - bps - Bits Per Second
 - CAS - Controlled Access Subsystem
 - CCAS - Integrated Computer Controlled Access Controls and CCTV System
 - CCD - Charged Coupled Device
 - CCTV - Closed Circuit Television

CFR	-	Code of Federal Regulations
CPU	-	Central Processing Unit
DAA	-	Duluth Airport Authority (the Owner)
DLH	-	Duluth International Airport
DPS	-	Data Processing Subsystem
DTS	-	Data Transmission Subsystem
DVR	-	Digital Video Recorder
EIA	-	Electronic Industries Association
EIB	-	Electronics Interface Box
FAA	-	Federal Aviation Administration
FAR	-	Federal Aviation Regulation
FCC	-	Federal Communications Commission
FM	-	Factory Mutual
F/O	-	Fiber Optics
FS	-	Federal Specification
GDT	-	Graphics Display Terminal
GSA	-	General Services Administration
HVAC	-	Heating, Ventilation and Air Conditioning
ICEA	-	Insulated Cable Engineer Association
ID	-	Identification
IDS	-	Intrusion Detection Subsystem
IEEE	-	Institute of Electrical and Electronics Engineers
IFP	-	Intelligent Field Panel
I/O	-	Input / Output
ISA	-	Instrument Society of America
KCS	-	Key Control Subsystem
KVA	-	Kilo-Volt-Ampere
LED	-	Light Emitting Diode
NCTA	-	National Cable Television Association
NEC	-	National Electrical Code
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
OSHA	-	Occupational Safety and Health Act
PIDS	-	Photo Identification Subsystem
PIN	-	Personal Identification Number
PTZ	-	Pan / Tilt / Zoom
PVC	-	Polyvinyl-Chloride
RF	-	Radio Frequency
SA	-	Secured Area
SAS	-	Surveillance and Assessment Subsystem
SCC	-	Security Control Console
STS	-	Signal Transmission Subsystem
TDT	-	Test Duration Time
TSA	-	Transportation Security Administration
UL	-	Underwriters' Laboratories
UPS	-	Uninterruptible Power Supply
VCS	-	Voice Communications Subsystem
VDT	-	Video Display Terminal

1.7 GLOSSARY OF TERMS

For the purpose of this document, the following terms are defined:

- A. Access Mode - The mode of operation in which the CCAS shall only annunciate tamper and trouble conditions at a monitored point. Alarm conditions shall not be annunciated in this mode. (Also referred to as alarm shunting or masking.)
- B. Accountability - A feature of the CCAS which keeps track of an individual's last use of a card reader.
- C. Acknowledge - The action taken by a SCC operator to indicate that they are aware of a specific off-normal event. Acknowledging an event shall silence the audible enunciator at the SCC.
- D. Advisory - An off-normal event providing information about controlled access, key control and data processing functions.
- E. Alarm - An off-normal event at a secured, monitored point indicating the supervision circuitry has detected a condition for which the sensor was designed to react.
- F. Card Reader - A device located at selected AOA/SA access points that shall automatically decode the information from an ID badge / keycard and process the access request locally.
- G. Cipher Code - A code number, between 5 and 9 digits in length (site-selectable), associated with an access point and used by an airline / airport group to request access at that point when it is controlled via the PIN pad only.
- H. Clear - The action taken by a SCC operator to remove an off-normal event display from the Video Display Terminal (VDT) at the SCC. Clearing an event shall allow the operator to annotate the alarm record with the cause of the alarm and a summary of the action taken.
- I. Control Level - 1 of 2 additional measures (keyswitch activation or password input) that may be assigned to a keyboard control function to further restrict its use.
- J. False Alarm - An alarm received for which there is no apparent cause (reason unknown). A false alarm may be due to system malfunction, environmental changes or electromagnetic/radio frequency (RF) interference.
- K. Inactive Mode - The mode of operation during which a point shall not be monitored, and alarm, tamper and trouble conditions at that point shall not be annunciated.
- L. ID Badge / keycard - An encoded device that will be presented at a card reader for automatic verification that the access request is authorized at the associated access point.
- M. Keyboard Control Function - An operator-initiated system command, such as securing or accessing a monitored point, entered via a console / terminal keyboard.
- N. Keycard Number - A number assigned to each ID badge / keycard user and linked by the system to the internal coding of the ID badge / keycard. After being linked, the keycard number shall be used by console / terminal operators when performing keyboard control functions associated with the Controlled Access Subsystem, such as, modifying database records and requesting displays, printouts and historical logs.

- O. Line Supervision - The monitoring of subsystem signal paths to verify their integrity.
- P. Nuisance Alarm - An alarm caused by the system detecting changes in its operating environment that it was designed to detect, but that do not represent a security threat. A nuisance alarm may be caused by wildlife, vegetation or weather conditions.
- Q. Off-Normal Event - A change of status signal from a monitored point to include alarm, tamper and trouble conditions and advisories.
- R. Operator Level - A number assigned to each console/terminal operator authorizing access to all keyboard control functions and database fields associated with that number.
- S. Password - A code or word or number, between 5 and 9 alphanumeric characters (site-selectable) in length, used by authorized console / terminal operators to sign on and off the system and to perform keyboard control functions with a Control level 2 restriction.
- T. Personal Identification Number (PIN) - A code number, between 4 and 9 digits in length, assigned to each ID badge / keycard user for use at access points equipped with PIN pads.
- U. Reset - A signal indicating that the status of a monitored point has returned to normal after the occurrence of an alarm, tamper or trouble condition and can be cleared by an operator.
- V. Secure Mode - The mode of operation during which a point shall be monitored for alarm, tamper and trouble conditions and shall annunciate them as specified herein.
- W. Security Area - An area with 1 or more card reader-controlled access points. Security areas shall be assigned individually or in groups to each ID badge / keycard user to authorize access to all access points associated with each area (subject to time zone constraints).
- X. Shall - Whenever the word "shall" is used in this section, it indicates a mandatory requirement that the Contractor must provide or fulfill to comply with the intent of this section.
- Y. Stop List - A computer-generated listing of all ID badges / keycards that have been deleted, deactivated or flagged to preclude their use (e.g., lost, stolen, etc.).
- Z. Tamper - An off-normal event at a secured or access monitored point indicating the tamper switch has been activated.
- AA. Time Zone - A pre-determined (programmable) schedule, consisting of the days of the week and the hours in each day, when an -ID badge / keycard user is authorized access to a particular security area or when the card readers / PINpads associated with a security area are operational.
- BB. Trouble - An off-normal event at a secured or accessed monitored point indicating an equipment malfunction; a loss of power; a loss of communications; and / or a single break, a single ground fault or a wire-to-wire short in signal wiring.

- CC. Will - Whenever the word "will" is used in this section, it indicates a mandatory requirement that the Contractor must provide or fulfill to comply with the intent of this section.

1.8 OPERATIONAL REQUIREMENTS

A. General

1. The CCAS shall be accessible and controllable via the SCC located in the airport Security Center so as to perform the security-related functions described herein.
2. The desired goal is operation of the CCAS by security and operations personnel with minimal technical training.
3. The CCAS shall provide continuous year-round, twenty-four (24) hours-per-day, seven (7) days-per-week operation.
4. The CCAS shall differentiate between group types of AOA/SA access points as indicated on the drawings and specified herein, and shall provide controlled access, intrusion detection, visual surveillance and data / video / audio signal communication as specified in the specifications and drawings.

B. System Capabilities

1. The CCAS shall perform the following functions:
 - a. Continuously collect and process status information from all monitored points.
 - b. Build and maintain monitored point, ID badge / keycard user and other system databases.
 - c. Electronically supervise wiring to and from all monitored points.
 - d. Regulate personnel and vehicle access and maintain accountability at controlled access points.
 - e. Detect alarm, tamper and trouble conditions and advisories at monitored points, as appropriate.
 - f. Initiate and annunciate duress alarms.
 - g. Visually monitor selected remote locations.
 - h. Automatically / manually display / record CCTV camera outputs. Display alarm event CCTV camera output. Record all alarm events by multiple cameras as indicated on the drawings.
 - i. Audibly and visibly annunciate all alarm, tamper and trouble conditions, advisories and keyboard control function input errors.
 - j. Print all alarm, tamper, and trouble conditions, advisories, executed keyboard control functions and keyboard control function input errors.
 - k. Regulate mechanical key issue / return.
 - l. Display and / or print system status information on demand and automatically on a pre-determined (programmable) time schedule.
 - m. Store all alarm, tamper and trouble conditions, advisories, executed keyboard control functions, subsystem test results and access control information.
 - n. Dump / reload historical records, system programs and database information.
 - o. Display and / or print historical logs on demand and automatically on a pre-determined (programmable) time schedule.
 - p. Perform specified keyboard control functions on demand and automatically on a pre-determined (programmable) time schedule.
 - q. Communicate with selected remote locations.
 - r. Provide a continuous source of power for subsystem operation.
 - s. Produce a combination photo ID badge / keycard.

- t. Perform system reprogramming and regeneration and background processing.
 - u. Interface with related items by others as specified.
 - v. Allow the operator to call up and view CCTV video from within the CCAS by selection of an alarm event on screen without having to manually access event in CCTV client application
 - w. Automatically send real time alarm event metadata to the CCTV application database.
2. The CCAS shall meet the following response requirements:
- a. Control shall be transferred from the primary central processor to the hot-standby secondary central processor (or FT server) within 1 second.
 - b. All Intelligent Field Panels (IFPs) in the system shall be polled for status changes at least once every second.
 - c. With a local database of at least 5,000 ID badge / keycard users, the CCAS shall be able to process access requests at each card reader-controlled access point within .5 second. No automated controlled access function shall delay the reporting of an off-normal event beyond 1 second.
 - d. The elapsed time between the occurrence of a single alarm, tamper or trouble condition and its annunciation as an off-normal event at the appropriate monitoring location(s) shall not exceed 2 seconds. When additional conditions occur before a previous condition has been annunciated, the subsequent conditions shall be annunciated as specified at intervals not exceeding 2 seconds each.
 - e. System response to any valid operator control request shall be initiated and visually indicated within 2 seconds.
 - f. System response to any valid operator request for demand displays shall typically be completed within 2 seconds and in all cases less than 5 seconds.
 - g. New and updated ID badge user data files shall be automatically transferred between the CCAS and the Photo Imaging System Upon validation at the initiating location.
 - h. Historical log printouts shall begin printing within 5 minutes of operator request.
 - i. ID badge / keycard inserts containing both textual and image data will be printed within 3 minutes.
 - j. The PIDS will be available for additional image capturing within 15 seconds after a print command is executed.
3. The CCAS design shall permit additional subsystem equipment to be added by inserting appropriate interfaces and entering minor parameter modifications into the software. The CCAS shall provide for a minimum growth capability of 50 percent of its initial capacity without the necessity for the replacement or addition of major hardware or software items.
4. Intelligent field panels shall be configured not to exceed 75 percent capacity in terms of card reader capacity. For example: if the proposed intelligent field panel is capable of supporting 8 card readers, only 6 of the available card reader inputs shall be used, the remaining 2 card reader inputs shall be designated as spares. Total available spare card reader inputs, at a minimum, shall equal 30 percent of initial quantity of card readers to be installed.

C. System Status

1. Monitored points within the system shall be in 1 of 2 modes: SECURE or INACTIVE.
 - a. In the SECURE mode, the system shall be sensitive to alarm, tamper and trouble conditions and shall annunciate them as specified.
 - b. In the INACTIVE mode, the system shall be insensitive to alarm, tamper and trouble conditions.
 2. Monitored point status changes shall be initiated on demand via the SCC, Programmer's Terminal and the PIDS Terminal or automatically based on a pre-determined (programmable) time schedule. Local accessing shall be reported to the SCC as an advisory.
 3. The CCAS shall provide the capability to selectively enable / disable operation of the following devices on demand via the SCC and the Programmer's Terminal or automatically based on a pre-determined (programmable) time schedule, without affecting the operation or status of other CCAS devices at the same point / location:
 - a. Card Readers.
 - b. Electrified Door Hardware.
 - c. Vehicle Gate Operators.
 - d. Automatic Roll-up Doors.
- D. System Monitoring and Control
1. CCAS equipment necessary for performing specified functions shall be incorporated in the Security Control Console (SCC). The console shall be located in the airport Security Center. The SCC layout and equipment arrangement shall be ergonomically engineered to present an efficient and organized appearance and facilitate operation.
 2. The SCC shall be the focal point for all specified functions associated with the monitoring and control of all CCAS and specified existing equipment. The SCC shall be provided with a VDT and keyboard as the primary man-machine interface. The VDT screen shall be formatted to permit simultaneous display of off-normal event annunciations, operator requested status information and keyboard control function request entries.
 3. A Programmer's terminal shall be provided in the airport Security Center to run diagnostic routines, initiate DPS maintenance utilities, perform system reprogramming and regeneration, enter/edit system database information, generate special reports and logs and perform specified keyboard control functions (site-configurable).
 4. ID badge / keycard preparation and encoding shall be monitored and controlled via the PIDS terminal located in the airport badging area.
 5. The man-machine interface portions of the SCC, Programmer's terminal and PIDS terminal shall be identical to facilitate training and operation.
 6. The specific off-normal events that shall be reported at the SCC: and the specific keyboard control functions that can be performed at the SCC, the Programmer's terminal and the PIDS terminal shall be site-configurable. The Programmers terminal will also serve as an alternate monitoring location to automatically annunciate off-normal events in the event that the SCC is not operable.
 7. The PIDS terminal shall be equipped with a card reader and PIN pad. The card reader PIN pad at the PIDS terminal will be used to verify operation of a newly issued ID badge / keycard and to demonstrate proper use.
 8. A key issue / return panel (box) shall be provided at the airport badging Area to control mechanical key issue and return.
- E. Access Control Software

1. Contractor shall state in their technical submittal that transmittal of the software license transfers ownership of the Duluth International Airport CCAS software to Duluth International Airport for the purpose of operation of the CCAS at Duluth International Airport only. It is understood by the owner that any additional software for installations other than at Duluth International Airport will require purchase of additional licenses for each site.

F. Signal Collection and Transmission

1. The central processors shall interface with CCAS equipment via Intelligent Field Panels (IFPs). The IFPs shall be connected to all card readers and monitored points collect and transmit status information to the primary central processor for processing. Each IFP shall be interrogated at least once every second to verify its status and / or report off-normal events and monitored point resets.
 - a. The IFPs shall buffer and retain status change information until transfer of data to the primary processor is verified.
 - b. In the event communications with the central processors is disrupted, each IFP shall have provisions to store a minimum of 4,000 authorized access transactions, off-normal events and monitored point resets locally. Upon restoration of communications, the IFPs shall upload the stored data. Data uploading shall not interfere with the real-time reporting of subsequent off-normal events and resets.
2. The CCAS shall provide a communication backbone for the collection and transmission of data, control, video and audio signals via metallic conductor (hardwire) and fiber optic (F/O) data path utilizing multiplexers with appropriate network equipment as specified below.
 - a. Card readers shall be hardwired to a Reader Module contained in an EIB within 50 feet of the card reader. The EIBs shall utilize a RS-422/485 multi-drop architecture to connect the reader module to the IFP. No more than 3 EIB locators shall be in a single multi-drop unless approved by A/E.
 - b. The EIB shall be hardwired to an IFP within 500 feet of the point as indicated on the drawings.
 - c. Ethernet TCP/IP architecture shall be used for connecting IFPs to the CCAS. An alternate Ethernet or serial to Ethernet port shall be provided as a backup communication in the event the primary communication fails. The backup communication shall be restored automatically with notification that primary communication has failed.
3. Transmission of CCTV video and data signals from cameras as indicated on the drawings, shall be transmitted via TCP/IP to the CCTV controlling equipment in the airport Security Center. Network based CCTV system shall use fiber and Category 6 cabling system.
4. Reliable data transmission shall be utilized between the IFPs and the central processors. The IFP message format will include its unique address to assure a properly directed response to the primary central processor poll. Accurate reception of error-free data will be ensured by the use of redundant message transmission or by the use of error detecting / correcting codes. Transmission failures will be annunciated as trouble conditions.

G. Controlled Access

1. The CCAS shall monitor and control personnel and vehicle access at AOA/SA access points in accordance with the Airport Security Plan FAR 1542 Amendment. Authorized access shall be granted based on the

following criteria in combination or individually as determined by Duluth International Airport:

- a. Possession of a valid ID badge / keycard.
- b. Knowledge of a valid personal identification number (PIN) corresponding to the valid ID badge / keycard.
2. AOA/SA access points shall be controlled via card reader PINpads and related controlled access and intrusion detection equipment.
3. Operation of an access point via card reader only, PIN pad only, or card reader and PIN pad shall be configurable via the SCCs or Programmer's terminal.
4. The CCAS will provide the capability to selectively enable/disable all automated controlled access operations at a card reader-controlled access point on demand from the SCC, Programmer's terminal or automatically based on a pre-determined (programmable) time schedule.
5. Access shall be controlled by assigning any combination of security areas to each ID badge / keycard user for authorized access. Each security area shall consist of 1 or more card reader-controlled access points. A minimum of 128 user-defined security areas shall be provided.
6. Access may be further controlled by assigning a time zone for access at each security area to each ID badge / keycard user. Each time zone shall define the days of the week and the hours in each day when access is authorized. A minimum of 128 time zones shall be provided.
7. Access authorization decisions will be made locally at the card reader or its associated IFP. Sufficient local memory will be provided to store all access authorization data for up to 5,000 individuals. Access authorization data will be automatically downloaded from the central processors to each access point, as appropriate (i.e., after the addition, modification or deletion of an authorized ID badge / keycard user file or upon restoration of communications between an IFP and the central processors). Authorized access transactions will be reported to the primary central processor individually or in groups. The downloading of access authorization data and the uploading of groups of authorized access transactions will not interfere with the real-time operation of the system. Unauthorized access requests will be reported as off-normal events as they occur.
8. Card readers shall operate in a proximity detection mode. When an ID badge / keycard is presented at a card reader, the encoded information shall be compared with the stored data for authorized access. If a PIN is required for access at that access point at that time, the user shall be prompted to enter the number. Each card reader shall be provided with separate visual indications that an ID badge / keycard has been decoded; a PIN entry is required (initial or retry); an incorrect PIN code has been entered; and access has been granted or denied.
 - a. Unauthorized access requests and / or the presentation of an inactive, expired, lost, stolen, unreturned or an improperly encoded ID badge / keycard shall be annunciated as an alarm. Access will not be granted.
 - b. In the event a PIN is not entered within a pre-determined (programmable) time period after the user is prompted (initially or for a retry), the card reader shall reset and an advisory shall be annunciated.
 - c. The number of consecutive incorrect PIN attempts accepted by the system shall be site-configurable (up to 4). After the maximum number of incorrect entries has been made, the card reader shall reset and an alarm shall be annunciated. An alarm shall also be

- annunciated if the maximum number of incorrect entries associated with the same ID badge / keycard user occurs consecutively at several card readers within a pre-determined (programmable) time period.
- d. At the Automatic Vehicle Gate (Type 12) an access request must be accompanied by a signal from the associated vehicle presence sensor. In the event this signal is not received, an advisory will be annunciated. Access will not be granted.
 9. The system shall provide the capability to initiate the access sequences described on drawings at any access point via the SCC or Programmer's terminal. The format for performing this keyboard control function shall require the inputting of the ID card number of the individual requesting access. This information shall be stored with the record for control function execution.
 10. The specific intrusion detection devices that are placed in the ACCESS mode for an authorized access request shall be site-configurable.
 11. The time periods for activating a local locking device and ACCESSING the intrusion detection device(s) shall be independently programmable from the SCC or Programmer's terminal. In the event 2 or more individuals utilize the same card reader or exit pushbutton, each valid request shall reset the time durations for unlocking and ACCESS status to allow sufficient time for the unalarmed entry / exit of each subsequent individual.
 - a. In the event an access point is not closed within the pre-set ACCESS time, an advisory shall be annunciated.
 - b. In the event an access point is not accessed within a predetermined (programmable) time after an entry request is granted, either locally via a card reader or remotely via the SCC, an advisory shall be annunciated and the event shall be recorded by the CCTV system.
 12. Failure to depress the exit pushbutton prior to exiting a security area will be annunciated as an alarm. Doors equipped with an exit pushbutton will be posted to inform the individual of this requirement.
 13. The CCAS shall have provisions to selectively print, at a specified data printer, all authorized automated access transactions at designated card readers or by designated ID badge / keycard users as they occur. All authorized automated access transactions, whether or not printed, shall be stored on the DPS hard disk units. As a minimum, the printed and / or stored information will include the individual's name and keycard number (except when an exit pushbutton is used), the date, the time, and the card reader or access point location or number.
 14. All access points equipped with electrical locking devices (magnetic locks or other locking devices as shown on drawings), automatic roll-up door operators, and gate operators will be remotely controllable from the SCC individually or in groups. These provisions will also allow the access point to remain in a permanently locked / unlocked or open/closed mode for a pre-determined (programmable) time period. An advisory shall be initiated when this time period expires.
 15. Signs shall be provided on the egress side of access points to advise individuals to press the exit pushbutton before opening the door. Signs shall be posted on the public side of door access points to advise individuals to contact the airport Security Center for nonemergency matters or to push on door panic hardware until alarm sound and that door will open in 15 seconds (time duration will be determined by the airport). Exact verbiage for signs shall be coordinated with the owner.

16. A local gate controller will be provided within the associated gate operator enclosure to permit local operation by an authorized user. Operation of the gate via the controller will be annunciated as an alarm.
17. ID badge / keycard encoding will include a facility code unique to Duluth International Airport, an individual code unique to each user and an issue number. An encoder will be provided with the PIDS to permit on-site encoding of the ID badges / keycards.
18. Each ID badge / keycard user will be assigned a keycard number for use by the console / terminal operators when performing keyboard control functions associated with the CAS and PIDS and requesting displays, printouts and historical logs. The keycard number will be linked by the system to the internal coding of the ID badge / keycard during the badge issue process. The system will allow for linking an existing keycard number and associated database record with a new ID badge / keycard by using a subsequent issue number for continuity when a damaged, stolen or lost ID badge / keycard is replaced.
19. Individual ID badge / keycards and PINS will be assigned via the PIDS. All personal database information associated with each ID badge / keycard user (name, address, etc.) and access authorization data (security areas and time zones) will be transferred from the photo information microprocessor to the CCAS central processors upon entry via the PIDS terminal. (Note: The operator level required to add / modify access authorization data will be higher than the one used to enter / modify of personal information.)
20. Existing personnel database files will be modified and / or deleted from the PIDS, SCC or the Programmer's terminal. When an ID badge / keycard is deleted from the system, the user data will be retained in the on-line databases until transferred to long-term storage.
21. The CCAS will provide the ability to automatically deactivate an ID badge / keycard if it has not been used to access a card reader-controlled access point for a pre-determined (programmable) time period. The user data for an inactive ID badge / keycard will be retained in the on-line DPS database. Provisions to reactivate an ID badge / keycard from the SCC, Programmer's terminal and the PIDS terminal will be provided.
22. The CCAS will provide the ability to flag a particular issue of an ID badge / keycard as lost, stolen or inactive. Additional information shall be recorded in a notes or user definable fields from the SCC, Programmer's terminal and the PIDS terminal.
23. An override command will be provided via the SCC to permit all ID badge / keycard users to enter and exit selected security area access points during emergency situations (i.e., access will be based on a valid facility code only).
24. Each ID badge / keycard user will have the ability to discreetly communicate a duress alarm -via a PINpad during the entry of the PIN. The alarm signal will be transmitted to the primary central processor while the access request is processed as specified heretofore.

H. Intrusion Detection

1. All intrusion detection equipment shall be capable of sensing the stimuli for which they are designed to react with at least a 90 percent probability with 95 percent confidence when the sensitivity is adjusted to produce not more than 1 false alarm per week.
2. Selected access points as shown on drawings shall be equipped with balanced magnetic switches to detect authorized and unauthorized openings.

- a. Each balanced magnetic switch will initiate an alarm signal whenever the door, gate or hatch is opened more than one (1) inch while in the SECURE mode.
 - b. Each balanced magnetic switch shall initiate an alarm signal upon increase, decrease or attempted substitution of an external magnetic field while it is in the SECURE mode.
3. Card reader-controlled access points shall be provided with a door status sensor to detect authorized and unauthorized openings and tampering attempts.
 - a. Each door status sensor shall initiate an alarm signal whenever the door is moved more than 1 inch while in the SECURE mode.
4. The Automated Vehicle Gate shall be equipped with a gate position switch to detect authorized and unauthorized openings.
 - a. Any attempt to force a gate open or open a gate via the local gate controller shall be annunciated as an alarm condition.
5. The Automated Vehicle Gate shall be equipped with vehicle presence sensors (ground loop) on the public and AOA/SA side to detect authorized and unauthorized entrée / exit attempts.
 - a. A signal from the vehicle presence sensor on the public or AOA/SA side of a gate without a concurrent signal from the associated card reader shall be annunciated as an alarm.
6. Tamper switches shall be provided inside all CCAS equipment cabinets, consoles, termination boxes and enclosures to detect unauthorized opening or tampering.
 - a. Tamper switches shall be installed and baffled to prevent defeat by deforming or opening the cover and to initiate a signal whenever the cover is displaced more than 1/4 of an inch from the closed position.
7. A manually-initiated flex-response (duress) call button device shall be provided at the airport security screening point as required by TSA.
 - a. A signal from the call button device shall be annunciated as an alarm at the SCC.
 - b. A signal from the call button device shall not be annunciated locally.
 - c. The call button shall be located to enable surreptitious activation.
 - d. The flex-response alarm shall only be reset at the initiating location.
8. Manually-initiated duress alarm devices shall be located at the airport Security Center SCC and other locations shown on the drawings.
 - a. A signal from the duress alarm device shall not be annunciated as an alarm at the initiating location.
 - b. The duress alarm will be located to enable surreptitious activation.
 - c. The duress alarm shall be reset at the initiating location.
 - d. The duress alarm from the Security Center will be annunciated at the Administration reception area or other locations approved by the airport director. The facility annunciation shall be via flashing blue light.
 - e. The duress alarm from check point screening area shall be annunciated in the security area by a flashing blue light as well as at SCC.
 - f. The duress alarm from administration area shall be annunciated at the SCC.
9. End-of-line termination networks shall be provided for all alarm and tamper contacts to provide the appropriate end-of-line impedance for signal line supervision.

I. Surveillance and Assessment

1. Solid-state Closed Circuit Television (CCTV) color cameras shall be provided for visual surveillance of selected areas. Each camera shall be mounted on either a free-standing pole, building exterior / interior wall, roof or hung from the ceiling. The complete system shall be provided as indicated on the drawings and specified herein.
2. Camera locations will be selected so that an individual 6 feet tall standing at the farthest end of the viewing area will be displayed at a height equal to or greater than 10 percent of the CCTV monitor screen.
3. All exterior cameras shall be housed in an environmental enclosure to provide a stable operating environment and to discourage tampering. Exterior cameras shall also be provided with a thermostatically controlled heating and blower system.
4. Display monitors as indicated on the drawings shall be provided for the surveillance and assessment subsystem.
5. Visual identification of which camera output is being displayed on each monitor, whether sequentially, manually or automatically, shall be provided.
6. The SAS shall provide sequence capability at all CCTV monitors. Switching sequence at each monitor shall be independent of the others. The console operators shall have provisions to adjust the sequencing interval and omit or add any camera(s) from the sequence.
7. Digital Video Storage System shall be provided at the airport SCC to automatically record alarm-associated camera outputs and manually record the outputs of any camera displayed on the alarm monitor. Each recording will include the time, the date and the associated camera identification.
8. The SCC will have provisions via a control unit (independent of the VDT keyboard) to manually pan, tilt, zoom and focus any camera. The Surveillance and Assessment Subsystem (SAS) will include provisions to assign up to 10 pre-set positions to each camera equipped with a pan/tilt unit. Upon manual or automatic (alarm condition) selection of a pre-set position, the associated camera will automatically pan, tilt and zoom to the appropriate view. After a pre-determined (programmable) time period, these cameras will automatically return to a pre-set "home" position.
9. The SAS will be designed such that a camera can be displayed on all monitors at the SCC concurrently without degradation of the picture.

J. Off-Normal Event Reporting

1. Alarm, tamper and trouble conditions and advisories shall be annunciated so that there is a visually discernible (color) difference between them. The CCAS shall have the capability to display a minimum of 5 off-normal events simultaneously on the VDTs. The CCAS shall continue to print off-normal events when additional VDT display space is not available. The SCC operators shall be advised via the VDT of pending off-normal events. Provisions for independent call up (scrolling and paging) of those alarm, tamper and trouble conditions and advisories that cannot be initially displayed due to VDT line limitations shall be provided. The VDT displays shall be automatically updated as space becomes available.
2. Off-normal events shall be prioritized by type (alarm, tamper, trouble or advisory) and category (see below) for reporting and historical logging. A minimum of 64 priority groups (programmable) shall be provided. Provisions to assign priority groups to the SCC for primary annunciation will be provided. (Note: Priority grouping will be used to assign monitoring responsibility to the SCC and is not intended to cause one priority group to "bump" a previously displayed priority group at a given VDT.)

3. No alarm, tamper or trouble condition or advisory shall be lost during switchover from normal to backup power (either at the SCC or at a field installed device) or from the primary to hot-standby central processor.
4. The following conditions shall be annunciated as an alarm (alarm categories are shown in parentheses):
 - a. Receipt of a signal from any detector / sensor performing intrusion monitoring functions at a monitored point (intrusion Alarm).
 - b. Unauthorized opening of any SECURED access point (intrusion Alarm).
 - c. Receipt of a flex-response signal from security screening point (Flex-Response Alarm).
 - d. Receipt of a duress signal (Duress Alarm).
 - e. Presentation of an unauthorized, inactive, lost, stolen, unreturned, expired or improperly encoded ID badge / keycard at a card reader controlled access point (Access Alarm).
 - f. Consecutive incorrect PIN entries exceeding the maximum number of tries (Access Alarm).
5. The following condition shall be annunciated as tamper:
 - a. Unauthorized opening of a CCAS equipment cabinet, console, box or enclosure (Tamper Alarm).
6. The following conditions shall be annunciated as trouble (trouble categories are shown in parentheses):
 - a. CCAS equipment malfunction or failure (Equipment Failure).
 - b. Loss of any source supplying power to the CCAS (Power Failure).
 - c. Failure at any portion of the CCAS power conversion or distribution equipment to include equipment power supplies (Power Failure).
 - d. Low battery indication from a UPS or battery backup unit (Low Battery).
 - e. Any attempt to disable or compromise wiring between any monitored point and the IFPs, and between the IFPs and the central processors.
 - f. A single break, a single ground fault, a wire-to-wire short, or any combination of these in the signal wiring between any monitored point and the IFPs, and between the IFPs and the central processors (Line Supervision).
 - g. Signal transmission failure (Communications Failure).
 - h. Automatic switchover from the primary to the hot standby central processor (Processor Failure).
 - i. Loss of video signal (Loss-of-Video).
7. The following conditions shall be annunciated as an advisory (advisory categories are shown in parentheses):
 - a. Failure of a temporarily ACCESSED card reader-controlled access point to close within a specified time after authorized opening (Access Advisory).
 - b. Failure of a temporarily ACCESSED card reader-controlled access point to be opened within a specified time (Access Timeout).
 - c. The time period for an access point opened / unlocked from the SCC has expired (Access Advisory).
 - d. ID badge / keycard user still has an issued key (Key Advisory).
 - e. Manual switchover from the primary to the hot standby central processor (Manual Switchover Advisory).
 - f. Resynchronization of central processors databases started / completed (Resync Started / Complete Advisory).

- g. DPS historical logging storage capacity 85 percent full/about to be overwritten 98 percent full (Historical Storage Advisory).
 - h. ID badge / keycard accountability drops below 95 percent or a predetermined percentage, to include expired, reported lost and stolen ID badge / keycard (Accountability Advisory).
 - i. Failure to enter a PIN within a specified time after being prompted by the card reader (Access Timeout).
 - j. Receipt of an access request from the automated vehicle gate without a signal from the respective vehicle presence sensor (Unauthorized Access Request).
8. Each alarm, tamper or trouble condition and each advisory at a monitored point shall cause an audible annunciator to be sounded and an off-normal event text message to be displayed on the SCC VDTs and printed at the event printer located in the airport Security Center. The displayed and printed text messages shall be in full-word English and shall, as a minimum, include the time of occurrence, the point identification code, the point description, the type and category of event and the required operator response. VDT displays shall contain a minimum of 2 lines per event. The SCC operator shall have provisions to selectively display additional text information (up to 6 lines) for each off-normal event.
- a. The audible annunciator shall be capable of being heard throughout console area. When the console is manned, the volume shall be capable of being reduced not more than 90 percent of its rated output to permit local alarming only. The SCC shall be provided with a momentary silencing switch for the audible annunciator. The audible annunciator shall be capable of being reset but not permanently silenced. The silencing of an audible annunciator in the presence of other unacknowledged off-normal events shall not interfere with the subsequent reporting of these events as specified. The silencing switch shall operate independently of the keyboard control function to acknowledge off-normal events. In addition, the audible annunciator shall be provided at another CCAS workstation as selected by DLH.
 - b. The printed message shall include the time and date and shall be readily distinguishable from other messages printed at the printers.
 - c. Duress alarms shall not be annunciated at the initiating location.
 - d. Subsequent alarm, tamper or trouble conditions at the same point received after the initial signal but prior to operator disposition (clearing) shall not be displayed (i.e., there shall be only 1 VDT text message for each alarm, tamper or trouble condition at the same point regardless of the number of signals received prior to disposition).
 - e. In the event the primary monitoring location is inoperable, an off normal event shall be automatically annunciated at its alternate monitoring location (Programmer's terminal).
9. Upon acknowledgment by any authorized SCC operator, the audible annunciator shall be silenced and cleared at all monitoring locations. The VDT displays shall be updated to indicate an off-normal event has been acknowledged.
- a. The CCAS shall assign each monitored point to a computer-generated color graphic display. Each display shall include a map or floor plan depicting the location of the point, the point identification code and a color-coded flag to identify the status of the point. Upon acknowledgment of an off-normal event, the associated graphic display shall be automatically presented on the GDT at the

acknowledging console. This display shall override any previously displayed graphics at the GDT. In the absence of alarms, the SCC operators shall be able to manually display the graphic associated with a specific point.

- b. The CCAS shall interlock monitored points with a camera output and pre-set position. Upon acknowledgment of an off-normal event, the associated cameras shall be automatically panned, tilted and zoomed (or fixed camera) to the appropriate scene and the output displayed on one of the color CCTV monitor at the acknowledging console. In the absence of alarms, the SCC operators will be able to manually display the camera output associated with a specific point.
- 10. When the cause of an alarm, tamper or trouble condition or advisory has been removed, a reset message shall be displayed and printed at the SCC (or alternate monitoring location on the third floor if the SCC is inoperable). The printed message shall include the time and date of reset, the point identification code, and the point description. Events returning to normal shall not require a separate acknowledgment by the console operators.
 - 11. After a point has been reset, it shall be capable of being individually cleared by any authorized SCC operator. Clearing a point shall remove the displays from all VDTs and GDTs and print an event-cleared message on the event printer. Clearing a point interlocked with an associated video output shall remove the automatically displayed camera output from the CCTV monitor; return the camera to its "home" position.
 - a. As part of the clearing function, each monitoring location shall have provisions to enter an explanation of the event (a minimum of 1 line) for storage with the event data and for printing with the event-cleared message.
 - b. No alarm, tamper or trouble condition or advisory shall be cleared from the VDTs without being stored on the DIPS hard disk units.

K. Test Reporting

- 1. Individual equipment operation and overall system performance shall be verified periodically by simulating or duplicating alarm, tamper and trouble conditions and advisories at each monitored point, as applicable. After annunciation, acknowledgment and reset, as described above, each monitoring location shall have provisions to clear and store these events on the DIPS hard disk units as tests via the keyboard. These provisions shall include at least 2 independent, operator-initiated actions so that a bona fide alarm, tamper or trouble condition or advisory is not accidentally stored as a test.

L. Mechanical Key Control

- 1. A system to monitor and control mechanical key issue and return shall be provided as part of the CCAS. Selective issuing of mechanical keys to authorized ID badge / keycard users shall be performed via PIDS terminal. The operator shall input the respective mechanical key number in the individual's database file and shall log the time, date and mechanical key number. A similar sequence shall be provided for mechanical key return."

M. Demand Display and Printing Functions

- 1. The console terminal operators shall have provisions to display and / or print system status information on a real-time basis. Paging and scrolling capability shall be provided for multi-page displays. Previously displayed information shall be automatically cleared when a new display is requested.

2. Status information shall be displayed on the VDT at the location initiating the request.
3. Status summary requests from the SCC and Programmer's terminal shall be capable of being directed to any printer. If the selected printer is an event printer, off-normal event printing shall be buffered until the printout is completed. Report sorts shall be performed alphabetically or numerically on all fields, as appropriate.
4. The following demand printouts shall be provided at the SCC and Programmer's terminal, as a minimum:
 - a. All INACTIVE monitored points.
 - b. All SECURE monitored points.
 - c. All monitored points in ACCESS.
 - d. All monitored points in ALARM.
 - e. All monitored points in TAMPER.
 - f. All monitored points in TROUBLE.
 - g. All current ADVISORIES.
 - h. All current off-normal events.
 - i. Status of all monitored points.
 - j. All data associated with all monitored points.
 - k. All data associated with all ID badge / keycard users (sort by any set of parameters).
 - l. All data associated with all access points.
 - m. All assigned ID badge / keycards.
 - n. All active, inactive, lost, unreturned, expired or deleted ID badge / keycards (select by type and sort by any set of parameters).
 - o. All access points assigned to each security area.
 - p. The days and times associated with all time zones.
 - q. All ID badge / keycard users assigned to each security area and / or card reader-controlled access point (sort by name and keycard number).
 - r. All ID badge / keycard users assigned to a particular security area and / or card reader-controlled access point (sort by name and keycard number).
 - s. Last card reader used by all ID badge / keycard users (sort by any set of parameters).
 - t. Last ID badge / keycard used at all card readers.
 - u. All unassigned IFP points.
 - v. All mechanical keys assigned to all ID badge / keycard users.
 - w. All mechanical keys issued by key number.
 - x. All keyboard control functions scheduled for automatic execution.
 - y. All ID badge / keycard users sorted by company / tenant.
 - z. All ID badge / keycard users sorted by a company / tenant.
 - aa. Ratio of the number of ID badge / keycards deleted and unreturned or reported as stolen or lost to the number of assigned ID badge / keycards.
 - bb. All Airport and company/tenant personnel with signature authorization.
 - cc. All data associated with all company tenant files.
 - dd. All ID badge / keycards set to expire by a particular date.
 - ee. Sort and print list of ID holder's last training by name or company.
5. The following demand printouts will be provided at the report printer at the PIDS terminal, as a minimum:
 - a. All data associated with all ID badge / keycard users (sort by any set of parameters).

- b. All assigned ID badge / keycards (sort by any set of parameters).
 - c. Status of all assigned ID badge / keycards (select by type (active, inactive, lost, stolen, unreturned, expired, deleted) and sort by any set of parameters).
 - d. All data associated with all company tenant files.
 - e. Time periods of data stored on storage device.
 - f. All ID badge / keycards set to expire by a particular date.
6. The console terminal operators shall have provisions to print the data displayed on their VDT screen at any time.

N. Logging Functions

- 1. Historical logs shall be requested from the hard disk units or other approved storage devices for a particular date or sequence of dates. When a log is requested, the date and the time of day shall be printed along with the log identification.
- 2. Capacity to store up to 500,000 events on-line on the hard disks shall be provided. Historical log data may be transferred to a magnetic tape cartridge for long term storage at any time.
- 3. The CCAS shall monitor the status of all remaining available on-line historical storage space. Routines shall be provided which respond to operator requests to display remaining storage space available and which automatically generate a visual indication when the system's historical storage space capacity is close to being exhausted (e.g. 85 percent full) and when stored data is about to be overwritten (e.g. 98 percent full).
- 4. A file management subsystem shall be provided for maintaining, cataloging and retrieving any historical files with minimum operator interaction. The subsystem shall be designed to accept an operator request specifying the type of data to be retrieved and the associated time period. For data that is stored permanently, the subsystem shall advise the operator which magnetic tape cartridge must be loaded for data retrieval. Upon notification that the appropriate tape cartridge has been loaded, the subsystem shall transfer the data on-line, sort it and generate the requested log.
- 5. Historical logs requests from the SCC, Programmer's terminal, and PIDS terminal shall be capable of being directed to any printer. If the selected printer is an event printer, off-normal event printing shall be buffered until the printout is completed. Historical log sorts shall be performed alphabetically or numerically on all fields, as appropriate.
- 6. The following historical logs shall be provided at the SCC and Programmer's terminal, as a minimum. Provide Crystal Reports or other 3rd party software as required to meet the specifications. The intent is to provide historical log for audit trail and meet TSA reporting requirements. It is recognized that different approved manufacturers may provide the logs in slight variations than as indicated.
 - a. ALARM conditions (sort by point and category).
 - b. TAMPER conditions (sort by point).
 - c. TROUBLE conditions (sort by point and category).
 - d. ADVISORIES (sort by point, category, name and keycard number, as applicable).
 - e. Test results at monitored points (sort by point).
 - f. Access attempts at card reader-controlled access points (sort by point, keycard number and name).
 - g. Authorized automated access transactions (sort by point, keycard number and name).

- h. Authorized access transactions through the keyboard (sort by point, key / card number and name).
 - i. SCC, Programmer's terminal and PIDS terminal operators on duty (sort by console / terminal and operator).
 - j. Operator-initiated keyboard control functions and associated data (sort by control function, console / terminal and operator).
 - k. Database changes (sort by database, console terminal and operator).
 - l. Keyboard control function input errors (sort by console / terminal and operator).
 - m. Keyboard control functions and associated data initiated automatically on a time schedule (sort by control function).
 - n. Mechanical keys issued and returned (sort by individual or key number).
 - o. A stop list of all access authorized changes at each card reader controlled access point and all ID badge / keycards that have been inactivated, deleted or flagged to preclude use (sort by access point and name).
 - p. A list of all ID badge / keycards that have not been used / presented at an access point for a specified time period (sort by individual).
 - q. Number of ID badge / keycards assigned, returned, deleted or reported as stolen or lost (accountability).
 - r. The following historical logs will be provided at the report printer at the PIDS terminal, as a minimum:
 - s. PIDS terminal operators on duty (sort by operator).
 - t. Operator-initiated keyboard control functions and associated data (sort by control function and operator).
 - u. Database changes (sort by database and operator).
 - v. Number of ID badge / keycards assigned, returned, deleted or reported as stolen or lost.
7. A report generator, accessible via the Programmer's terminal or PIDS terminal shall be provided for special reports and logs. After a report has been developed, it shall be available for use by all authorized operators.
8. The capabilities required by this section shall be strictly background mode and shall not interfere with the real-time functions of the system or diminish system throughput or response times.

P. Keyboard Control Functions

- 1. All SCC and Programmer's terminal control functions, except operation of the master intercom station and CCTV equipment, will be performed through the VDT keyboards. The keyboard at the PIDS terminal will be used to perform selected control functions associated with badge preparation and issue.
 - a. The specific keyboard control functions that can be performed at the SCC and the Programmer's terminal shall be site-configurable.
 - b. All keyboard control function requests shall be checked to verify the correctness of all inputted data prior to execution and the operator shall be advised accordingly. Keyboard control function input errors at all consoles / terminals shall be displayed and printed locally and stored on the DPS hard disk units. Input error messages shall be appropriately descriptive and consistent for each control function.
 - c. Keyboard control functions shall be implemented in a manner which minimizes the number of keystrokes required. If the keystrokes are in the form of characters, these characters shall be intuitively obvious for the function they are to perform. If a menu-driven or prompt approach is utilized, provisions to by-pass the menu or prompt shall

- be provided to allow for efficient operation of the system by experienced operators.
 - d. On-line help data for each keyboard control function shall be available to all console / terminal operators.
- 2. A system of operator levels shall be provided at all console / terminals to restrict operator use of keyboard control functions and access to database fields. A minimum of 8 levels shall be provided. Keyboard control functions and database fields shall be assigned to 1 or more operator levels which, in turn, shall be assigned to a console / terminal operator. The operator shall be permitted to perform all keyboard control functions and access all database fields associated with his assigned level (subject also to SCC, PIDS terminal and Programmer's terminal keyboard control function assignment). If the system is menu or prompt-driven, operators shall only have access to those menus / prompts for which they are authorized use.
- 3. Each console and terminal operator shall be assigned a unique password, between 5 and 9 alphanumeric characters in length. This password shall be utilized to log on and off the system and perform keyboard control functions with a Control level 2 restriction. Passwords shall not appear on any system VDT, nor shall they be printed on any system printer.
 - a. An operator shall be automatically logged-off when another operator logs on at that console / terminal.
 - b. An operator shall be automatically logged-off if there has not been any keyboard activity for a pre-determined (programmable for each console terminal) time period.
- 4. Provisions to abort any keyboard control function prior to completion of execution shall be provided. In addition, an "escape" feature shall be provided to cancel a keyboard control function request before execution is initiated.
- 5. The DIPS shall have provisions to automatically initiate keyboard control functions, to include report and historical log printing, based on a predetermined (programmable) time schedule. This schedule shall include both the day(s) and the time(s) when the control function is to be executed. At the time of execution, the keyboard control function shall be displayed at the SCC, printed at the event printer and stored on the DIPS hard disk units.
- 6. Keyboard control functions performed at the SCC, Programmer's terminal, and PIDS terminal shall be displayed at the console / terminal initiating the request at the time of execution and printed on the event printer. All completed keyboard control functions shall be stored on the DPS hard disk units. If keyboard control function request execution is not immediate or obvious, the operators shall be advised when the control function is completed.
- 7. The following keyboard control functions shall be provided at the SCC and Programmer's terminal, as a minimum:
 - a. A command to set and / or reset the internal time and date reference of the central processors.
 - b. A command to selectively define or modify monitored point descriptions.
 - c. A command to interlock a monitored point with a camera output.
 - d. A command to interlock a monitored point with a graphics display.
 - e. A command to selectively define or modify security area identification.
 - f. A command to selectively define or modify time zones.
 - g. A command to selectively assign a keyboard control function to a SCC or Programmer's terminal.

- h. A command to selectively assign any combination of control levels to a keyboard control function.
- i. A command to selectively assign keyboard control functions / database fields to any operator level.
- j. A command to assign or change the operator level for a console / terminal operator on an individual basis.
- k. A command to assign or change the unique password for a console / terminal operator on an individual basis.
- l. Commands to selectively enable / disable CCAS device operation on an individual basis.
- m. A command to inactivate monitored points (individually or in groups).
- n. A command to change the status of monitored points to SECURE (individually or in groups).
- o. A command to selectively change the status of monitored points to ACCESS (individually or in groups).
- p. A command to modify ID badge / keycard user data (individually or in groups).
- q. A command to delete ID badge / keycards (individually or in groups).
- r. A command to reactivate ID badge / keycards (individually or in groups).
- s. A command to initiate the automated access sequence at a card reader-controlled access point. The format for initiating this command shall include inputting the keycard number of the individual requesting access.
- t. A command to program, on an individual basis, the length of time a card reader-controlled access point may remain open without alarm after an authorized access request is granted.
- u. A command to selectively print all automated access transactions at designated card readers or for designated ID badge / keycard users, as they occur.
- v. A command to allow / disallow all active ID badge / keycard users to enter and exit selected card reader-controlled access points based on a valid facility code only.
- w. Commands to lock / unlock access points equipped with electrical locking devices for a pre-determined (programmable) time period (individually or in groups).
- x. A command to selectively acknowledge an alarm, tamper or trouble condition or an advisory.
- y. A command to selectively clear an alarm, tamper or trouble condition or advisory and enter an explanation of the event.
- z. A command to selectively clear and store an alarm, tamper or trouble condition or an advisory as a test.
- aa. Commands to request selected demand displays and printouts.
- bb. A command to selectively clear VDT demand displays.
- cc. A command to print the data displayed on the VDT screen.
- dd. Commands to request selected historical logs.
- ee. A command to halt a historical log in progress.
- ff. Commands to transfer data between the DIPS hard disk units and a DPS magnetic tape cartridge.
- gg. A command to assign a keyboard control function to a time schedule for automatic execution.
- hh. A command to display the graphic display associated with a specified point. This command shall override any manually or automatically displayed graphic previously displayed on the GDT.

- ii. A command to display the camera output associated with a specified point. This command will override any manually or automatically displayed camera output previously displayed on the monitor.
- jj. Commands to configure an access point for controlled access via a card reader only, a PINpad only or both card reader and PINpad.
- 8. The following keyboard control functions will be provided at the PIDS terminal, as a minimum (Note: Any or all of these functions may be performed via a mouse):
 - a. A command to set and / or reset the internal time and date reference of the photo imaging microprocessor.
 - b. A command to selectively assign keyboard control functions / database fields to any operator level.
 - c. A command to assign or change the operator level for a terminal operator on an individual basis.
 - d. A command to assign or change the unique password for a terminal operator on an individual basis.
 - e. A command to modify ID badge / keycard user data (individually or in groups).
 - f. A command to delete ID badge / keycards (individually or in groups).
 - g. A command to reactivate ID badge / keycards (individually or in groups).
 - h. A command to modify company / tenant file data (individually or in groups).
 - i. A command to capture an individual's video image.
 - j. A command to capture an individual's signature.
 - k. A command to print a badge insert (individually or in groups).
 - l. Commands to interrupt, re-order, restart and cancel a badge insert print queue.
 - m. Commands to reformat a badge insert layout.
 - n. A command to encode an ID badge / keycard.
 - o. Commands to calibrate image color, hue, contrast and sharpness.
 - p. Commands to use the PIDS terminal card reader and digital keyboard to test an assigned ID badge / keycard and PIN and train an individual in the proper use of the reader and PINpad.
 - q. Commands to request selected demand displays and printouts.
 - r. A command to selectively clear VDT demand displays.
 - s. A command to print the data displayed on the VIDT screen.
 - t. Commands to request selected historical logs.
 - u. A command to halt a historical log in progress
 - v. Commands to transfer data between the PIDS hard disk unit and the magnetic tape cartridge unit.
 - w. Command to transfer data between fingerprinting equipment and PIDS hard disk.

Q. Power Supply

- 1. Power for all CCAS equipment shall be provided as indicated on the drawings.
- 2. An Uninterruptible Power Supply (UPS) unit shall be provided at the DLH Security Center for the SCC: and other CCAS equipment located there to assure continued operation upon loss of normal ac power for a period of at least 15 minutes. The Airport diesel generators will provide backup power for this equipment during extended power outages.
- 3. The UPS shall be sized to support the following equipment at a minimum. Provide 50 percent space capacity in the UPS for future loads.

- a. All the CCAS equipment located in SCC, PIDS and EOC.
4. Battery backup units will be provided for field-installed devices not equipped with integral backup batteries to assure continued operation upon loss of normal ac power for a period of at least 4 continuous hours.
 - a. Battery backup units shall be incorporated into the field equipment cabinets or a separate, adjacent tamper-protected enclosure.
 - b. During normal operation, the battery backup units will be maintained at full charge. In the event of a loss of normal and emergency ac power, the associated load will be automatically transferred to the battery backup unit. Upon restoration of ac power, the load will be automatically re-transferred and the batteries will be recharged to capacity at a rate not to exceed 10 times the discharge time.
 - c. When power is being supplied from its batteries, a battery backup unit will monitor battery voltage and will disconnect the load if the voltage drops below 85 percent of its rated output. Upon restoration of ac power, the load will be automatically re-transferred.
5. The status of the UPS unit and battery backup or integral back up unit batteries will be monitored by the CCAS. A low battery condition will be annunciated as trouble.

R. ID Badge / keycard Preparation

1. A PIDS will be provided to produce ID badge / keycards for issue to authorized users. Badge preparation will include the inputting of personal and access authorization data, the capture of an individual's video image and signature, the printing of the badge insert, the cutting and laminating of the badge insert to the keycard and the encoding of the keycard.
2. Personal and access authorization data will be entered via the PIDS keyboard. Database fields with limited input options (e.g., sex, race, etc.) will utilize pop-up windows with mouse selection to facilitate data entry and minimize input errors.
3. A high resolution digital video camera will be utilized to capture a continuous tone color image of an individual. Subject placement will be displayed in a preview window on the PIDS VDT during the capture process and may be moved, via software, for proper centering. Provisions for freezing an image and immediate recapture of an image will be provided. During the capture process, photographic lighting will be controlled by the photo imaging microprocessor.
 - a. The PIDS will support transfer and storage of video images captured via a portable Digital Camera
 - b. The PIDS will be provided with a stored reference frame to calibrate image color, hue, contrast and sharpness.
4. The PIDS will support variable size badge inserts and multiple insert formats. The badge insert layout may include a portion or all of the text and image data contained in an individual's database file (site configurable). Text and image arrangements, insert colors (text and background), fonts, typestyles and image sizes will be site-selectable. Background color will be automatically selected by the system based on the badge type (employee visitor), employer affiliation or access authority. Image sizes will be proportionally variable.
5. Individual badge inserts with all associated text and image data will be capable of being previewed simultaneously on the PIDS VDT prior to printing (either initially or for reissue). The display will be in a "What You See Is What You Get" format.

6. The PIDS will support single and two-sided printing in a horizontal or vertical alignment. Badge inserts will be printed individually or in groups. The system will be capable of printing a minimum of 100 badge inserts while operating unattended. The print queue will be capable of being interrupted, re-ordered and restarted or canceled.
 7. Badge encoding shall include a facility code unique to the airport, an individual code unique to each user and an issue number.
 8. The laminating process will be tamper-resistant and will securely bond the badge insert to the keycard in such a manner that any attempt to alter or extract the data will be visibly obvious or render the ID badge / keycard unusable.
 9. Video image fingerprint data and signature data will be stored on the PIDS hard disk unit. All other data will be transferred to the DPS for storage. An interactive data link will be provided between the PIDS and DPS for the bidirectional exchange of information.
 10. The PIDS will support the display and printing of full size video images.
- S. Miscellaneous Provisions
1. Physical Barriers
 - a. Bollards will be provided around field-installed equipment at Type 12 access points to preclude accidental damage from vehicles. These bollards will consist of 6" concrete-filled pipes appropriately anchored.
 2. Maintenance Aids
 - a. To facilitate routine preventive and corrective service of the CCAS by Airport Maintenance personnel, the CCAS will be provided with a set of all special or nonstandard test equipment, tools, adaptors and fittings to maintain and service the supplied equipment to include card extenders for each different type of printed circuit card, tools for removing tamper-proof screws and a portable IFP analyzer (laptop computer work station).

1.9 QUALIFICATIONS

- A. The system contractor / integrator responsible for providing the CCAS shall have at least ten (10) years experience in furnishing and installation of such systems.
- B. The system contractor integrator shall have previous experience in installation of systems of similar scope for at least 2 projects in the past five (5) years and airport security system under PART 1542 (or FAR 107.14) for at least one (1) project in the past five (5) years. Contractor shall provide names of the project, year completed and references to the A/E for review and approval with bid.
- C. The system contractor's project manager and on-site superintendent shall have a minimum of fifteen (15) years experience each and shall have worked on the projects listed in Art. 1.9B in similar capacity. Submit name with bid.
- D. Manufacturer Qualifications (submit with product submittal)
 1. Manufacturer of the CCAS shall be an established organization with referenced and documented experience delivering and maintaining Security Systems of equal or higher sophistication and complexity as compared to the system detailed in this specification.

2. CCAS Manufacturer's manufacturing facilities shall be certified ISO-9000:2000 operations, utilize ISO-9000:2000 manufacturing procedures and maintain their ISO certifications.
 3. CCAS Manufacturer shall employ at a minimum the following methods for Quality Control of component and assembly devices.
 - a. Visual inspection of devices shall be performed to verify assembly according to defined procedures.
 - b. End of line operational tests shall be performed to ensure product functionality has been correctly configured.
 - c. A system burn-in period shall be utilized to screen for early life failures of electronic components.
 4. Individual functionality and system level regression testing shall be performed to ensure compliance with product specifications. Single and multiple unit system tests shall be performed to mimic end-user installation configurations. Automated hardware and software testing shall be utilized to verify system performance under published operational loads and shall be compared to published system capabilities.
- E. Access controls and CCTV software experience: The access controls and CCTV system integrator / contractor shall have factory trained personnel from the approved manufacturer with a minimum of five (5) years experience in system integration and a minimum of two (2) years experience in the proposed access controls and CCTV systems for this project. Submit name of the qualified personnel with bid.

1.10 MAINTENANCE SERVICES - WARRANTY

- A. General Requirements: The Contractor shall provide all services required and equipment necessary to maintain the entire CCAS in an operational state as specified for a period of two (2) year(s) after formal written acceptance of the system, and shall provide all necessary material required for performing scheduled service or other unscheduled work.
- B. Personnel: Service personnel shall be factory certified in the maintenance and repair of the equipment installed under this section of the specification. The owner shall be advised in writing of the name of the designated service representative, and of any change in personnel.
- C. Routine Inspection and Warranty Maintenance: This work shall be scheduled in advance with Duluth International Airport.
 1. Inspections: The Contractor shall perform two minor inspections at six (6) month intervals (or more often if required by the manufacturer), and two major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.
 2. Minor Inspections: These inspections shall include:
 - a. Visual checks and operational tests of all console equipment, peripheral equipment, field hardware, sensors, and electrical and mechanical controls.
 - b. Mechanical adjustments if required on any mechanical or electromechanical devices.
 3. Major Inspections: These inspections shall include all work described under paragraph Minor Inspections and the following work:
 - a. Clean all CCAS equipment, including interior and exterior surfaces.
 - b. Perform diagnostics on all equipment.

- c. Check, walk test, and if required by the manufacturers' maintenance procedures, calibrate each sensor.
 - d. Run all system software diagnostics and correct all diagnosed problems.
- D. Operation: Performance of scheduled adjustments and repair shall verify operation of the CCAS as demonstrated by the applicable tests of the performance verification test.
- E. Emergency Service: The owner will initiate service calls when the CCAS is not functioning properly. Qualified personnel shall be available to provide service to the complete CCAS. The owner shall be furnished with a telephone number where the service supervisor can be reached at all times. Service personnel shall be at site within four (4) hours after receiving a request for service. The CCAS shall be restored to proper operating condition within 8 hours after service personnel arrive on site.
- F. Records and Logs: The Contractor shall keep records and logs of each task, and shall organize cumulative records for each component, and for the complete system chronologically. A continuous log shall be maintained for all devices. The log shall contain all initial settings. Complete logs shall be kept and shall be available for inspection on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the CCAS.
- G. Work Requests: The Contractor shall separately record each service call request on a service request form. The form shall include the model and serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the materials used, the time and date work started, and the time and date of completion. The Contractor shall deliver a record of the work performed within five (5) days after work is accomplished.
- H. System Modifications: The Contractor shall make any recommendations for system modification in writing to the Owner. No system modifications, shall be made without prior approval of the Owner. Any modifications made to the system shall be incorporated into the operations and maintenance manuals, and other documentation affected.
- I. Software: The Contractor shall provide all software updates during the period of the warranty and verify operation in the system. These updates shall be accomplished in a timely manner, fully coordinated with CCAS operators, shall include training for the new changes / features enabled, and shall be incorporated into the operations and maintenance manuals, and software documentation.

PART 2 - PRODUCTS

2.1 GENERAL DESIGN REQUIREMENTS

- A. Operating Environment
 - 1. All indoor equipment shall be capable of operating in an environment of 50 to 95 degrees F with 20 to 80 percent relative humidity, non-condensing.
 - 2. All outdoor-installed components shall include electric heaters and forced ventilation as required for operation in an ambient environment of:

- a. Temperatures between -20 degrees F and +115 degrees F.
 - b. Relative humidity's up to 100 percent at +100 degrees F.
 - c. Wind gusts up to 100 miles / hour.
 - d. Rainfall rates up to 6 inches / hour for periods up to 60 minutes.
- B. Cabinets and Terminals
- 1. All cabinets and terminals shall be free-standing assemblies with leveling provisions and rear access doors. Where rear access cannot be accommodated, cabinet and terminal equipment shall be provided on racks that slide out from the front. Each cabinet and terminal shall be completely modular, physically and electronically. Each module shall be capable of passing through an opening 2 feet 8 inches wide by 6 feet high, maximum. Racks, shelves, and other structural parts shall be constructed to prevent warping or distortion.
 - 2. Cabinet and terminal doors shall open a minimum of 170 degrees to avoid blocking personnel movement. Each door shall be equipped with a UL-approved cylinder lock (per UL 437, "Key Locks" a tamper switch and a piano-type hinge with welded tamperproof pins. All cabinet, console and terminal locks shall be master-keyed by type. Four keys of each type shall be supplied.
 - 3. Racks for the plug-in circuit cards shall permit access to the interconnecting wiring. Initial rack space capacity for circuit cards shall accommodate the requirements specified in Paragraph 1.8B.3. Circuit card identification shall be stenciled or permanently marked on the panel structure adjacent to its location with a minimum letter height of 1/4-inch. All backplane wiring and program allocation for spare slots reserved for future expansion shall be provided so that additional points can be implemented by simply inserting a card into the spare slot and defining the points in central processor memory.
 - 4. Each cabinet and terminal shall contain a copper ground bus running the entire length of the cabinet or console with the enclosure connected to the bus so as to effectively ground the entire structure. A bolted compression-type terminal shall be installed at each end of each ground bus for connection to the facility ground cable.
 - 5. All cabinet, console and terminal materials and paint shall be nonflammable (as defined by ASTM D 635, "Rate of Burning and / or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position"). No preparation or material shall release toxic gases or dense smoke or propagate flames when heated or exposed to open flame.
 - 6. Provisions shall be made for field wiring to enter the cabinets, consoles and terminals at the top and the bottom, except as specified. All cable openings shall be provided with flame-resistant grommets. All wiring for field connections shall terminate on terminal blocks or plug sockets.
 - 7. All unshielded cabinet and terminal wiring, except for off-the shelf equipment, shall be stranded 600 volt Class C stranding in accordance with ASTM B8, "Concentric-Lay Stranded Copper Conductors," or DLH-approved equal. All wiring shall be capable of passing the applicable flame-resistance tests specified in ICEA S-19-81 I A Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. @
 - 8. Low level signal wiring (100 mV and under) which is designated as having twisted and shielded field wiring shall also have twisted and shielded wiring within the cabinets, consoles and terminals. Each shield shall be connected to a separate terminal point immediately adjacent to the signal wire. Connection to the ground bus, when required, shall be made with insulated No. 12 AWG wire.

9. Each wire shall be identified at both ends with the wire designation corresponding to the wire numbers shown on the wiring diagrams. The wires shall be marked with a sleeve-type, smear-proof, nonconductive, flame-resistant, embossed wire marker or approved equivalent (chlorine or other halogen compounds shall not be used).
10. All exposed wiring within the cabinets, consoles and terminals shall be formed neatly with wires grouped in bundles using non-metallic, flame resistant wiring cleats or bands and with groups substantially supported along their length. Wires shall not be spliced, taped or joined with wire nuts between terminal points. Wiring which crosses hinged joints shall be flexible hinge-type wire. No wiring shall be routed across the face or rear of an instrument, junction box or other device in a manner that will prevent or hinder the opening of covers or will obstruct access to leads, terminals, devices or instruments. Wiring shall not cross a door opening or be fixed to a door. Where wiring must cross sharp metal edges, protection in the form of grommets or equivalent devices shall be provided.
11. Thermostatic control shall be provided for each cabinet, console and terminal equipped with a cooling fan. All fans shall be shaded pole type with fuses and guarded blades. Motor units shall be provided with permanently lubricated bearings for continuous duty and overload protection devices. Replaceable filters shall be provided for all fan vents. These filters shall be removable from outside the cabinet, console and terminal.
12. Nameplates shall be provided for each cabinet, console and terminal. Nameplates for indoor-mounted equipment shall be three-ply laminate, black face, and white core. Outdoor-mounted equipment shall be provided with an engraved metal nameplate.
 1. Where practical, nameplates shall be attached to equipment with two self-tapping stainless steel screws in holes drilled in the equipment.
 2. Where installation of screws is not practical, such as for small nameplates or where equipment cannot be drilled, a permanent adhesive shall be used. The Contractor shall prepare the surface according to the adhesive manufacturer's recommendations.
13. Each cabinet, console and terminal shall be provided with at least one polarized duplex receptacle to facilitate maintenance. Receptacles shall be connected to a separate terminal block with a disconnect switch for the 120 V ac supply. Connect the outlet to a non-UPS circuit.

C. Surge Protection

1. All CCAS power lines shall be equipped with surge protection provisions in accordance with ANSI C62.41, "Guide for Surge Voltage in Low Voltage AC Power Circuits," and UL 1449, "Standard for Safety Transient Voltage Surge Suppressors," as applicable.
2. All data communications lines and sensor inputs shall be equipped with surge protection provisions in accordance with IEEE Transaction Volume COM-21, "Lightning Surges in Open Wire, Coaxial and Paired Cables," as applicable.
3. All protection devices shall be self-restoring and non-destructing and online at all times. Protection devices shall respond within 1 nanosecond on data circuits and within 5 nanoseconds on power circuits.

D. Electromagnetic Interferences

1. Noise suppression shall be provided as required for total system immunity from internally and externally generated sources of electromagnetic and RF interference including that from portable two-way radios. Noise suppression

provisions shall comply with ANSI C63.12, "Recommended Practice on Procedures for Control of System Electromagnetic Compatibility," as applicable.

2. All CCAS equipment shall comply with the standards for electromagnetic interference in FCC Rules and Regulations, Part 15, Subpart J, "Class A Computing Devices," as applicable.

E. Fabrication

1. All metalwork shall be free of sharp edges, burrs, and other imperfections.
2. The interior and exterior surfaces of all enclosures shall be thoroughly cleaned so that the surfaces are free of all rust, mill, scale, oil, and foreign matter. All nonpermanent marks and coatings shall be removed.

2.2 CONSOLES AND EQUIPMENT

A. Operator Consoles and Terminals

1. General.
 - a. All console / terminal equipment shall be as indicated on the drawings. VDTs, GDTs and CCTV monitors shall be located to minimize distortion from angular line-of-sight and glare due to reflected light. PIDS equipment shall be mounted in a manner to facilitate the badge generation process.
 - b. Console / terminal control switches, pushbuttons, indicating lights and nameplates shall be provided on insert modules suitable for rack mounting. These modules shall be located to facilitate visibility and operability. Front mounted modules shall be held in place with tamper-resistant screws that require a special tool for removal. Indicating lights shall be selected to provide long bulb life and ease of bulb replacement. Lamp test capabilities shall be provided. All switches shall be selected and installed to provide protection against contamination that may block operation of the switches or contacts.
 - c. Front cover panels shall be provided for console terminal modules reserved for existing radio and other equipment. The required cutouts in these panels shall be provided to incorporate the equipment neatly and to give the appearance of a single integral unit.
 - d. The consoles / terminals shall have provisions at both ends for terminating printer power and signal wiring. Pre-fabricated cables (10 feet each, minimum) with connectors at both ends shall be provided for the printers.
 - e. Console / terminal cooling provisions shall be sized to accommodate existing radio and other equipment to be integrated into the console terminal layouts.

2.3 MANUFACTURERS

A. CCAS Software.

The integrated Security System software shall be manufactured by the following manufacturers. The specifications are based on products of multiple manufacturers, the products from the approved manufacturers with integrated or 3rd party software to achieve the functionality is acceptable. This shall not be construed to indicate that the approved manufacturers are not required to meet the specifications; however, it recognizes the fact that the approved manufacturers may use 3rd party software to provide specified performance. The specified performance must be met by the approved manufacturers.

1. Access Control.
 - a. Genetec Synergis.
 - b. AMAG Symmetry Enterprise.
 - c. Lenel OnGuard 2009 Enterprise.
 - d. Software House, CCURE 9000.
 - e. HIRSCH Velocity.
 - f. S2 Enterprise.
 - g. Or Approved Equal.
 2. CCTV Storage & Analytics.
 - a. 3VR SmartRecorders.
 - b. iOmniscient.
 - c. Genetec Omnicast.
 - d. ONSSI NDVMS.
 - e. Intransa.
 - f. Pivot3.
 - g. or approved equal.
- B. CCAS Field Hardware as specification indicates Genetec. Equivalent products from approved equal manufacturer may be used.
1. Intelligent Field Panel (IFP) Vertx V1000.
 2. Dual Reader Interface Module (DRM) Vertx V100.
 3. Input Modules (ICM) Vertx V200.
 4. Output Modules (OCM) Vertx V300.
 5. Ancillary devices as required to provide a complete and operational system.
- C. CCAS Authentication Hardware
1. HID I-Class Readers.
 2. L1-Identity Biometric Readers.
 3. or approved equal.
- D. CCAS Credential Printers
1. The CCAS credential management module shall be compatible with printers and printer / encoders from Fargo, Eltron, Magicard and Nisca that support Windows 2000, 2003 and XP drivers.
- E. CCAS Third Party Integrated Devices
1. The CCAS shall interface with third party devices and applications. The Third Part integration shall be accomplished by:
 - a. Direct Serial Interface.
 - b. Virtual Serial Interface (Lantronix controller).
 - c. TCP/IP (DLL, XML, etc).
 - d. Software Development Kit w/ Scripts shall be provided.
- F. Computer Work Stations:
1. The computer work stations shall be as manufactured by Dell. HP or IBM using specified processor. However, all work stations shall be from the same manufacturer.

2.4 DATA PROCESSING SUBSYSTEM (DPS)

- A. General.
1. The DPS shall integrate all access control, credential management, digital video management and functionality into a single database in a networked environment. The DPS shall allow the incorporation and integration of

servers, access control client workstations, badging client workstations, digital video management client workstations, remote access level management client workstations and integrated client workstations sharing the same database on local area or wide area networks. The DPS shall allow future expansion to include additional client workstations without losing functionality.

2. DPS administrative operations shall be available from any client workstation on the DPS that is configured and licensed to do so. System Administrator functions include the creation of maps, alarm response instructions, access levels, time zones, holidays, reports, area control, outputs and all required DPS configurations. System Administration operations shall include changes / configuration to the CCTV image comparison screen, cardholder window, employee capture, and cardholder look-up screen.

B. Fault Tolerant CCAS Server

1. The CCAS Fault Tolerant Server shall be a NEC Express 5800 320 Series server with Intel Xeon series processors. The Server shall be a self-contained fully redundant system (dual module / mirrored components) with on-line serviceability and hot-swappable replacement of all major subsystems including processors, power supplies, PCI bus and SCSI controllers. The server shall provide 99.999% system up time and include the following list of features / hardware:
 - a. NEC Express5800-320Fd-MR Rack mount with Redundant dual Xeon processors, 3.0GHz, 6MBx2 L2 cache.
 - b. Operating Temperature from 50 to 95 degrees F (10 to 35 degrees C) with relative humidity from 20% to 80% (no condensation)..
 - c. Redundant ECC DDR2 SDRAM memory (minimum of 1 GB per module.
 - d. Redundant dual channel Ultra 160 SCSI controllers. (minimum two drives per module, three drives maximum) utilizing 10K RPM Ultra SCSI Disk Drives RAID0/1 configured.
 - e. External 3.5" USB floppy drive, 3 PCI expansion slots, redundant integrated 10/100 and 1000 Ethernet NIC Copper cards, redundant integrated PCI video cards, redundant 24xCDROM drives, 2 serial ports, 2 USB ports, keyboard, mouse and surge suppression strip, USB to PS/2 Converter for KVM Connectivity.
 - f. Windows 2003 Server operating system software with 25 user licenses, ESMPRO system management software suite, Management Workstation Application software (MWA) for remote systems management, VERITAS Volume Manager software for storage management, RDR.

C. CCAS Client Workstation for administrative, programmer, alarm monitoring, CCTV review and badging.

1. The CCAS Client Workstation(s) shall be 100% Windows / Intel Standard compatible, approved for use with Microsoft Windows latest version, and scaled according to the following system application requirements:
 - a. CCAS Client Workstation minimum requirements shall consist of a Dell PowerEdge 2950 or equivalent business class computer.
 - 1) See Plans.

D. Badging System Peripherals

1. Video Camera.

- a. The video camera to capture cardholders' photos shall be highly durable with a built-in auto-focus feature. It shall have an auto iris, an optical power zoom lens and be capable of USB connectivity.
 - b. CCTV Camera shall be Canon Powershot sx110 or equal.
2. Card Printer.
- a. The high definition printer shall be Fargo HDP 5000 or approved equal. Contractor shall develop the card design with the Owner and A/E and provide three different design samples to review prior to implementation and issuance of the cards.
 - b. Specifications:
 - 1) The printer(s) shall be capable of printing full-color images and text on the following card types: ABS, PVC, PET, PETG, matte-finish (clean) and rough finish (clean). The cards may include proximity, contact smart, contactless smart, magnetic stripe, and optical memory technology. The printer must meet the following requirements:
 - 2) Print Method - High Definition Printing Dye-Sublimation / Resin Thermal Transfer.
 - 3) Resolution - 300 dpi (11.8 dots/mm).
 - 4) Colors - Up to 16.7 million / 256 shades per pixel.
 - 5) Print Ribbon Options:
 - a) Provide to print on the specified contactless smart cards.
 - b) Full-color with two resin black panels, Yellow, Magenta, Cyan, 500 prints.
 - 6) High Definition Print Film Options:
 - a) Standard Holographic (500 prints).
 - 7) Overlamine Options:
 - a) PolyGuard Overlamine, .6 mil thick (250 prints).
 - b) All overlaminates, standard holographic design.
 - 8) Print Speed:
 - a) 38 seconds per card / 95 cards per hour in batch mode (YMC with transfer).
 - b) 46 seconds per card / 78 cards per hour in batch mode (YMCK with transfer).
 - c) 70 seconds per card / 51 cards per hour in batch mode (YMCKK with transfer).
 - d) 50 seconds per card / 72 cards per hour in batch mode (YMCK/lamination).
 - e) 75 seconds per card / 48 cards per hour in batch mode (YMCKK/lamination).
 - 9) Accepted Standard Card Sizes - CR-80 (3.370"L x 2.125"W / 85.6mmL x 54mmW).
 - 10) Print Area - Over-the-edge on CR-80 cards.
 - 11) Accepted Card Thickness.
 - a) Print only: .030" (30mil) to .070" (50mil) / .762mm to 1.778mm.
 - b) Print / Lamination: .030" (30mil) to .070" (50mil) / .762mm to 1.778mm.
 - 12) Accepted Card Types - ABS, PVC, PET, PETG, proximity, smart and mag stripe cards, optical memory cards.
 - 13) Input Hopper Card Capacity - 100 cards (.030" / .762mm).
 - 14) Output Hopper Card Capacity - 200 cards (.030" / .762mm).

- 15) Card Cleaning - Replaceable cleaning roller.
- 16) Memory - 16MB RAM.
- 17) Display - User-friendly, SmartScreen LCD Control Panel.
- 18) Software Drivers - Windows® 2000/XP, Windows 2003 or Windows Vista.
- 19) Interface - USB 2.0 (High Speed) and Ethernet with internal print server.
- 20) Operating Temperature - 65° to 90° F / 18° to 32° C.
- 21) Humidity - 20-80% non-condensing.
- 22) Agency Listings:
 - a) Safety: UL 60950, CSA C2.2 No. 60950, CB report (EN 60950), CE mark.
 - b) EMC: FCC Part 15 Class A, EN 55022; 1998 Class A, CRC c1374, EN 61000-3-2: 2000, EN 61000-3-2: 1995, EN 55024; 1998, CE mark, and CCC mark.
- 23) Supply Voltage - 100-240 VAC at 50 Hz / 60 Hz, 3.8A.
- 24) Warranty:
 - a) Printer – 2 year; including 1 year On-Call Express.
 - b) Print head – Lifetime; unlimited pass with Fargo Certified Cards.
- 25) Certified Supplies - Card Printer / Encoders require highly specialized media to function properly. To maximize printed card quality and durability, print head life and printer / encoder reliability, use only Certified Supplies. Warranties are void, where not prohibited by law, when non-Certified Supplies are used.
- 26) Required Options:
 - a) Printer Cleaning Kit.
 - b) Door and cartridge locks.
 - c) Card Lamination Module - dual-sided (simultaneous).
 - d) Dual-sided printing.
 - e) Contactless Smart Card Encoder (HID iCLASS and MIFARE).

E. Report printer

- 1. The report printer shall be a Laser network printer of latest design.
- 2. Specifications:
 - a. Memory: 16 MB of RAM.
 - b. Print Specs:
 - 1) Speed (pages per minute): 19.
 - 2) Resolution: 1200 x 1200 dpi.
 - 3) Language: HP PCL 5e and 6; printer language (emulates Adobe PostScript7 level 2).
 - 4) Fonts: 45 scalable fonts plus 35 postscript fonts built-in.
 - c. Paper Handling:
 - 1) Main input tray capacity: 250-sheet regular weight 20 lb (75 g/m2) paper or up to 30 envelopes.
 - 2) Priority input tray capacity: 10-sheet 20 lb (75 g/m2) paper or 1 envelope.
 - 3) Output bin capacity: 125-sheet 20 lb (75 g/m2) paper or cardstock 16 to 28 lb (60 to 105 g/m2) Straight through paper path handles media 16 to 43 lb (60 to 163 g/m2).
 - d. Paper size:

- 1) Letter 8.5 x 11 and Legal 8.5 x 14 in (215 x 356 mm).
- e. Connectivity: IEEE-1284 compliant bi-directional parallel port and 2.0 compliant USB port; HP Jetdirect 175x print server/ Internet connector; 10/100Base-T Ethernet, Microsoft TCP/IP & IPX/SPX, and LocalTalk protocols.
- f. Environmental Ranges:
 - 1) Operating temperature: 50 to 90.5° F (10 to 32.5° C).
 - 2) Operating humidity: 20 to 80% RH non-condensing.
 - 3) Storage temperature: 32 to 104° F (0 to 40° C).
 - 4) Storage humidity: 10 to 80% RH non-condensing.
- g. Supported OS: Microsoft Windows latest version, Apple Macintosh latest version.
- h. Acoustics:
 - 1) Sound power: LwAd = 6.1 Bels (A) printing, LwAd = 6.5 Bels (A) copying (HP LaserJet 1220).
 - 2) Acoustics are inaudible during powersave mode.
 - 3) Tests per ISO 9296.
- i. Power Requirements:
 - 1) Source: 110 to 120 v (∇ 10%)/127v (∇ 10%)/220 to 240 v (∇ 10%).
 - 2) Frequency: 50 to 60 Hz (∇ 2Hz)/60 Hz NOM/50 to 60 Hz (∇ 3Hz).
- j. Dimensions: (w x d x h) 16.3 x 19.2 x 10.0 in (415 x 487 x 252 mm).
- k. Weight (with cartridge): 18.3 lb (8.3 kg).
- l. Printer shall be HP LaserJet 1035n or approved equal.

F. Modem

- 1. The CCAS modem shall be available for remote diagnostics, downloading of upgrades, dial-in capabilities, and remote communications. The modem shall be plug and play and support the Windows 2000 Operating System. All system servers must include a modem.
- 2. The modem shall have the minimum specifications:
 - a. Data Transmission: 56 Kbps.
 - b. Universal Compatibility: Yes.
 - c. Error Control: V.42/MNP 2-4 error control.
 - d. Data Compression: V.42 bis/MNP5 data compression.
 - e. Approvals: FCC Approved (Part 15 Class B/Part 68), IC (Formerly DOC) Approved, UL Listed and CSA Approved.
 - f. Warranty: five (5) year manufacturer's standard warranty.

G. Backup System

- 1. The system server shall utilize a network backup system for system backups and archiving capabilities. The network backup system must support the Windows 2000/2003 Operating System.
- 2. Scheduled / Unattended Backups: Allows System Administrators to perform backups at pre-determined times. Intervals shall be in hourly, daily, weekly, and monthly intervals.
- 3. Network Backup Storage shall be at minimum same size as CCAS server array.
- 4. Storage shall be connected to network in different location that CCAS servers.

2.5 ACCESS CONTROL FIELD HARDWARE DEVICES

- A. General
 - 1. The system shall be equipped with the access control field hardware required to receive alarms and administer all access granted / denied decisions. All field hardware must be designed to meet UL 294 and ULC requirements. Depending upon the configuration, the system field hardware must be able to include any or all of the following components:
 - a. Intelligent Field Panels (IFP).
 - b. Input Control Module (ICM).
 - c. Output Control Module (OCM).
 - d. Dual Reader Interface Module (DRI).
 - e. Proximity Card Readers.
 - f. Panel Power Supplies.
- B. Intelligent Field Panel (IFP)
 - 1. The Intelligent Field Panel (IFP) shall link the CCAS Software to all downstream field hardware components (RIMs, ICMs and IOMs). The IFP shall provide full distributed processing of access control / Alarm Monitoring rules and operations. A fully loaded and configured IFP with shall respond in less than one-half (0.5) second to grant or deny access to cardholder.
 - 2. The IFP shall continue to function normally (stand-alone) in the event that it loses communication with the CCAS software. While in this off-line state, the IFP shall make access granted / denied decisions and maintain a log of the events that have occurred. Events shall be stored in local memory, and then uploaded automatically to the CCAS database after communication has been restored.
 - 3. In addition, the IFP shall incorporate the following features:
 - a. UL 294, ULC, and CE Certified.
 - b. Support for Host Communications Speed of 38,400 bps.
 - c. Support for Direct Connect, Remote Dial Up, or Local Area Network (LAN) Connection.
 - d. Support for Dual Path Host Communications - Secondary Path shall be Local Area Network (LAN) Connection, or Remote Dial Up Connection via Lantronix Ethernet controller.
 - e. Support for up to 32 MB of On-Board Memory, min 6MB.
 - f. LAN Support shall utilize RJ45 (10/100baseT) Ethernet Interface.
 - g. Flash Memory for real time program updates and overall host communications.
 - h. Support for four 2 wire downstream ports, two 4 wire downstream ports, or combination one 4 wire downstream port and two 2 wire downstream ports. Downstream ports shall be for connecting card readers and data gathering and output control panels via RS-485 multi-drop wiring configuration.
 - i. Memory storage of up to 250,000 card holders and 65,000 transactions.
 - j. Initial base memory download between IFP with standard memory from the CCAS shall require no more than ten (10) seconds.
 - k. Support for up to 32 devices consisting of RIMs, ICMs, and OCMs in any combination desired with a maximum of 16 I/OCM devices.
 - l. Support of multiple card technologies.
 - m. Supervised Communications between IFP and CCAS Software.

- n. AES 128 bit Symmetrical Block Encryption conforming to the FIPS-197 standard between IFP and CCAS Software communications driver.
- o. Multi drop support for up to eight IFPs per CCAS communications port.
- p. Support of up to eight card formats and facility codes.
- q. Support for SEIWG card formats.
- r. RS-485 Full Duplex, UL 1076 Grade AA communication channel to the CCAS head-end.
- s. Integration to other manufacturer's card readers.
- t. Uninterruptible Power Supply (UPS) with battery backup.
- u. 32-bit Microprocessor.
- v. Biometric Interface Support.
- w. An IFP downstream serial port shall multi-drop 16 access control field hardware devices using an RS-485 UL 1076 Grade A communication format allowing a distance of 4,000 feet using Belden 9842 cable or equivalent.
- x. 12 VDC input power.
- y. Issue Code Support for both Magnetic and Wiegand Card Formats.
- z. Individual Shunt Times (ADA Requirement).
- aa. Up to four Digit PIN Codes.
- bb. Downstream serial RS-232 device support.
- cc. Status LEDs for normal component and communication status.
- dd. RoHS Compliance.

C. Input Control Module (ICM)

- 1. The Input Control Module shall provide 16 UL 1076 Grade A or AA alarm input zones and monitor / report line fault conditions, alarm conditions, power faults and tampers. Status LEDs shall provide information about the sixteen alarm zone inputs, cabinet tamper, and power fault.
- 2. In addition, the ICM shall incorporate the following features:
 - a. UL 294, ULC, and CE Certified.
 - b. Alarm contact status scanning at up to 180 times per second for each zone.
 - c. Eight configuration DIP switches to assign unit addresses and communications speed.
 - d. Elevator control support for 64 floors.
 - e. Variable resistor values for line supervision.
 - f. A low power CMOS microprocessor.
 - g. Filtered data for noise rejection to prevent false alarms.
 - h. Up to 16 Grade A, or AA Supervised Inputs in any combination.
 - i. 12 VDC Input Power.
 - j. 2 Form C 2A, 30 VDC Contacts for load switching.
 - k. 2 dedicated inputs for tamper and power status.
 - l. RoHS Compliance.

D. Output Control Module (OCM)

- 1. The Output Control Modules shall provide 12 Form-C 2A 30 VDC relay contacts for load switching. The relays shall be configurable for fail-safe or fail-secure operation. Each relay shall support "On" "Off" and "Pulse"
 - a. 12 VDC input power.
 - b. Two dedicated digital inputs for tamper and power failure status.
 - c. RS-485 communications, multi-dropped (2-wire or 4-wire RS-485).

- d. Up to 16 OCMs per Intelligent System Controller.
 - e. Onboard termination jumpers.
 - f. DIP switch selectable addressing.
 - g. Status LEDs for communication to the host, heartbeat and relay status.
 - h. Elevator control, support for 64 floors.
 - i. RoHS Compliance.
- E. Dual Reader Interface Module (DRI)
- 1. The DRI shall provide a dual interface between the IFP and authentication devices. The DRI must operate with any authentication device that produces a standard Wiegand (Data 1 / Data 0 or Clock and Data) communication output.
 - 2. In addition the DRI shall incorporate the following features:
 - a. 12 VDC power supply.
 - b. Reader communications (Clock / Data or Wiegand Data1 / Data0) - more than 150 different readers approved for use.
 - c. 4 Form-C 2A at 30 VDC relay outputs.
 - d. Up to 16 different formats (8 card and 8 asset).
 - e. Issue code support for Magnetic and Wiegand formats.
 - f. Door contact supervision (Open / Closed).
 - g. REX push-button monitor.
 - h. Strike Control output.
 - i. Bi-color status LED support and 2-wire LED support.
 - j. Beeper control.
 - k. Dedicated tamper and power failure circuits.
 - l. Support for offline reader access mode.
 - m. Onboard jumpers for termination.
 - n. Elevator control, native support for 6 floors.
 - o. DIP switch selectable addressing.
 - p. UL 294 listed and CE approved.
 - q. RoHS Compliance.
- F. Card Readers
- 1. All readers shall be configured with the card reader and reader interface module mounted separately. The reader interface module shall be mounted in the EIB located on the secure side of the door.
 - 2. Smart Access Control Reader with Keypad: Provide *iCLASS*, contactless smart card reader or equivalent where shown on the drawings. Card reader shall be "single-package" type, combining controller, electronics and antenna in 1 package, in the following configurations:
 - a. RK40 - Card Reader, Wall Mounting (Single-Gang Mounting Applications):
 - 1) Provide "single-gang" mounting style contactless smart card reader for wall mounting, Vehicle Stanchions and Pedestals, and where shown on plans.
 - 2) The reader shall be of potted, polycarbonate material, sealed to a NEMA rating of 4X (IP65).
 - 3) The reader shall contain an integral magnet for use with an external magnetic reed switch to provide tamper protection when connected to an external alarm system. Provide external magnet reed switch and tamper indication.
 - 4) The reader shall be UL/C 294 listed, and shall be FCC and

- CE certified, and shall conform to the following ISO Standards: 15693, 14443A (CSN read-only), 14443B1 (read-only), and 14443B2.
- 5) Transmit Frequency: 13.56 MHz6) The reader shall have an approximate read range of 1 inch to 4.5 inches when used with the compatible access card.
 - 7) The reader shall require that a card, once read, must be removed from the RF field for 1 second before it will be read again, to prevent multiple reads from a single card presentation and anti-passback errors.
 - 8) The reader shall be capable of reading access control data from any *iCLASS* contactless smart card or equivalent, and transmitting that data in SIA standard Wiegand format.
 - 9) The reader shall be capable of reading the CSN (card serial number B a permanent, unique identification number) from any MIFARE[®] card using the S50 chip or equivalent, and transmitting that data in SIA standard Wiegand format.
 - 10) The reader shall be capable of writing to the compatible access card in compliance with ISO 15693 or 14443B2.
 - 11) The reader shall provide 1 Wiegand port, for connection to standard access control panels.
 - 12) The reader shall provide Internal Control for Read-only Access Control applications, transmitting Wiegand Data.
 - 13) The reader shall have separate terminal control points for the green and red LEDs, and for the audible indicator.
 - 14) The reader shall have multiple LEDs for increased visibility
 - 15) The reader shall have a 12-position keypad, with metal keycaps, and backlit numbers located above each key.
 - 16) The reader keypad shall be rugged, waterproof and backlit, and impervious to liquid spills, dirt, and water spray from any direction.
 - 17) The reader shall be configurable so that keypad data may be sent as individual keystrokes or buffered and formatted in a card data format, as required by the Host System.
 - 18) The reader shall allow users to enter a PIN code as a primary, secondary or alternate means of identification, based on configuration of the Host System.
 - 19) The reader shall optionally be configurable to verify the user's PIN entry locally, based on a comparison with PIN data stored on the user's card, transmitting Wiegand data to the host only if the PIN code is valid.
 - 20) The reader keypad shall have keys of sufficient size and with sufficient separation such that users wearing gloves can easily press the individual keys.
 - 21) The reader keypad shall work in conjunction with the audio transducer, such that each keypress shall produce a click or beep signifying that the keypress was received by the microprocessor.
 - 22) The reader keypad should have definite tactile "snap" when depressed, giving the user confirmation that the key was pressed correctly.
 - 23) The reader shall have an audio transducer capable of producing unique tone sequences for various status

- conditions.
 - 24) The reader shall have a configurable hold input, which when asserted shall either buffer a single card read or disable the reader, until the line is released. This input may be used for special applications or with loop detectors.
 - 25) Access control data shall be protected using 64-bit diversified security keys, encrypted RF data transmission, and mutual authentication using a proprietary symmetrical key-based algorithm.
 - 26) Security keys in the cards and readers shall be required to match, and may be customized for individual sites by using the *iCLASS* Card Programmer (or equivalent) or by special order from the factory.
 - 27) The reader shall have flash memory to allow future feature enhancements to be added in the field.
 - 28) The reader shall have a lifetime warranty against defects in materials and workmanship.
 - 29) Color shall be selected by the Architect: gray, black or white
 - 30) HID Model RK40, or equivalent, compatible with selected card media.
- b. Biometric Card Reader.
- 1) Reader shall use the combination of the fingerprint and *iCLASS* contactless smart card technology from HID. Both the fingerprint and *iCLASS* technology shall be designed to meet the needs of access control. The card reader shall be as manufactured by Bioscript or HID.
 - 2) Reader shall offer a RS-232, RS-485 and Weigand connection.
 - 3) Using the ISO 7816 protocol, the standard for contact smart card applications, the RWKLB575 allow connection to a PC or microcontroller to support read/write applications. Provide RS-232 to USB converter.
 - 4) Keypad: Offers twelve discrete switches with metal keycaps. Raised tactile mark on "5" key for visually impaired users. Configurable audio feedback. Backlit numbers in bezel overlay, above each key. Lighting is configurable: "Always On", "Always Off", "Triggered by Card Read", or "Triggered by Key Press".
 - 5) User Function Keys: Four programmable user function keys with metal keycaps. User function keys are available with factory default settings or can be customized. In either case, user function keys are easily defined in the graphical LCD display.
 - 6) Security: 64 bit authentication keys are extremely secure. Readers and cards require matching keys to function. All RF data transmission between the card and keypad reader is encrypted, using a secure algorithm. The key management system reduces the risk of compromised or duplicated cards.
 - 7) Cards and keypad readers with site-specific keys shall be provided from the factory.
 - 8) Audiovisual Indication: Audio transducer provides configurable tone sequences to signify access granted, access denied, power up, and configuration card read. A light bar provides a clear visual status indication in red, green, or amber. All units contain an LED to light the sensor area if the biometric option is included.
 - 9) Graphical Display: The backlit graphical LCD display offers a 60 x 18

mm viewing area, 120 x 32 resolution. It is factory preset to provide written instructions to the user. Fully customizable, the display also describes the function of the user function keys.

- 10) Indoor Design: Rugged, weatherized polycarbonate enclosure provides reliable performance and resistance to vandalism. Permanent magnet built into housing facilitates tamper alarm when used with a magnetic reed switch.
- 11) Enrollment: Enrollment software and a reader unit shall be provided to write the biometric template to the cards. The template never enters the PC – it is collected by the reader and written to the *iCLASS* card all in one simple process. To alleviate privacy and database management concerns, the biometric template is stored on the *iCLASS* card rather than in the unit.
- 12) *iCLASS* Credential Compatibility: The reader shall be compatible with all *iCLASS* credentials. The units shall read or read/write to credentials compatible with several ISO standards including:
 - a) 15693 - read/write; 2kbits (256Bytes) and 16kbits (2kBytes) *iCLASS* credentials.
 - b) 14443A - read only; MIFARE® Standard (serial number), Ultralight, or DESFire™.
 - c) 14443B2 – read / write; 16kbits (2kBytes) *iCLASS* credentials.
- 13) Reader shall be HID Model RWKLB575 with high security key management and programmable LED / Beeper / LCD key operation or approved equal.

G. Field Hardware Power Supplies: Power Supplies for field hardware shall be designed specifically for the equipment installed. These power supplies shall be regulated, isolated versions for the IFP, ICM, Card Readers and other equipment. Each shall be available in UPS with battery back-up. All power supplies shall be housed in locked enclosures that also allow mounting space for the IFP, ICM, DRI or other device / panel required.

H. Audible Annunciators

1. The audible annunciators and associated volume and reset controls shall be rack-mounted.
2. The audible annunciators shall not conflict with other audible signals at the SCC.
3. Each audible annunciator shall provide a maximum sound output of at least 60 dbA at 1 foot.

I. Local Audible Annunciators

1. Local audible annunciators shall be self-contained units of rugged, vandal-resistant construction.
2. Each annunciator shall incorporate the following features, as a minimum:
 - a. Audible alarm.
 - b. Visual indicator with a solid-state flasher.
 - c. Solid-state power supply.
 - d. Contacts for remote reset.
 - e. Operates on low voltage dc.
3. The audible alarm shall provide a sound output of at least 60 dbA at 1 foot.

2.6 SURVEILLANCE AND ASSESSMENT SUBSYSTEM (SAS)

- A. System Description: Video
1. Provide a complete and operational IP-based Digital Video Management System (IPDVMS) as specified here and shown on the drawings.
 2. IPDVMS shall provide the following functions:
 - a. IPDVMS shall store video from video cameras. Provide access to video in real-time ("live"), and stored on computer-based storage devices for review at a later time.
 - b. Recorders and servers will consist of rack-mountable PCs connected to a LAN.
 - c. Video and other data managed by the IPDVMS accessible from workstation PCs connected directly to the LAN, WAN or modem connections.
 - d. Includes GUI software designed to run on PCs equipped with the Microsoft Windows latest operating system.
 - e. GUI application software functions include system setup, administration and monitoring; live video viewing and PTZ camera control; video playback; video export; alarm monitoring; and other capabilities as detailed in the following paragraphs.
 - f. Provide access and control cameras via wireless handheld devices.
 3. Compatibility with Digital Video Equipment: The IPDVMS shall be designed to work with a wide variety of IP Cameras. The recorders shall utilize a standard Ethernet connection for video input via TCP/IP.
 4. Scalability and Expandability:
 - a. Cameras: The IPDVMS family of products to include cost-effective solutions for any number of cameras including large sites with 1000 or more cameras in a single system.
 - b. Storage: The IPDVMS to support a wide range of automated storage options ranging from as little as a few hours of online storage capacity to months of long-term storage using digital tape or other cost-effective long-term storage media.
 - c. Workstations: The IPDVMS shall be a distributed, multiuser, multitasking system capable of supporting simultaneous requests from multiple workstations.
 - d. Sites: The IPDVMS shall be capable of supporting large organizations with systems at multiple sites connected via LAN, WAN or dial-up modem connections.

2.7 CONTROLLED ACCESS SUBSYSTEM (CAS)

- A. Card Reader Electronics Interface Box (EIB)
1. Each card reader EIB shall consist of a tamper-resistant enclosure equipped with a tamper switch and a UL-approved cylinder lock (per UL 437, "Key Locks"). The card reader EIB shall normally be mounted on the secure side of each card reader-controlled access point. Mounting screws for surface mounting shall be provided inside the enclosure or, if exposed, shall be tamper-resistant requiring a special tool for removal. All EIB boxes shall be keyed alike.
 2. Card reader EIBs shall incorporate the required local power supply and battery backup unit equipment for operating the card reader(s), and the associated electrical locking device(s) at card reader controlled access points. A trouble signal shall be provided to indicate failure of any portion of this power supply equipment.

3. Each card reader EIB shall be capable of supplying power to a minimum of 2 card reader controlled access points. Power cabling from the card reader EIB to the card reader shall be a maximum of 50 feet.
- B. Exit Pushbutton
1. Each exit pushbutton shall consist of a momentary switch within an enclosure. Mounting screws for surface mounting shall be provided inside the enclosure or, if exposed, shall be tamper-resistant requiring a special tool for removal.
 2. Each switch shall provide 1 set of normally open and normally closed contacts. The switches shall be rated for a minimum of 1,000,000 activations without malfunction.
 3. The exit pushbuttons shall be provided with a 1-1/2 inch mushroom button.
- C. Panic Hardware (Push Bars) - Refer to access point schedule for scope of work in the terminal contract.
1. Push bars shall be external surface-mounted rim devices, UL-listed for accident hazard installations.
 2. Each push bar shall incorporate the following features, as a minimum:
 - a. Nonhanded.
 - b. Field sizeable.
 - c. Both time delay exit and lock/unlock operation
 3. Each push bar shall be provided with a surface-mounted rim strike with a signal switch. The signal switch shall be a normally open momentary switch rated for a minimum of 1,000,000 activations without malfunction.
 4. The device finish shall match existing door hardware.
- D. Signage - Refer to access point schedule for scope of work in the terminal contract.
1. Signage shall be provided as indicated on the drawings at selected access points to provide information for the users.
 2. Signs shall be black acrylic plastic with graphics silk-screen applied to the back side of the sign. Lettering shall be white Helvetica medium. Signs shall be square, with rounded corners and white border line. Provide samples of the signs for approval.
 3. The signs shall be applied with adhesive tape to the door or to metal plates which are mechanically attached on the wall adjacent to the door at a height of 5 feet, 7 inches as follows:
 - a. Wood screws for anchoring to wood.
 - b. Toggle bolts for anchoring to hollow masonry or gypsum board.
 - c. Expansion shields and lag bolts for anchoring to concrete or solid masonry.
- E. Gate Control Panels
1. Each gate control panel shall consist of a tamper-resistant weatherproof NEMA 4X (stainless steel) enclosure equipped with a tamper switch and a UL-approved cylinder lock (per UL 4379 "Key Locks") or padlock. The gate control panel shall normally be mounted on the secure side of the card reader-controlled vehicle gate. Mounting screws for surface mounting shall be provided inside the enclosure or, if exposed, shall be tamper-resistant requiring a special tool for removal.
 2. The gate control panel shall incorporate the required local power supply and battery backup equipment for operating the card reader(s), PINpad(s), and

- gate operator at card reader-controlled vehicle gates. A trouble signal shall be provided to indicate failure of any portion of this power supply equipment.
- 3. The gate control panel shall be provided with a heating element to assure continued gate operation during severe cold temperatures.
- 4. A concrete foundation shall be provided for the gate control panel.

2.8 INTRUSION DETECTION SUBSYSTEM (IDS)

A. Balanced Magnetic Switches

- 1. Balanced magnetic switches will be designed for intrusion detection in security applications.
- 2. Each balanced magnetic switch will consist of two (2) cast nonferrous metal enclosures. Mounting screws for surface mounting will be provided inside the enclosure or, if exposed, will be tamper resistant requiring a special tool for removal. Each magnet will be 778ALNICO V or better.
 - a. The switch enclosure will be mounted on the door frame or other non-movable surface. Each switch enclosure will contain a reed switch, an adjustable bias magnet, a tamper switch, and one (1) set of normally open and normally closed contacts. (Note: In lieu of a tamper switch, the enclosure may be encased in epoxy.) Arc protection will be provided to prevent the reed switch from being fused together by transient current conditions. Each switch will be rated for a minimum of 1,000,000 activations without malfunction. The switch enclosure will be provided with a 1/2-inch threaded conduit connector at one end.
 - b. The magnet enclosure will be mounted on the door or other movable surface, so that when the door is closed, the magnet will be within 1 inch of the reed switch.
- 3. Balanced magnetic switches will comply with the applicable requirements of UL 634, Connectors and Switches for Use with Burglar-Alarm Systems and UL 639, Intrusion Detection Units.

B. Gate Position Switches

- 1. Gate position switches shall be designed for wide gap (up to 3 inches) applications.
- 2. Each gate position switch shall consist of 2 cast nonferrous metal enclosures. Mounting screws for surface mounting will be provided inside the enclosure or, if exposed, shall be tamper resistant requiring a special tool for removal. Each magnet shall be ALNICO V or better.
 - a. The switch enclosure shall be mounted on the fence post or other non-movable surface. Each switch enclosure shall contain a reed switch, an adjustable bias magnet, a tamper switch, and 1 set of normally open and normally closed contacts. (Note: In lieu of a tamper switch, the enclosure may be encased in epoxy.) Arc protection shall be provided to prevent the reed switch from being fused together by transient current conditions. Each switch shall be rated for a minimum of 1,000,000 activations without malfunction. The switch enclosure shall be provided with a 1/2-inch threaded conduit connector at one end.
 - b. The magnet enclosure shall be mounted on the gate post or other movable surface, so that when the door is closed, the magnet shall be within 1 inch of the reed switch.

3. Gate position switches shall comply with the applicable requirements of UL 634, Connectors and Switches for Use with Burglar-Alarm Systems and UL 639, Intrusion Detection Units.
- C. Tamper Switches
1. Each tamper switch shall consist of a single-pole, double-throw momentary switch rated for 5 amps at 120 volts. Each switch shall be rated for a minimum of 1,000,000 activations without malfunction.
 2. Tamper switches shall comply with the applicable requirements of UL 634, Connectors and Switches for Use with Burglar-Alarm Systems and UL 639, Intrusion Detection Units.
- D. End-of-line Termination Networks
1. End-of-line termination networks required to provide the proper impedance for supervision specified in Paragraph 1.09G.5 shall be provided on printed circuit cards. A terminal block shall be provided on each card for connection to the individual devices.
- E. Duress Alarm Devices
1. Each duress alarm device shall consist of a momentary switch and a tamper-resistant enclosure.
 2. The momentary switch shall be rated for 1,000,000 activations. The switch shall be provided with a latched output.
 3. Mounting screws for surface mounting shall be provided inside the enclosure or, if exposed, shall be tamper-resistant requiring a special tool for removal.
 4. The duress alarm devices shall be hand-actuated.

2.9 UNINTERRUPTIBLE POWER SUBSYSTEM (UPS)

- A. Battery Backup Units for IFP, EIB and Gate Control Panels.
1. Each battery backup unit shall incorporate an inverter, battery charger, batteries and a sensing and transfer relay housed in a cabinet.
 2. The battery backup unit inverters shall be the filtered rectangular waveform type with an efficiency of not less than 80 percent at 0.9 power factor, full load and rated output.
 3. The battery chargers shall be solid-state and designed for taper charge operation.
 4. Batteries shall be completely sealed and ready for service. The batteries shall be capable of accommodating a minimum of 500 full discharges / recharges.
 5. The sensing and transfer relays shall monitor the ac input and initiate a transfer to the battery supply upon failure or low voltage. Transfer shall be automatic and shall be completed within 20 milliseconds. The sensing and transfer relays shall continue to monitor battery voltage and shall disconnect the load if the voltage drops below 85 percent of its rated output.
 6. Front panel indication of critical status information shall be provided with contacts for remote monitoring via the DPS. A local audible signal shall be provided for off-normal conditions.

2.10 ID BADGE / KEYCARDS

- A. ID badge / keycards shall have provisions to incorporate a badge insert on the front side and the following information on the back side (preprinted):

1. Guaranteed postage and mailing address for lost devices.
 2. Arrow or similar marking to indicate the proper orientation for presentation at a card reader.
 3. Notice: "THIS BADGE MUST BE WORN ON OUTER GARMENT WHEN IN AOA AND MUST BE RETURNED TO AIRPORT OPS WHEN EMPLOYMENT IS TERMINATED."
- B. ID badge / keycards shall be provided with removable pocket clips.
- C. ID badge / keycards shall be capable of incorporating a printed photograph of the user-without interfering with its operation.
- D. ID badge / keycards shall be resistant to wear and environmental deterioration to include breakage, cracking, delaminating or coding changes or losses from any of the following conditions.
1. Minor impact.
 2. Temperature changes.
 3. Radial-type bend up to 90 degrees in either direction (end to end along the longest dimension of the card) for at least 50 bends.
- E. Access Cards (Credentials): Provide a quantity of 2000 *iCLASS* Contactless Smart Card Credentials (or equivalent) in the following form factor:
1. Access Card:
 - a. Access cards shall be used with access readers to gain entry to access controlled portals (e.g.; doors, gates, turnstiles) and to hold information specific to the user.
 - b. The card shall be available in single technology or multiple technology configurations. Double technology cards shall meet the following criteria:
 - 1) The card shall meet the following standards for contactless smart cards: ISO 15693 and ISO 14443B2.
 - 2) The card shall meet ISO 7810 specifications for length, width thickness, flatness, card construction and durability, and shall be in a form suitable for direct two sided dye-sublimation or thermal transfer printing on the specified badge printer.
 - 3) Presentation to the access control reader at any angle within a minimum of one (1) inch shall result in an accurate reading of the card.
 - 4) Unique 64-bit, fixed card serial number, used for anti-collision and key diversification.
 - 5) The card shall support read / write capability, with a minimum of 16 Kbits [2048 bytes] of EEPROM memory. The 2 Kbit card shall have a minimum of 2 Application Areas, and the 16Kbit shall have either (specify) 2 or 16 Application Areas to support future applications. Data retention shall be ten (10) years, nominal. Wiegand card data up to 84 bits in length shall be factory programmed in Application Area 1 for use with access control systems.
 - 6) Each Application Area on the card shall be secured with a 64-bit unique, diversified security key, such that data stored in that area cannot be accessed or modified until the card and reader have completed a mutual authentication process.

- 7) The card shall be capable of completing any write operation, even if the card is removed from the RF field during that operation.
- 8) The card shall be warranted against defects in materials and workmanship for two (2) years, or if multiple technologies are used: with a magnetic stripe the card shall have a fifteen (15) month warranty.
- 9) The card shall not carry any identification showing the location of the property unless otherwise specified herein.
- 10) The card shall be capable of accepting a slot punch on one end, allowing it to be hung from a strap / clip in a vertical orientation.
- 11) The card shall be PET/PVC composite.
- 12) The card shall support 13.56 MHz *iCLASS* contactless smart chip and antenna plus any or all of the following technologies, simultaneously:
 - a) 125 kHz HID Proximity chip and antenna.

F. Corporate 1000 Program

1. Cards shall be uniquely identified for the location using HID Corporate 1000 Program.

2.11 MISCELLANEOUS PROVISIONS

A. Physical Barriers

1. Wherever mechanical locks and keys (mortise locks, key-in-knob, etc.) and padlocks are required to provide access controls, the proposed locks may become part of the DLH Master-Keyed-System.
 - a. This system will employ high security locks, with keyblanks, key codes and keyways restricted by the manufacturer. Locks will be of the seven-pin tumbler type, combined for six pins. Locks will be furnished with interchangeable cores and pinned to the specifications furnished by the DLH Administration. Each lock will be supplied with at least one spare (uncombined) interchangeable core. Keyblanks will be released by the manufacturer only upon written authorization of a predesignated DLH official. Keyblanks will be stamped "DO NOT DUPLICATE". No other markings will be acceptable.
 - b. Each padlock will be furnished with one padlock chain, preattached to the lock shackle. The padlock chain will be no less than 2 feet in length, and no more than 4 feet in length. The unattached chain end will be equipped with a device to allow rapid attachment of padlock chain to chainlink fencing or other mounting surface as required. The padlock chain will be vinyl coated preformed aircraft cable.
2. Bollards shall be provided around field-installed equipment at Type 11 and Type 12 access points to preclude accidental damage from vehicles. These bollards shall consist of concrete-filled pipes appropriately anchored.

2.12 MAINTENANCE AIDS AND SPARE PARTS

A. Nonstandard Test Equipment, Tools, Adaptors and Fittings

1. One set of all special or nonstandard test equipment, tools, adaptors and fittings required to install, maintain and service the CCAS shall be provided to include card extenders for each different type of printed circuit card in the

system, tools for removing tamper resistant screws and a portable IFP analyzer.

2. The portable analyzer unit shall be able to test the IFPs in either an on-line or off-line mode. This unit shall be capable of exercising all devices connected to the IFP and all functions of the IFP itself.
3. All test equipment and tools provided shall be new, unused, of first-class quality and of suitable material.
4. All test equipment and special tools furnished shall be provided with complete operating instructions.

B. Spare Parts

1. Provide spare parts in the amount of 10% of all hardware furnished on the project. The spare parts shall include, but not be limited to, mag locks, card readers, power supplies, balance magnetic contacts, REX switches, tamper switches and other similar components.
2. Provide at least one quantity when 10% results in a quantity of less than one.
3. Provide two IFP panels completely equipped to support six card readers.
4. Provide two IFP hardware components located in the gate control terminal cabinets.
5. Provide two network switches located in GCTC cabinet.

2.13 SOFTWARE REQUIREMENTS

A. General

1. The CCAS software shall perform all processor-related functions at DLH necessary to satisfy the security requirements defined in FAR 1542. This software shall support all functions required for system operations, system software debugging and I/O handling.
2. Source code for application programs shall be in a high level language.
3. The CCAS shall be supplied with 2 complete sets of software and firmware (running and backup), compiled after the completion of the Field Verification Test, to include, as a minimum:
 - a. Executive programs and operating system.
 - b. Utility programs.
 - c. Software debugging and on-line / off-line diagnostic and test routines.
 - d. On-line / off-line hardware diagnostics.
 - e. I/O drivers.
 - f. Application programs.
 - g. Software spooling to I/O devices.
 - h. Macro-assembler.
 - i. On-line high level language compiler.
 - j. Run-time library for the high level language supplied.
 - k. Relocatable loader.
 - l. Full-screen text editor.
 - m. Database manager with report generator.
4. The Contractor shall be responsible for all required software licenses.
5. The Contractor shall not make any modifications to the standard software package provided by the central processor supplier that would in any way preclude the purchase of a standard maintenance and service contract directly from the supplier.
6. Provisions for system regeneration, reprogramming and background processing using either central processor and other supplied equipment shall be provided. These activities shall not interfere with the real-time functions

of the CCAS or the automatic switchover provision. The program development provisions supplied shall allow operators to utilize a high level language that has efficient access to all information included in the system databases. High level reprogramming capability shall include provisions to modify existing display / printout / log formats and to generate new displays / printouts / logs.

7. All utilities and command files required to compile, link and execute the application programs shall be provided. Application program source code shall be loaded, compiled and linked at the job site at the start of the Field Verification Test.
8. All firmware changes to E-PROMS resulting from the Field Verification Test shall be incorporated into all like devices and fully documented.

B. CCAS Software Capabilities

1. The CCAS Software shall support an unlimited number of card readers, input points, video cameras, intrusion detection points, and relay outputs. The CCAS database server shall support an unlimited number of cardholders, visitors, and assets limited only by the available memory on the IFP. The database server shall also support an unlimited number of system events and System Operator transactions in the history file limited only by available hard disk space. Client Workstations shall be limited only by the limitations of the operating system server software.

C. CCAS Software Functionality

1. Time Zones.
 - a. The CCAS shall be capable of creating and storing up to two hundred fifty four (254) time zones. Each time zone shall have a minimum of six (6) intervals. Each interval shall be assignable to any day of the week.
 - b. Each time zone shall be assignable to an alphanumeric name of up to 40 characters. Time zones shall be applied to access levels, card reader modes, alarm inputs, alarm outputs, and alarm masking and logging functions. Time zones shall be allowed to belong to any or all access levels so that the time zone only has to be defined once.
2. Access Levels.
 - a. The CCAS shall be capable of defining a minimum of 32,000 access levels with a minimum of 32 access levels per cardholder per database segment (see Section 2.04.8 Database Segmentation). Access Levels shall consist of a combination of card readers and time zones.
 - b. Each Access Level shall be assignable to an alphanumeric name using up to 40 characters.
 - c. Card readers shall have the ability to be assigned to any or all access levels defined in the CCAS. Individual card readers shall be capable of having a distinct time zone assigned to it.
 - d. The CCAS shall allow an "Allow User Commands" option to be assigned on a per access level basis where keypad readers are in use.
3. Temporary Access Levels.
 - a. The CCAS shall be capable of assigning Temporary Access Levels inclusive of the 32,000 assignable Access Levels.
 - b. Each Temporary Access Level shall be assignable to an alphanumeric name using up to 40 characters.

- c. Each Temporary Access Level shall be definable with a start and end date.
 - d. Temporary Access Levels shall be stored in the IFP and functionality shall be maintained in the event of disconnection with the IFP.
- 4. Access Groups.
 - a. The CCAS shall be capable of assigning Access Groups with a maximum of 32 Access Levels per Access Group.
 - b. Each Access Group shall be assignable to an alphanumeric name using up to 40 characters.
- 5. Precision Access Levels.
 - a. The CCAS shall be capable of assigning Precision Access Levels in addition to the 32,000 Access Levels with the ability to assign unlimited card reader and time zone combinations.
 - b. Each Precision Access Level shall be assignable to an alphanumeric name using up to 64 characters.
- 6. Holidays.
 - a. The CCAS shall provide a minimum of 255 Holiday assignments using an embedded calendar. Holidays shall be assigned an alphanumeric name using up to 40 characters and shall be grouped into eight (8) types of holidays, and shall be assignable to individual time zones. Access rights, card reader modes, and alarm masking schedules must be able to be altered when the current date is designated a Holiday.
 - b. Dates for Daylight Savings Time changes shall be definable and shall take effect automatically.
 - c. The CCAS shall support Holiday Ranges that allow a single holiday to span across multiple calendar days.
- 7. Database Segmentation.
 - a. The CCAS shall be required to support data segmentation whereby each segment shall have its own set of cardholders, field hardware and system parameters (time zones, access levels etc.). This segmentation shall expand the limitations of the CCAS parameters (i.e. access levels and time zones) to the maximum capacity of each parameter multiplied by the number of segments. The following list shall be made available for segmentation:
 - 1) Access Group.
 - 2) Access Levels.
 - 3) Actions.
 - 4) Action Groups.
 - 5) Alarm Inputs.
 - 6) Alarm Mask Groups.
 - 7) Alarm Outputs.
 - 8) Areas.
 - 9) Badge Types.
 - 10) Card Formats.
 - 11) Cardholders.
 - 12) Card Readers.
 - 13) Central Station Receivers.
 - 14) Device Groups.
 - 15) Digital Video Archive Servers.
 - 16) Fire Alarm Panels.
 - 17) Guard Tours.
 - 18) Global I/O Function Lists.

- 19) Global I/O Links.
 - 20) Holidays.
 - 21) Intercom Panels.
 - 22) Intercom Stations.
 - 23) Intrusion Detection Panels.
 - 24) IFPs.
 - 25) Maps.
 - 26) Monitor Zones.
 - 27) Precision Access Groups.
 - 28) Receiver Accounts.
 - 29) System Operators.
 - 30) Time Zones.
 - 31) Tour Groups.
 - 32) Visitors.
 - 33) User Permission Groups.
9. Field Hardware Communications.
 - a. The CCAS shall communicate with the IFPs by the following protocols:
 - 1) RS-232.
 - 2) RS-485.
 - 3) TCP/IP.
 - 4) Dial-up via Modem.
 - b. Communication baud rate shall be system selectable with a range between 9,600 to 38,400 bits per second.
 - c. Download communication between the CCAS and the IFP shall be fully multi-tasking and shall not interfere with operational functions.
 - d. Upon loss of communications between the CCAS Server and the IFP an alarm shall be created with a time stamp. Upon re-established communication the CCAS and the IFP shall automatically re-synchronize from the point of communication loss without operator intervention.
 10. Dual Path Field Hardware Communication.
 - a. The CCAS shall support Dual Path communications between the CCAS Server and the IFPs. This shall allow for a redundant communication path in the event the primary path fails. The secondary path shall support all primary path protocols.
 - b. In the event of a communication failure of the primary path the IFP shall initiate a switch over to the secondary path. During this fail over period the IFP shall periodically check to see if the primary path has been re-established and will automatically switch back upon a successful connection. Alarms shall be generated upon loss or restoration of communications.
 11. Area Control.
 - a. The CCAS shall provide five (5) area control features: Global Hard Anti-passback, Global Soft Anti-passback, Timed Anti-passback, Two Person Control, and Occupancy Limit. Area control shall be a security method of preventing a person from passing their badge to another person for dual entry into a single location utilizing one card.
 - 1) Global Hard Anti-passback.
 - a) The Global Hard Anti-passback feature shall require that a badge always be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Entry and Exit Readers

shall be able to span across multiple Ifps. Areas shall be logically defined under the CCAS, and area control shall not be required at all areas of CUSTOMER facility to be utilized. Global Hard Anti-passback shall work in the following manner. A cardholder must present his / her badge at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the badge to another entry card reader within the same area without first presenting his / her badge to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area=s exit card reader once access has been granted to that area, the cardholder shall be denied access and an alarm shall be reported to the Alarm Monitoring client workstation. Nested control areas (areas inside areas) shall be definable with a minimum of 64 entry and exit card readers. It shall be possible to have an area within an area and / or multiple areas that are independent of each other in which Global Hard Anti-passback rules shall apply.

- 2) Global Soft Anti-passback.
 - a) The Global Soft Anti-passback feature shall require that a badge be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Entry and Exit Readers shall be able to span across multiple IFPs. Areas shall be logically defined under the CCAS, and area control shall not be required at all areas of CUSTOMER facility to be utilized. Global Soft Anti-passback shall work in the following manner. A cardholder must present his / her badge at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the badge to another entry card reader within the same area without first presenting his / her badge to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area=s exit card reader once access has been granted to that area, the cardholder shall be allowed access (if that cardholder has the appropriate access level to access the new area), and an alarm shall be reported to the Alarm Monitoring client workstation. It shall be possible to have an area within an area and / or multiple areas that are independent of each other.
- 3) The following summary criteria shall apply under Global Hard or Soft Anti-passback:
 - a) Initially (Time 0) all card holders are reset to Area 0.
 - b) Any cardholder shall enter a controlled area anytime after Time 0 by presenting a badge to a CCAS entry card reader.

- c) A cardholder shall not exit the controlled area unless he has entered the area presenting a badge to the CCAS entry card reader.
- d) A cardholder shall not enter the controlled area a second time unless the cardholder has exited that area previously.
- e) A cardholder shall be able to enter through any entry card reader and exit through any exit card reader of a single controlled area.
- f) These options shall include a "forgiveness" feature that will allow the System Administrator to reset the anti-passback of all cardholders to Time 0 Area 0, either through a manual override or a time zone command.
- g) The CCAS shall provide an anti-passback exempt option for privileged or VIP cardholders. Cardholders with this option will not have anti-passback rules applied to them.
- h) The CCAS shall also have a "forgiveness" feature that will allow the System Administrator to assign a "one free pass" to an individual cardholder. This shall allow the System Administrator to reset the anti-passback of an individual cardholder to Time 0 Area 0.
- 4) Timed Anti-passback.
 - a) Timed Anti-Passback shall allow the System Administrator to decide how long after a cardholder has swiped their badge that they will have to wait before the same badge will be accepted again at the same card reader. This helps prevent multiple swipes by an individual to allow access to others through turnstile doors.
- 5) Two Person Control.
 - a) Two Person Rule shall be provided to restrict access to certain areas unless there are two (2) cardholders present. This restricts individuals from being alone in restricted or highly secure areas. When an area is configured for Two Person Rule, the following criteria shall prevail:
 - b) The card reader shall grant access only if two valid cardholders (with authorized access levels) swipe their badges one (1) after the other. In the event that a second authorized card is not presented within ten (10) seconds of the first authorized badge, the card reader shall reset and the first card will have to be swiped again.
 - c) Once two (2) people occupy an area, individual access shall be granted.
 - d) Individual exit shall be permitted until an area is occupied by only two (2) cardholders at which point the Two Person Rule applies for exit.
- 12. Mustering.
 - a. The CCAS shall support advanced Mustering functionality. The Mustering function shall provide an automatic capability for

- registering cardholders that are on site during an incident. Designated exit and entry card readers shall be used to enter and leave hazardous locations and safe locations. When an incident occurs, a Muster Report shall be generated that consists of a listing of all personnel that are within the hazardous locations as well as all personnel that have registered in a safe location.
13. Global Input / Output / Event Linkage.
 - a. The CCAS shall support a global linkage feature whereby any input / output / event shall be linked to any other input / output / event in the CCAS. Input / Output Linkages shall be able to span across Intelligent System Controllers.
 - b. System Administrators shall be able to create global I/O function lists, each consisting of a sequence of actions to be performed, such as changing card reader modes, activating outputs, and opening or closing anti-passback areas. Each function list may include up to six actions.
 14. Cardholder Escort Control.
 - a. The CCAS shall support comprehensive Escort functionality based upon Access Levels. Access Levels shall include options for "Escort Required," "An Escort" and "Not an Escort" and "does not require an Escort"
 - b. The Escort feature shall be capable of one-to-one and one-to-many Escort to Escorted functionality.
 15. Cardholder Use Limits.
 - a. The CCAS shall support a Cardholder Use Limit feature that shall allow System Administrators to specify the maximum number of times that a cardholder may use their credential at card readers in the CCAS.
 16. Extended Individual Strike Times.
 - a. The CCAS shall support Extended Individual Strike Times that allows a card reader's strike to be active for an extended period of time beyond the pre-determined standard strike time on a per cardholder basis. The extended strike time shall be user definable up to 255 seconds. Extended strike times shall be set on a card reader by card reader basis.
 17. Extended Individual Door Held Open Times.
 - a. The CCAS shall support Extended Individual Door Held Open Times that allows a card reader's door to be held open for an extended period of time beyond the predetermined standard held open time on a per cardholder basis. The extended held open time shall be user definable up to 131,070 seconds. Extended held open times shall be set on a card reader by card reader basis.
 18. Extended, on Demand, Door Held Open Times.
 - a. The CCAS shall support extended, on demand, door held times via a command keypad. The Extended Held Open command configuration shall consist of a command key sequence that shall be from 3 to 6 keys used to enter the number of minutes to extend the door held open time (up to 999 minutes) and a pre alarm time (from 0 to 30 minutes).
 - b. Only those cardholders having Command Authority at a given card reader configured for >Allow User Commands= shall have the ability to execute the Extended Held Open command at that card reader. The Extended Held Open command shall be available after a valid

cardholder has received an Access Grant at the card reader. The cardholder shall have a period of fifteen seconds after the Access Grant to enter the extended held open command sequence.

19. Elevator Control.
 - a. The CCAS shall provide elevator control using standard access control field hardware that will permit the restriction of cardholder access to certain floors while also allowing general access to other floors. The elevator control feature shall allow, at the elevator, the use of any card reader and all card reader modes used on any other card reader in the SMS. Each elevator card reader shall control access for a minimum of 64 floors.
 - b. The CCAS shall be able to track which floor was selected by an individual cardholder for auditing and reporting purposes.
20. Graphical System Overview Tree.
 - a. A graphical system overview tree shall display a graphical representation of all field hardware (including IFPs, fire panels, intrusion detection devices, personal safety devices, intercom systems, central station alarm receivers), digital video hardware, access levels, time zones, access groups, holidays, and card formats that have been configured in the CCAS. System Administrators shall be able to modify a device that is depicted on the graphical system overview tree or see its properties by double clicking on the icon and the CCAS shall bring them to the appropriate form.
21. Pre-Alarm.
 - a. The CCAS shall support a pre-alarm feature at the card reader. The pre-alarm will sound a tone at the card reader prior to the door held open alarm. The pre-alarm setting shall be configurable for up to a maximum of 5,940 seconds (99 minutes).
22. Alarm / Event Logging.
 - a. All alarms and events in the CCAS shall by default, always be recorded in the database. The CCAS shall give System Administrators the ability to select on a time zone basis, the times that they require the CCAS to log specific events to the database.
 - b. System Administrators shall have the option for Alarm / Events to be set to log or not to log particular alarms / events on any individual reader and or input.
23. Scheduling Utility.
 - a. The CCAS shall provide an integral Scheduling Utility. The Scheduling Utility shall allow System Administrators to schedule actions to occur on a one-time or a recurring basis. Recurring schedules shall be configured to begin immediately, last indefinitely, or have optional start and end dates.
 - b. The Scheduling Utility shall be available from both the System Administration and Alarm Monitoring modules.
 - c. The types of actions that shall be schedulable include but are not limited to:
 - 1) Action Group.
 - 2) Event Archiving / Purging.
 - 3) Arm / Disarm Area.
 - 4) Start of Guard Tour.
 - 5) Execution of Data Exchange Scripts.
 - 6) Activate, Deactivate, Pulse Device Output and Device Output Groups.

- 7) Global Anti-Passback Reset.
 - 8) Download Database to IFPs.
 - 9) Execute Function List.
 - 10) Mask / Unmask Inputs, Input Groups, Alarm Mask Groups, Door Forced Open or Held Open.
 - 11) Open Door, Open Door Group.
 - 12) Change Reader Mode.
 - 13) Automatic Reports.
 - 14) Reset Use Limit.
 - 15) Move Bulk Badges from an Area.
 - 16) Deactivate Badges.
 - 17) Logout Visitors.
 - 18) Schedule PTZ Presets.
- d. The Scheduling Utility shall maintain a history log in the database for actions that it executes.
24. Multiple Card Formats.
- a. The CCAS shall support an unlimited number of card formats. Magnetic stripe and Wiegand card formats shall be supported. Each IFP shall support a minimum of eight (8) access control card formats and if applicable, eight (8) asset formats. As such, each card reader shall also be able to support a minimum of eight (8) access control card formats. If applicable, asset readers shall be able to support a minimum of eight (8) access control card formats and eight (8) asset management card formats. The CCAS shall support any magnetic stripe format that uses card number, facility code, and issue code combinations with a maximum of a nine digit card number and two digit issue code. The CCAS shall support any industry standard Wiegand card format.
25. Denied Access Attempts Counter.
- a. The CCAS shall support a denied access attempts count on a per card reader basis. The "Denied Attempts Count" value shall be configurable from 0 to 255. The following access denial types shall cause the current denied count to be incremented:
 - 1) Unknown PIN entry at a card reader configured as "PIN or Card" mode.
 - 2) Invalid cipher entry at a card reader in Cipher Mode.
 - 3) Invalid PIN entered for a given card at a card reader configured as "Card and PIN" mode.
 - 4) Non-matching biometric presented for a given card at a card reader in biometric verify mode.
26. Card Reader Time Zone Overrides.
- a. The CCAS shall allow for the pre-defined default card reader settings to be overridden or temporarily changed on a time zone basis. At the beginning of the a selected time zone, the selected card reader=s operational mode shall be modified from it=s default mode to any one of the following modes: locked, unlocked, facility code, card only, card or PIN, card and PIN, card and Biometric, card or PIN and biometric, and / or card and PIN and biometric. The aforementioned options shall be available depending on the type of card reader utilized.
 - b. Each card reader shall have the ability to have multiple time zone setting overrides assigned to them as required by the System Administrator.

27. On-Line Context Sensitive Help.
 - a. The CCAS shall provide on-line context sensitive help files to guide System Administrators and System Operators in the configuration and operation of the CCAS. The help menu shall be available from any window in the CCAS by pressing the F1 function key or clicking on the Help icon in the toolbar. Help windows shall be context sensitive so System Administrators can move from form to form without leaving the help window. The CCAS shall also come with complete on-line documentation on CD.
28. Monitor Zones.
 - a. The CCAS shall provide System Administrators the ability to segment their access control CCAS field hardware devices into various zones or areas where Alarm Monitoring client workstations will monitor. These zones shall be assigned an alphanumeric name using up to 128 characters.
 - b. The CCAS shall allow subset relationship devices (such as card readers or ICMs to Intelligent System Controllers) to be automatically part of the monitoring zone when an IFP is selected AND it shall allow the System Administrator to define which subset devices (card readers, ICMs, etc.) belong to that monitor zone.
 - c. Updating of monitor zones shall take place in real time and without requiring operators to re-login.
29. Alarm / Event Routing.
 - a. The CCAS shall be capable of allowing System Administrators to route alarms and events to various Alarm Monitoring client workstations on the network. The CCAS shall allow any alarm or event to be routed to one or multiple client workstations on the network regardless of where the alarm is generated in the field. Alarms shall be routed to client workstations on a device by device level.
 - b. The CCAS shall be capable of automatic re-routing of an alarm from workstation X to workstation Y if the alarm is not responded to within a user definable time period.
 - c. The CCAS shall implement network synchronization that in the event alarm / event is routed to multiple client workstations, once the first client workstation >grabs= the alarm, the alarm / event shall be cleared from all other client workstations. As such, alarms that are routed to an Alarm Monitoring client workstation which does not have a System Operator logged in shall be queued so that all unacknowledged alarms will report to that client workstation once a System Operator has logged into the CCAS. Alarms / Events shall be routed based on default settings or time zone control.
30. Text Instructions.
 - a. The CCAS shall allow for a set of text instructions to be associated with each alarm that arrives into the CCAS. The text instruction function shall allow the System Administrator to enter a minimum of 32,000 characters of text for procedures to follow for each alarm that arrives at the Alarm Monitoring client workstations. Each alarm or event in the CCAS shall have it=s own unique set of text instructions should the System Administrator desire.
31. Customizable Voice Instructions.
 - a. The CCAS shall allow for a customizable voice instruction to be associated with CCAS alarms. The customizable voice instruction

- feature shall allow the System Administrator to record a voice instruction of unlimited length.
32. Customizable Voice Annunciation.
 - a. The CCAS shall allow for a customizable voice annunciation to be associated CCAS alarms. The customizable voice annunciation shall allow the System Administrator to record a voice annunciation of unlimited length.
 33. Alarm Attributes.
 - a. The System Administrator shall have the ability to configure how the CCAS handles the annunciation of alarms on an individual basis. Each alarm and / or event shall have the option(s) to:
 - 1) Display at one or more Alarm Monitoring client workstation.
 - 2) Allow higher priority alarms to be displayed on the Alarm Monitoring client workstation ahead of lower priority alarms.
 - 3) Require the field device, which generated the alarm to be restored to its normal state before the alarm is cleared.
 - 4) Print the alarm to the local event printer.
 - 5) Have a customized voice message annunciate at the client workstation.
 - 6) Have the alarm breakthrough to the Alarm Monitoring window should the System Operator be working in another application
 - 7) Allow System Operators to amend the journal entry once the alarm has been acknowledged.
 - 8) Insure that the alarm will not be able to be deleted from the Alarm Monitoring window upon acknowledgment.
 - 9) Display text and audio instructions outlining the procedures to follow when responding to the alarm.
 - 10) Automatically call-up associated maps.
 - 11) Automatically call up the associated cardholder record.
 - 12) Automatically call up the associated cardholder photo using the video verification function.
 - 13) Require a password to view the alarm.
 - 14) Require a password to acknowledge the alarm.
 - 15) Require acknowledgment to clear.
 - 16) Allow mandatory journal entry upon acknowledgment.
 - 17) Use pre-defined journal entries for alarms.
 - 18) Select the option for journal entry based upon the specific alarm.
 - 19) Bring up video on defined monitors.
 - 20) Automatically send an e-mail message.
 - 21) Automatically send an alphanumeric page.
 - 22) Have the alarm appear on the Alarm Monitoring window with a flashing colored coded bar across the alarm for high priority alarms.
 - 23) Have the alarm, when acknowledged, display an alternative flashing color coded bar across the alarm than for the original alarm color.
 - 25) Require User Logon for Acknowledgment.
 - 26) Have the ability to mark an alarm as Aln Progress@ where the system shall silence any repeating audio notifications on the Workstation where the alarm was routed and remove the alarm sprite notification on the graphical map. Additional

operators monitoring alarms shall be notified that the alarm has been marked AIn Progress.@

34. Alarm-Event Mappings.
 - a. The CCAS attributes in Alarm Attributes shall be assignable on a >global= basis to all devices that share an alarm description. Thus, the >door forced open= alarm attributes shall apply to any door with a card reader that is forced opened in the CCAS. The CCAS shall have the capability to assign a unique group of alarm attributes to specific device / alarm combinations to override the global settings for specific case settings.
35. System Downloads.
 - a. The CCAS shall provide for the downloading of data to the IFPs. Downloads shall load CCAS information (time zones, access levels, alarm configurations, etc.) into the IFPs first, followed by cardholder information and card reader configurations.
 - b. All IFPs on the CCAS shall be capable of either full or selective downloads to individual Intelligent System Controllers, and bi-directionally so that alarms will still report to their respective Alarm Monitoring client workstations as cardholder information is being downloaded.
 - c. A complete database download of 10,000 cardholder records to all IFPs (regardless of the number of IFPs) must be complete within ten (10) minutes.
 - d. Information on cardholder status, badge status, time zones or access levels shall download in real time as they are added, modified, or deleted from the CCAS.
36. Card Reader Options.
 - a. The CCAS shall include the following options for each reader on the system:
 - 1) Allow User Commands.
 - 2) Rename Auxiliary Inputs.
 - 3) Rename Auxiliary Outputs.
 - 4) Independently Supervise REX and DPS.
 - 5) Configure REX and DPS as Normally Open or Normally Closed.
 - 6) Deny if Duress.
 - 7) Alarm Masking.
 - 8) Activate Outputs.
 - 9) Two Card Control.
 - 10) Checkpoint.
 - 11) Do Not Activate Strike on REX.
 - 12) The ability to allow System Administrators to determine on a time zone basis to log or not to log on a card reader by card reader basis:
 - a) Access Grants.
 - b) Access Denied.
 - c) Card Reader Status Alarms.
 - d) The CCAS shall allow for user definable door strike functionality for each card reader in the CCAS.
 - e) The CCAS shall allow for each card reader to be selected as either an "in" reader, "out" reader, or "none" to allow for ease of reporting time and attendance basic "time in" and "time out" data.

- f) Enforce Use Limit - This option shall enable Card Use Limits at the card reader limiting the number of times that cardholders may use their credential to gain access at the card reader.
 - g) Supervise Door - Sets the CCAS so that the card reader door contact is wired as a supervised input.
 - h) The CCAS shall allow for one or more access points in a specified area to be armed and disarmed directly from the Command Control Keypad.
- 37. Input Control Module (ICM) Options.
 - a. The CCAS shall provide the following options for the Input Control Modules:
 - 1) Alarm Masking B The ability to mask the alarm input on a time zone basis.
 - 2) Local Linkage B The ability to locally link outputs with inputs that are attached to the same ICM/Output Control Module (OCM).
 - 3) Activate Output - The ability to activate an output tied to the ICM/OCM on a time zone basis.
 - 4) Activate Output Always- The ability to activate an output always.
 - 5) Configuration of Debounce Times B The ability to control the amount of time that an input state change must remain consistent in order for it to be considered a real change of state.
 - 6) Configuration of Hold Times - When configuring an Alarm Input, a hold time setting shall be settable from 0-15 seconds.
 - 7) Checkpoint B The ability to configure an input as a designated stop on one or more guard tours.
 - 8) Supervised Input B The ability to specify if a specific alarm contact on the ICM is a supervised or unsupervised contact.
 - 9) Entry / exit Delay B The ability to set up entry / exit delays for inputs that are attached to any ICM, SRI, or DRI. This shall include Non-Latched Entry: When an input activates, the alarm will not be reported until the Entry delay expires. If the input is still active when the entry delay expires, the alarm will be reported. If the input is not active when the entry delay expires, then the alarm will not report; Latched Entry: When an input activates, the alarm will not be reported until the Entry delay expires. If the input is still active when the entry delay expires AND the alarm has NOT BEEN MASKED, the alarm will be reported. If the input has been masked when the entry delay expires, then the alarm will not report; Exit Delay: When an input activates, the alarm will not be reported (operates as if masked) until the Exit delay expires. If the input is still active when the exit delay expires, the alarm will be reported. If the input is not active when the exit delay expires, the alarm will not be reported.
- 38. Alarm Monitoring.
 - a. Alarm Annunciation Configuration - The CCAS shall offer the same functionality as ICM of this document.
- 39. Current Status Indication.

- a. The Alarm Monitoring window shall provide a visual status that displays the current status of all devices in the device tree including child devices downstream from the primary device. Additionally there shall be a numeric display of card readers, IFPs and ICMs that are off line.
- 40. Device Group Support.
 - a. The CCAS shall support device grouping for uniform command and control of groups of devices within the system. Four types of homogeneous device groups shall be supported:
 - 1) Card Reader Groups.
 - 2) Input Groups.
 - 3) Relay Output Groups.
 - 4) Video Camera Groups.
- 41. Color Coding for Alarm Priorities.
 - a. The CCAS shall display alarms in the active Alarm Monitoring window with a flashing colored bar across the alarm based upon priority. Acknowledged alarms may be set with alternate color-coding. A minimum of 255 colors must be available for assignment to a minimum of 255 priority levels.
- 42. Highlighting of Unacknowledged Alarms.
 - a. The CCAS shall provide an Unacknowledged Alarm pop-up window that displays alarms that have been unacknowledged after a user defined period of time.
- 43. Pre-Defined Alarm Acknowledgment Responses
 - a. The CCAS shall have the capability for pre-defined alarm acknowledgment responses for alarms in the CCAS. An unlimited number of pre-defined responses shall be able to be configured for each alarm in the CCAS.
- 44. Lost Card Alarm.
 - a. The CCAS shall provide an optional setting to designate a Lost Card Alarm when a badge that is not active. The normal settings would be Terminated or Lost.
- 45. Request to Exit Event.
 - a. The CCAS shall provide an optional setting to annunciate an event when a REX device is used. Normally a REX event is not annunciated.
- 46. Real-Time, Live Video User Verification.
 - a. The CCAS shall have the capability of interfacing to a CCTV system and displaying a live video image next to a stored cardholder image record. This feature shall be system configurable.
- 47. Traces.
 - a. The CCAS shall allow for a live or historical trace on any IFP, ICM, Alarm Input, Credential (Cardholder), Intrusion Detection Device, Monitor Zone, or card reader. If applicable, the CCAS shall allow for a trace on any asset, intercom, or camera. Multiple traces may be run simultaneously. The CCAS shall allow System Operators to filter alarm types from the history trace window. Alarms that shall be filtered from the trace window are access granted alarms, access denied alarms, system alarms, duress alarms, and area control alarms.
- 48. "On the Fly" New Login of System Operators.
 - a. The CCAS shall allow a System Operator to login over another System Operator who is already logged into the same client

- workstation. This process shall log the first System Operator off of Alarm Monitoring and log the new System Operator on, changing any permissions necessary for that System Operator.
49. Auto Exit to Windows 2000 / 2003/ XP Login Window.
 - a. The CCAS shall be configurable to automatically exit the Alarm Monitoring application and log the System Operator out of the Windows 2000 / 2003 / XP Operating System when a System Operator logs off an Alarm Monitoring client workstation. The CCAS shall then bring the System Operator to the Windows / XP Login Window for the next System Operator to log on.
 50. Alarm Monitoring - Column Display & Configuration.
 51. Test Mode.
 - a. The CCAS shall support a Test Mode for Alarm Inputs, Door Forced Open, and Access Grants. Tests on Input Device Groups shall be available to verify that all inputs within the group are operational. Upon entering into Test Mode and for the duration of the test, alarms from members of the group shall either be displayed in a separate window/view on test Alarm Monitoring client workstations or on all Alarm Monitoring client workstations in which the alarms are usually routed. During the test (the duration of the test shall be set by the System Operator), all inputs within the group are manually activated in the field. At the end of the time duration, a report shall be generated flagging any inputs for alarms that were not received. During the Test Mode, all alarm operations carry on as programmed (i.e. Global I/O functions, CCTV commands, printer activity, etc.) so that all functions are tested.
 52. Manual Control.
 - a. The CCAS shall provide the System Operator the option to manually control over all output points or input points connected to the CCAS. Control points are defined as any door strike, auxiliary card reader output, or any other relay output point of an Output Control Module (OCM).
 53. Real-Time, Dynamic Graphical Maps.
 - a. The CCAS shall support graphical maps that display device / group status, function lists and video cameras dynamically in real-time. The maps may be configured to appear on command or when specified alarms are selected for acknowledgment. Map device icons shall have the ability to dynamically change shape and / or color to reflect the current state of the device. The CCAS shall indicate if the field hardware is not operating with the most current version of firmware.
 - b. The CCAS shall support all commands available and used map formats listed below:
 - c. The CCAS shall support user defined icons for field hardware devices. The CCAS shall also give System Operators the ability to affect the mode of card readers, open doors, start a trace on a device, mask / unmask alarm inputs, and activate / deactivate / pulse an output from the map icons.
 - d. The graphical maps shall have the ability to be printed to a local printer.
 54. Automatic Credential Deactivation by Lack of Use.
 - a. The CCAS shall have an automatic credential deactivation function where a cardholder's credential will automatically deactivate after an extended period of inactivity based upon a predetermined time

- period. The credential status may be reset by authorized System Operators.
55. Automatic Credential Deactivation based upon an Event.
 - a. The CCAS shall have a programmable ability to deactivate an active badge based upon a pre-determined event.
 56. Alarm Filtering.
 - a. The CCAS shall have the capability for filtering out alarm types from the Alarm Monitoring window. Alarms that may be filtered are access granted alarms, access denied alarms, system alarms, duress alarms, and area control alarms. If applicable, fire alarms, asset alarms, intercom alarms, central station receiver alarms, intrusion detection alarms, video event alarms, and transmitter alarms may also be filtered.
 57. Manual Override of Card Readers.
 - a. The CCAS shall support System Operator overrides of card readers from the Alarm Monitoring window, graphical maps or the real-time system status tree. The CCAS shall also support the ability to manually set a reader back to default mode.
 58. Alarm Masking.
 - a. The CCAS shall support the masking of alarms to be controlled on a time zone basis or by manual control.
 - b. The CCAS shall support the ability to configure inputs to be "Unable to Mask."
 59. On-Line Context Sensitive Help,
 - a. The CCAS shall provide on-line context sensitive help. The help menus shall be available from any window in the CCAS by pressing the F1 function key or clicking on the help icon in the toolbar.
 60. Sorting Capabilities,
 - a. The CCAS shall allow System Operators to arrange the way that alarms and / or events in the Alarm Monitoring window are listed by sorting the alarms and events. Sort criteria shall be based on priority, time / date, IFP, Card Reader, ICM, Input Device, or Cardholder. Additionally alarms and events can be sorted based on asset scan ID, asset name, intercom station, intrusion panel, transmitter, or transmitter input.
 61. Paging Interface,
 - a. The CCAS shall support a paging interface seamlessly integrated within the CCAS Alarm Monitoring module. System Operators shall have the ability to manually or automatically send numeric or alphanumeric paging messages on demand regarding any alarm currently displayed in the Main Alarm Monitoring window. Pages shall have to ability to be sent to multiple pagers if desired. The CCAS shall allow any pager to be accessed through a paging terminal that communicates through the TAP (Telocator Alphanumeric Paging) protocol.
 62. E-mail Interface,
 - a. The CCAS shall provide an e-mail interface seamlessly integrated within the CCAS Alarm Monitoring module. System Operators shall have the ability to manually or automatically send ASCII text e-mail messages from the Alarm Monitoring module on demand regarding any alarm currently displayed in the Main Alarm Monitoring window. E-mails shall have to ability to be sent to multiple e-mail accounts if desired. The CCAS shall integrate with Microsoft Exchange Server.

63. Credential Management,
 - a. The CCAS shall incorporate a Credential Management (PIDS) and Enrollment module that is integral to the CCAS source code with the ability to create and maintain the Cardholder database. Features shall include the ability to:
 - 1) Add, Modify and Delete records based upon permissions.
 - 2) Capture photo images, biometric information and signatures.
 - 3) Print Credentials.
 - 4) Boolean Search on any single or multiple fields.
 - 5) Determine single or multiple active badges.
 - 6) Assign Access Levels and Access Groups.
 - 7) Bulk Assignment / Modification / Deletion of Access Levels.
 - 8) Bulk Deletion of Cardholder Records.
 - 9) Native support for U.S. Government CHUID standard.
 - 10) Limit the number of times the credential can be printed.
 - 11) Limit the access for searching the database based upon user defined criteria.
64. Mobile Badging Operations.
 - a. The CCAS shall support seamlessly integrated Mobile Badging Operations that allow the CCAS cardholder database to be replicated onto an off the shelf laptop computer. The laptop computer shall then have the ability to go to remote sites to enroll cardholders into the CCAS and later synchronize the data.
65. Credentials.
 - a. The CCAS shall support the following credential types and allow for direct Thermal Dye Sublimation printing onto the credential surface.
 - 1) Composite Credentials - 3.375" x 2.125", UPVC Composite credentials with an ISO standard 30 mil thickness.
 - 2) Proximity credentials.
 - 3) Smart Cards B Contact-less.
 - b. The CCAS shall support HID ICLASS contact-less smart card technology. Security for ICLASS cards shall be handled via challenge and response authentication techniques, data ciphering, message authentication checking and unique unalterable serial numbers. The system shall support HID OEM- 100/150 encoders and allow for 2K and 16K ICLASS encoding.
66. Credential Management Enrollment Features.
 - a. The CCAS shall allow for automation of enrollment procedures with the following attributes based upon badge type:
 - 1) Default Deactivation Date.
 - 2) Default Access Levels.
 - 3) Badge Design Layout.
 - 4) Badge Printer Selection.
 - 5) Encoding Format (if required).
 - 6) Badge ID if set to automatic generation.
 - b. The CCAS Credential Management module shall incorporate a seamless interface to IDScan models CSS-800 and CSS- 1000 series scanners that scan, import text and / or photo data and automatically populates the associated CCAS database fields from drivers licenses, passports, government issued and DOD issued credentials.
67. Cardholder Image Capture.

- a. The CCAS must be compatible with flash lighting, USB sources and digital cameras and allow the capturing of the cardholder image at a minimum resolution of 640 x 480.
 - b. CCAS image capture, storage, and hardware compression techniques must be in compliance with the ANSI standard or JPEG (Joint Photographic Experts Group). Cardholder images must be stored as Binary Large Objects (BLOB) within the cardholder record.
 - c. The CCAS shall provide the ability to capture a cardholder's image through the use of any industry standard scanner or digital camera that utilizes a TWAIN interface. Images shall be able to be scanned in at up to 16.7 million colors for a true color scanned image. When using a digital camera that supports multiple resolutions, the system shall allow the operator to select the desired resolution.
68. Image Import.
- a. The CCAS shall allow for System Operators to have the ability to import a cardholder's image at the time of enrollment. The CCAS must support all standard and commonly used image formats:
69. Biometric Verification.
- a. The CCAS shall allow for the viewing, capturing and deletion of biometric templates.
 - b. All biometric templates shall be stored within the CCAS database, and depending on the Biometric device and the CCAS configuration, in the IFP or on a smartcard chip.
 - c. The CCAS shall support Biometric Verification for the following platforms:
 - 1) RSI Handkey with template on IFP.
 - 2) Identix V20 with template on IFP.
 - 3) Biocentric with template on IFP.
 - 4) Bioscrypt with template (one or two finger capture) on iClass, Mifare ISO 14443A and 1569 technologies or on IFP (model dependant).
 - 5) LG Iris Scan with template on iClass.
 - 6) Ultra-Scan with template on iClass.
 - 7) Cross Match ID-500 ten fingers for ID verification and use with access control authentication.
 - d. The CCAS shall be capable of a search of cardholder records to view biometric template images that are currently associated with that cardholder.
70. Digital Certificate Management.
- a. The CCAS shall support Digital Certificate Services to enable System Operators to securely obtain and manage digital certificates for smart card cardholders. The CCAS shall allow a System Operator to enroll and issue a smart card to each cardholder during enrollment process. This shall allow the issuing of a Smart Card Logon certificate (which provides authentication) or a Smart Card User certificate (which provides authentication plus the capability to secure e-mail) for the purpose of Smart Card Login to PCs.
 - b. The CCAS shall support any smart card reader(s) that have been tested by the Microsoft Windows Hardware Quality Lab and have obtained the Windows-compatible logo and that are to be installed on Windows 2000/2003/XP computers.
71. Smart Card Encoding Support.

- a. The CCAS shall include the ability to support Off-line and In-Line SmartCard Encoding for the following readers and technologies
 - 1) Bioscrypt V-Smart (iClass & Mifare) Off-line and Inline.
 - 2) Integrated Engineering (Mifare) Off-line and Inline.
 - 3) Biometric Container (iClass and DESfire) In-line.
 - 4) Texas Instruments (15693 Vicinity) Off-line.
 - 5) GSC (iClass and DESFire) In-Line.
 - 6) LG Iris Access (iClass) In-line.
 - 7) Ultra Scan (iClass) In-Line.
 - 8) Badge Design.
 - b. The CCAS shall incorporate a Badge Design module that is integral to the CCAS source code with the ability to create and maintain badge designs. Features shall include the ability to support:
 - 1) Complete Badge design and Layout tools.
 - 2) Image Import.
 - 3) Signature Capture.
 - 4) Barcode.
 - 5) Smart chip Support.
- 72. ID Badge Printers.
 - a. The CCAS shall support any printer with industry standard and Microsoft Certified Windows 2000/2003/XP drivers. The CCAS shall support.
 - 1) Double-sided full color printing.
 - 2) Edge to edge printing.
 - 3) High-speed printing.
 - 4) Holographic overlays.
 - 5) In-line Magnetic Stripe Encoding.
 - 6) In-line Smart Card Encoding (printer model specific).
- 73. Avery Dennison Badge Label Templates.
 - a. The CCAS shall provide pre-defined badge layouts that are specific to match Avery Dennison=s US and International self adhesive ID labels.
- 74. Image Export.
 - a. The CCAS shall have the ability to export a captured and cropped cardholder image to an industry standard JPEG (.jpg) file format.
- 75. Intelli-Check ID Check Integration.
 - a. The CCAS shall integrate with the Intelli-Check ID Check 1400 product for the scanning of credentials including driver's licenses, military and government issued IDs. This integration will populate cardholder form during the enrollment process. Provide the specified or equivalent product to achieve the function.
- 76. Remote Access Level Management.
 - a. The CCAS shall provide a client / server based or N-Tier architecture browser based Remote Access Level management option. This optional shall allow users with the correct permission to administer and allocate access levels to specific pre determined devices.
- 77. IP Based Integrated Digital Video Management System (IPDVMS).
 - a. The CCAS shall support an integrated IP Based Digital Video Management recording solution that provides the following features and capabilities:
 - 1) Integration with the CCAS.
 - 2) Stand alone operation without connection to the CCAS.

- 3) The IPDVMS shall be computer hardware independent and must meet or exceed the manufacturer's minimum specification for the computer and related devices.
- 4) The IPDVMS shall incorporate a modular architecture and be able to support an unlimited number of cameras.
- 5) The IPDVMS shall be able to simultaneously record and display live video and display recorded video.
- 6) The IPDVMS shall support both event based and continuous recording.
- 7) The IPDVMS shall mark all events and they shall be available for playback and or archiving at any time.
- 8) Video events shall be linked to CCAS events in the CCAS database and only one database shall be acceptable for this interface.
- 9) Up to 32 simultaneous users shall be able to access any video feed from any recorder on the network.
- 10) User defined profiles shall be available for tailoring granular access to configuration and operation.
- 11) Shall have the ability to enhance a frame of video with embedded features or off the shelf software while providing security for the original video image to preserve integrity.
- 12) Shall be capable of independent camera setup for, compression rate, brightness, contrast and other factor setups.
- 13) The IPDVMS shall support Ethernet 10BT, Ethernet 100BT and 1000BT. Network protocols shall be supported including TCP/IP, IPX, and UDP.
- 14) The network interface shall allow remote access of the IPDVMS from anywhere on the end-users LAN/WAN.
- 15) Shall support limiting of frame rate transmission to individual clients.
- 16) The IPDVMS shall support either Multicast or Unicast streaming technology.
- 17) The IPDVMS shall be have the ability to playback stored video over the LAN / WAN for remote access of video clips.
- 18) The IPDVMS shall support World Time Zone.
- 19) Any alarm / event in the CCAS shall have the ability to be associated with a digital video clip in real time. The IPDVMS shall support user defined pre and post roll.
- 20) Each camera shall be configurable for a 32 alphanumeric character name and shall allow for the setup and adjustment of brightness, contrast, archiving, motion detection, Pan / Tilt / Zoom, on a per camera basis.
- 21) The IPDVMS shall support CCTV PTZ control via the CCAS video interface.
- 22) The IPDVMS shall support Analog CCTV PTZ control via approved Video Encoding Devices.
- 23) The IPDVMS shall support MJPEG, H.264 and MPEG4 formats for multiple IP Video Cameras and IP Video Encoders from approved sources.
- 24) The IPDVMS shall support integral time stamping upon receipt of video from the camera.

- b. The IPDVMS shall support the following configuration and customization parameters:
 - 1) Compression percentage.
 - 2) Pre and Post Roll in seconds.
 - 3) Motion Detection Alarms.
 - 4) Set Time Lapse Recording.
 - 5) Continuous Recording Mode.
 - 6) The ability to enforce user authentication to specify individuals or groups that have the ability to view live or recorded video or make modifications to the system.
 - 7) The ability to change any or all of the associated IP camera passwords manually or on schedule.
 - 8) User determination of Event Locking method.
 - 9) Dual Path Fail Over support.
 - 10) Blind Camera (Obstructed View) Alarm reporting.
 - 11) Presets on Alarm.
 - 12) Event Locking to protect specific video events from being overwritten.
 - 13) UNC path support for Network Attached Storage Devices.
 - 14) Configuration of Off-line cameras.
 - 15) Support for Intelligent Motion Video Searching.
 - 16) Advanced Video Analytics and Video Searching.
 - 17) Facial Detection.
 - 18) Object Direction.
 - c. Device Linkages.
 - 1) An unlimited number of access control hardware / device links shall be configurable.
 - 2) A camera viewing priority shall be given to each access control hardware device link.
 - 3) Each alarm / event condition shall have the ability to mark the start of a video event or the end of a video event in real time.
 - d. The IPDVMS shall support automatic firmware downloads to select IP cameras.
 - e. The IPDVMS shall support both internal camera video storage and external camera video storage. Internal storage shall allow the camera to store video events and then download these events to the IPDVMS on a predetermined schedule or on demand.
78. Pan / Tilt / Zoom Control from Alarm Monitoring.
- a. The IPDVMS shall support PTZ control from the Alarm Monitoring workstation. The PTZ control shall support approved IP PTZ cameras and Analog Cameras connected to approved IP Servers.
 - b. The IPDVMS shall support the following PTZ features:
 - 1) Priority Levels.
 - 2) Device Group Control.
 - 3) PTZ Override (Lockout).
 - 4) Proportional PTZ Control.
 - 5) Preset Lock via video screen.
 - 6) Preset Tour.
79. Video Archiving.
- a. The Archive Server software shall be hardware independent, providing the ability to utilize commercial off-the-shelf mass storage devices, including SAN (Storage Area Network) solutions, Tape Libraries, and direct connect external storage drive arrays.

- b. The Archive Server software shall provide the ability to manage and store video information from multiple video recorders to a central location, without operational degradation.
 - c. Each DVMS / IPDVMS shall have the ability to set its own unique archiving properties. Video shall automatically be archived based on user defined "percentage full" settings. When the IPDVMS (** Select either DVMS or IPDVMS) reaches the designated capacity threshold, video shall be automatically copied to the archive storage media and space on the recorder is released for over-write by new video information.
 - d. Regardless of the storage location (local on the recorder or in archive) the system will automatically retrieve video associated with an event on demand. The actual storage location shall be transparent to the user.
80. Browser Based Video Viewer.
- a. IPDVMS shall allow monitoring of real time video from an optional web browser based video viewer using N-Tier architecture and Microsoft Internet Explorer @ 1024x768 resolution. The browser based viewer shall have the ability to select multiple viewing templates. The browser based viewer shall provide the following functionality:
 - 1) Display live video.
 - 2) Digital zooming and panning.
 - 3) PTZ camera control.
 - a) Drag or double click to center.
 - b) Continuous click to center.
 - c) Click and hold to move.
 - 4) Ability to access video from multiple recording sources.
 - 5) PTZ locking.
 - 6) Priority based camera control takeover.
81. Real Video Time Monitoring.
- a. IPDVMS shall allow monitoring of real time video from any Alarm Monitoring client workstation. DVS and Camera status shall be displayed on a System HardwareTree.
82. Video Viewing Layouts.
- a. IPDVMS shall support the ability to save the list of camera views currently being displayed along with the currently selected template with a user defined name to be loaded as needed by the system operator.
83. Video Player.
- a. IPDVMS shall support an advanced matrix view of multiple On-line camera views. Up to a total of 128 fps @ CIF resolution and 72 fps @ 4CIF resolution shall be available for viewing in the Matrix View. The 128 frame rate limitation of video shall be any combination of Live or Recorded video. The number of open video windows shall be dependent on the frame rate and resolution of the cameras. The Video Player shall allow operator sizing of the video windows in the matrix view.
84. Video Camera Groups / Video Camera Tours.
- a. IPDVMS shall support camera grouping to allow for video camera tours in the CCAS Alarm Monitoring Module.
 - b. An unlimited number of camera groups shall be supported in the CCAS and each camera group shall support an unlimited number of

- cameras. Cameras within a camera group shall span multiple digital video servers. Cameras shall have the ability to be placed into multiple camera groups.
- c. The CCAS shall provide for video camera tours that rotate live video between each of the cameras defined in the video camera group at a user defined increment. The time increment shall be user definable in whole seconds.
85. Still Image Capture / Save.
- a. During playback or monitoring of video, the System shall have the ability to create and save a still picture. This operation shall not affect any other operation and shall not alter the recorded video. The file format shall be an industry standard format allowing for file transfer via email, printing or file transfer to other media.
86. Export Video Clip to File.
- a. The CCAS shall have to ability to save and export recorded video to a file for the purpose of sharing and reviewing video clips. The start and end times for each video segment shall be user defined. The exported video clip shall be viewable via a standard Windows media player.
87. Video Image Processing.
- a. IPDVMS shall support video image processing of a single frame captured image through use of an integral image processing module which shall offer the following features:
 - 1) Intensity, Contrast and Saturation.
 - 2) Gamma Correct.
 - 3) Histo-Contrast and Histo-Equalize.
 - 4) Flip, Reverse, Invert and Rotate.
 - 5) Shear.
 - 6) Add Noise, Average, Sharpen, Mosaic, Posterize and Median.
 - 7) Halftone.
 - 8) Emboss.
 - 9) Gray Scale.
 - b. IPDVMS shall allow the ability to save any combination of effects as a defined profile. Profiles shall have the ability to be added or deleted from the CCAS at any time.
88. Video Loss Detection.
- a. The CCAS shall detect video loss from any or all cameras and activate an alarm.
89. Automated Motion Video Searching.
- a. IPDVMS shall support advanced automated motion video searching against pre-recorded video. The automated motion video search shall analyze frames in a video segment to detect motion activity from image to image. It shall display thumbnail images of the frames with activity, complete with a histogram depicting the relative amount of activity within each frame.
 - b. The search shall be defined by selecting a specific camera and a specific time period in which the suspected activity took place and all motion events associated with that camera and time period shall be displayed in either a trace or thumbnail format for review.
90. Remote Monitoring Application.

- a. IPDVMS shall support a Remote Monitoring Application that allows the operator to monitor video from any computer connected to the CCAS network.
- 91. Video Authentication.
 - a. IPDVMS shall support imbedded authentication of video where the video is watermarked with an authentication key / signature during recording of live video to a hard drive. The video player shall have the ability to verify the authenticity during playback. This authentication shall provide the recorder name, camera name, video time and user information. The authentication shall have the ability to be password protected.
- 92. Intelligent Video Analysis System (IVAS).
 - a. The CCAS shall provide an option for an Intelligent Video Analysis solution that shall seamlessly integrate with the IPDVMS. The set of Intelligent Video Analysis algorithms shall provide the following functionality. In addition to the approved manufacturers of CCAS system, 3rd party integration with Vidient, 3M, and Object Video is acceptable. Provide the following IVAS functions.
 - 1) Alert Types.
 - a) Smart Video Motion Detection (the IVAS shall ignore minor vibration and provide motion masking).
 - b) Camera Tampering (shall occur when the IVAS detects a camera is moved from its original position, when the camera view is obstructed or when the focus is changed).
 - c) Sudden Change in Light Intensity (shall occur when the IVAS detects an extreme change in ambient light B light to dark or dark to light).
 - d) New Object in Scene (shall occur when the IVAS detects an object not present when the IVAS originally learned the scene view is left in that view).
 - e) Object Removed from Scene (shall occur when the IVAS detects an object that was present when the IVAS originally learned the scene view).
 - f) Object Detected in Scene (shall occur when the VAS detects an object defined by specific properties including people, automobiles or an object of a specific color).
 - g) Congestion in Defined Area (shall occur when the IVAS detects congestion in a specific region).
 - h) Directional Motion (shall occur when the IVAS detects an object moving in a direction specified in the setup of this feature).
 - i) Object Crosses a Defined Region (shall occur when the IVAS detects an object moving across a virtual boundary or area from a specified direction).
 - j) Moving Object Stops (shall occur when the IVAS detects a moving object in the scene ceases to move).
 - k) Static Object Starts to Move (shall occur when the IVAS detects a static object in the scene starts to move).

- l) Object moves too fast (shall occur when a pre-defined speed has been exceeded).
 - m) Loitering (shall occur when the IVAS detects a person in the scene slows down or ceases to move for a specified period of time).
 - n) Detection of a Human Face (shall occur when the IVAS detects a frontal view of a human face is detected in the scene).
 - o) People Counting (shall occur when the IVAS is set for a top down view of a portal. This feature shall provide an alarm with a positive count for entry and a negative count for exit).
 - 2) The IVAS shall support the ability to store the graphical output for a specific event for use with IVAS alarms. This feature shall allow the graphical output of a specific event to be stored as a file and later used as an overlay to be used and associated with an alarm for historical searching.
 - 3) The IVAS shall support CIF, 4CIF and D1 video resolutions during video processing.
 - 4) The IVAS shall support video infra-red imaging.
93. TSA Reporting Functions:
- a. Provide Crystal Reports or similar 3rd party software to provide various reports required by TSA. Contractor shall work with DLH in developing all required reports in electronic formats for submittal to TSA. In addition, provide customized software if required, to automatically check the badge holder's information with TSA "watch list". The cross check shall be made during the initial issuance and renewal of the badge as well as on a periodic basis as required by TSA.

2.14 INTERFACE REQUIREMENTS

A. Local Power

- 1. Local power at the locations specified on the Contract drawings will be 120 V ac, 60 Hz, single phase. Coordinate work with the terminal construction contractor. Extension or modifications to the power locations shown on the terminal contract shall be performed by this contractor.
- 2. The Contractor shall provide the necessary power conversion, distribution and isolation equipment to ensure the specified operation and protection of all CCAS equipment when fed from the normal and backup sources.
- 3. All power supply components by the Contractor shall be provided with indicating fuses or circuit breakers located to permit convenient and rapid identification and maintenance in accordance with UL 198, "Fuses," UL 512, "Fuse Holders," and NFPA 70, National Electrical Code," as applicable. Fuse holders shall be labeled to indicate fuse type, size, and identification. Circuit breakers shall be labeled to indicate their intended function.

B. Fire Alarm System

- 1. The Contractor shall interface with the Fire Alarm System to provide a common alarm annunciation at the SCC wherever a fire alarm is received.
- 2. The Contractor shall provide the hardware and software necessary to interface these for operation as specified heretofore.

3. The Contractor shall interface with F.A. control relay (ZAM) to type 4 access point panic device to release them upon activation of the relay. The relay is activated upon activation of smoke detectors or sprinkler system flow switch. Coordinate with terminal construction contractor.
- C. Baggage Belt System
 1. The contractor shall interface the baggage belt systems as indicated on the drawings.
- D. Automatic Vehicle Gates
 1. The contractor shall interface with the sliding gate at Access Points as indicated on drawings with gate operators and card reader PINpad to operate as specified.
 2. The Contractor shall provide the hardware and software necessary to interface these for operation as specified heretofore.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. CCAS components shall be delivered properly packaged in factory-fabricated type containers or wrappings which properly protect equipment from damage. The Contractor shall be responsible for all damaged equipment due to improper preparation for shipment.
- B. Equipment subject to deterioration by humidity at the project site shall be provided with plastic covers forming a vapor seal and an adequate quantity of desiccant. Desiccant shall be either visible or stored in a manner which can be easily reached for inspection and replacement. Equipment so protected shall be noted on the packing list.
- C. CCAS components shall be stored in original cartons in a clean dry space protected from weather and construction traffic. The Contractor shall be responsible for observing the equipment manufacturers storage and handling procedures as required to maintain any implied or stated warranty.
- D. CCAS components shall be handled carefully to avoid breakages, impacts, denting and scoring finishes. Damaged equipment shall not be installed but returned for replacement.

3.2 INSTALLATION REQUIREMENTS

- A. Examination
 1. The Contractor shall examine areas and conditions under which the CCAS components are to be installed and notify the A/E, in writing, of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Installation
 1. CCAS components shall be installed in accordance with equipment manufacturer's written instructions, in compliance with NFPA 70, "National Electrical Code (NEC)," and ANSI C2, "National Electrical Safety Code," and

with recognized industry practices, to ensure that the CCAS meets all requirements stated herein and serves its intended purposes.

2. The Contractor shall coordinate installation of CCAS components with work performed by others.
3. Surface-mounted equipment shall be securely fastened to indicated structural supports. The Contractor shall ensure that this equipment is plumb and level.
4. Connectors and terminals, including screws and bolts, shall be tightened in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with the tightening torques specified in UL 486A/13, "Wire Connectors and Soldering Lugs for Use with Copper / Aluminum Conductors," and the NEC.

C. Grounding

1. Equipment grounding connections for CCAS components shall be provided. Ground connections shall be tightened to comply with the tightening torques specified in UL 486A to assure permanent and effective grounds.
2. The Contractor shall ensure and demonstrate that resistance to solid earth for signals is less than, or equal to, 3 ohms.

D. Adjusting and Cleaning

1. Upon completion of installation of CCAS components, the Contractor shall set all field-adjustable controls / components and align and calibrate all equipment for the required performance and operation as specified herein.
2. The Contractor shall touch-up scratched and marred surfaces to match the original finishes.
3. Installed CCAS components shall be protected from damage during the remainder of the construction period.

E. Field Quality Control

1. Prior to energization, the Contractor shall test all field-run wires and cables for electrical continuity and short circuits and to ensure proper polarity of all connections.

3.3 INSPECTIONS AND TESTS

A. Inspections

1. The prime responsibility for inspection of all materials and work furnished by the Contractor pursuant to the Contract rests with the Contractor. The inspection or waiving of inspections by the airport shall not relieve the Contractor of any obligations or responsibilities to perform in accordance with the Contract.
2. The Contractor shall assure that components procured from Subcontractors comply with the requirements of the Contract. Suggested methods of providing this assurance are audits of the Subcontractor and its Quality Control program or receipt inspections and tests designed to demonstrate that the device(s) functions properly and complies with the specified requirements. The airport's "release" of any materials being furnished by the Contractor's Subcontractors shall not be construed to imply acceptance of same in the end product and shall not in any way relieve the Contractor of its responsibility of inspection.

3. The Contractor shall cooperate fully with Duluth International Airport's representatives and shall grant Duluth International Airport free access to all documents and work areas which the airport deems necessary to perform thorough and meaningful tests and observations. The airport's representatives shall have the right to inspect the equipment, workmanship, labor, testing procedures and any other item or task performed, furnished or used by the Contractor under the Contract, and the airport may reject, without cost or liability, any which are defective or unsuitable for the use and purposes intended or which are not in accordance with the intent of the Specification. The Contractor, upon demand by the airport, shall remedy or replace, at the Contractor's expense, such defective or unsuitable equipment or performance item. The Contractor shall act promptly to obtain the airport's approval of corrective or remedial action(s) and shall implement these actions promptly after receipt of Duluth International Airport's approval.
4. The Contractor shall give the airport's representatives at least ten (10) working days notice of events or conditions specifically requested by the representatives. Where specific inspections are required, the work involved shall not proceed beyond that point until the representatives have made or waived such inspection. The Contractor shall provide the representative with appropriate drawings and technical documentation for use during the inspection visits, as required.

B. Field Verification Tests

1. Field tests to verify that the system hardware and software, as approved for shipment, function in the same demonstrated manner after installation of the CCAS will be performed by DLH at the site. The Contractor shall provide any technical assistance required during the tests. A test procedure will be developed by Contractor and reviewed by DLH, prior to performance. These tests shall be performed on the entire system.
2. Where possible, malfunctioning components shall be corrected at the site; otherwise, the Contractor shall remove and replace. Upon correction / replacement, the component shall be retested.
3. System hardware acceptance will be provided by DLH upon satisfactory completion of the approved system hardware verification tests at the site.
4. System software acceptance will be provided by DLH upon satisfactory completion of the approved system software verification tests at the site.

C. Availability Test

1. The Contractor shall demonstrate a continuous operation of the CCAS at the site over a period of 1,440 hours with an availability of 99.5 percent or more to include all supplied hardware and software. This shall be demonstrated after the Field Verification Test of the CCAS.
2. Availability shall be calculated as follows:

$$\text{Availability} = \text{Percent } \frac{\text{TDT} - \text{AOT}}{\text{TDT}} \times 100$$
 TDT where:
 - a. Test Duration Time (TDT) is the total elapsed time from start of the test to completion of the test. This time shall be a minimum of 1,440 hours. The TDT shall equal the time the WAS is undergoing testing less the time allocated for pre-scheduled preventive maintenance as required by the Contractors maintenance manual.
 - b. Accumulate Outage Time (AOT) is the total amount of time after start of the test when any part of the system or its function are not available (downtime) as specified below.
3. Downtime shall be calculated according to the following rules:

- a. The duration of any outage shall be calculated from the time that a functional deficiency is first recognized to the time the deficiency has been corrected to the satisfaction of DLH.
 - b. If an intermittent failure (those which occur and then disappear three (3) or more times) occurs, the problem shall be isolated and repaired. The system shall be considered unavailable while corrective maintenance is being performed.
 - c. Central processor failure not specifically attributed to system hardware malfunctions shall be considered a system failure and downtime shall be accumulated when it occurs at any rate greater than once per week.
 - d. No minimum time shall be charged against any occurrence.
 - e. All time shall be recorded to the nearest minute.
 - f. In the event of the failure of existing equipment, site conditions and / or accidental operator damage to the equipment caused by actions of DLH, its agents or employees, the effect of which is to render the equipment unavailable as described above, the testing shall cease. Upon return to normal operation, the testing shall begin again. No downtime shall be accumulated during this outage.
4. The CCAS shall be considered available under the following conditions:
 - a. Loss of the primary central processor or any on-line memory section or I/O controller attributable specifically to hardware malfunction if backup units or features are automatically activated and all lost functions are successfully transferred to an operating unit without disruption of any real-time functions of the CCAS.
 - b. Loss of either 1 printer or 1 VDT at the SCC attributable specifically to hardware malfunction, if the other display/printing items are operational during the outage.
 5. Commencement of the Availability Test shall be mutually agreed upon, but in no event shall it start prior to DLH's receipt and review of all manuals, working drawings and software documentation, unless prior waiver is obtained from DLH. In addition, the test shall not begin until training of DLH's operating personnel has been completed, recommended spare parts purchased by DLH are in stock and all scheduled preventive maintenance has been completed.
 6. In the event that the AOT exceeds 22 hours, the start time shall be shifted to delete some of the earliest outages until the accumulated outages during the 1,440-hour test no longer exceed 20 hours. The shifted start date time shall be mutually agreed upon between DLH and the Contractor. No time shift shall be permitted until at least 25 percent (1100 hours) of the test has been completed.
 7. A new test shall be started if major modifications are required to either hardware or software in order to conform to specified functional requirements.
 8. The CCAS shall be maintained (parts and labor included) by the Contractor at its expense until completion of a successful Availability Test.
 9. The Contractor shall provide a service representative on call 24 hours a day, 7 days a week for the duration of the Availability Test. The contractor has an option for on site availability of service representative or other appropriate means to ensure successful availability test as specified.
 10. The CCAS must be operating at 100 percent at the end of the test.
 11. During the Availability Test:

- a. Alterations to software shall not be permitted unless required to correct an error and DLH's approval is obtained.
- b. Alterations to the hardware shall not be permitted unless required to correct a failure or, if in the opinion of the Contractor, such changes will improve system reliability.
- c. DLH shall be permitted to verify system performance as specified.
- d. Any redesign or modification to the system that is a result of the Availability Test shall be made to and documented for all equipment supplied under the Contract.

3.4 TRAINING AND INSTRUCTION

A. General

1. The Contractor shall provide on-site training for operating, servicing and programming personnel designated by DLH and end-users (employees and tenant personnel).
 - a. Operating personnel shall receive detailed instruction in operating procedures, routine preventive maintenance and routine servicing of console and terminal equipment. The training of operating personnel shall be completed prior to the start of the Availability Test.
 - b. Servicing personnel shall receive detailed instruction in principles of operation, setup, adjustment, routine preventive maintenance, diagnosis and corrective repair of all CCAS equipment. The training of servicing personnel shall be completed at least 180 days prior to the end of the maintenance period.
 - c. Programming personnel shall receive detailed instruction in software architecture, addressing and instructions, device capabilities and program capabilities. The training of programmers shall be completed at least 180 days prior to the end of the maintenance period.
 - d. End-users shall receive detailed instruction in the operation and use of CCAS access point equipment.
2. Training shall be conducted by experienced, knowledgeable personnel, supported by modern training aids and shall utilize the actual system being supplied as much as possible. Participants shall receive individual copies of all pertinent technical manuals and documentation which apply specifically to the CCAS hardware and software.
3. Each training program shall be video-recorded by the Contractor for use by DLH for future training. Record each session on DVD and include 2 copies with the OEAM submittal.
4. DVD shall be of sufficient video quality such that all personnel and equipment involved with the training can be seen. In addition, the audio quality should be of sufficient quality such that all voices can clearly be heard throughout the recording. If these conditions are not met, the contractor will be required to perform the training and videotaping until these conditions are met.
5. Training shall be scheduled at the convenience of DLH.

B. Operator Training

1. Operating personnel must be familiar with the scope, operation and capabilities of the CCAS. This training shall include system concepts, general design features and detailed familiarization with the man machine interface. This training must be reinforced with hands-on experience on all

equipment. All operator courses shall be conducted at the site and must be structured to minimize the length of the instructional periods. It shall be necessary to repeat each course several times to accommodate all personnel on each shift.

2. The Contractor shall provide the operator training for up to 20 of DLH's personnel. This course shall have a duration of at least one (1) week.

C. Maintenance Training

1. DLH's servicing personnel shall attend courses designed to instruct them in the internal operations of the CCAS hardware and in diagnostic software. It is expected that the courses will be divided into a series pertinent to maintenance and troubleshooting on the console and terminal equipment including the central processors, peripherals and communications hardware and a series pertaining to field devices (IFPs, card readers, CCTV cameras etc.). This will permit selective assignment of personnel by DLH to optimize the skills of the maintenance staff.
2. Maintenance training courses shall include operation and troubleshooting using both test hardware and diagnostic programs and failure repair of actual system hardware. If actual system hardware is not available, an equivalent hardware system which simulates as closely as possible the system supplied, may be used in the training process.
3. The maintenance training program offered by the Contractor shall familiarize DLH's personnel with a comprehensive preventive maintenance program structured specifically for the system supplied.
4. The Contractor shall provide the hardware training for up to 20 DLH personnel.

D. Software Training

1. The Contractor's software training program shall familiarize DLH's programming personnel with off-line and on-line procedures for generation and modification of programs and the database, operation of peripherals, use of documentation, use of the Programmer's terminal, start-up and shut-down procedures, the use of off-line and on-line diagnostics and other pertinent operating, maintenance and development procedures. The courses shall include:
 - a. A course offering a detailed study of the specialized software supplied by the Contractor and the detailed logical structure of all standard software used by the system.
 - b. A course detailing the programming required to expand the database to include new monitored points, new security area access points and new types of I/O devices.
2. The Contractor shall provide the software training for up to 20 of DLH's personnel.

E. End-user Training

1. Airport employees and tenant personnel shall attend courses designed to instruct them in the proper operation of each access point type and in the use of its associated CCAS equipment. The course shall cover normal and emergency access procedures.
2. The end-user course shall be repeated a sufficient number of times to accommodate all individuals assigned an ID badge / keycard.

F. ID Badge / keycard Preparation Training

1. DLH personnel shall attend courses designed to instruct them in the preparation, encoding, printing, and controlling ID badges and Keycards.
2. The training shall have a minimum duration of one (1) week, and shall occur sixty (60) days prior to activation of the system.
3. The Contractor shall provide the ID badge / keycard preparation training for up to 20 of DLH's personnel.

3.5 MAINTENANCE SERVICES (WARRANTY)

- A. The Contractor shall provide "on-call" warranty maintenance service for all equipment supplied under this Contract for two (2) years after acceptance of the entire CCAS (hardware and software) by DLH. The service shall consist of all material, labor and travel expenses, as indicated in paragraph 1.10 "Maintenance Services" of this section.

END OF SECTION 13700

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 13742 – MULTI-USER
FLIGHT INFORMATION
SYSTEM**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Display Devices
 - 2. Computer Control System
 - 3. Networking Hardware
 - 4. System Support Hardware
 - 5. Software
 - 6. Spare Parts

1.2 ABBREVIATIONS

ADA	Americans with Disabilities Act
AODB	Airport operational database
ASP	Application Service Provider
CUTE	Common use terminal equipment
DDC	Device display controller
DLH	Duluth International Airport
FIDS	Flight Information Display System
GB	Gigabyte (approximately one billion bytes of memory)
GUI	Graphical user interface
IVA	Integrated voice announcement system
IVR	Interactive voice response system
LAN	Local area network
LCD	Liquid crystal display
LED	Light emitting diode
MB	Megabyte (approximately one million bytes of memory)
MUFIDS	Multi-User Flight Information Display System
MUSE	Multi-user system environment
SNMP	Simple Network Management Protocol
SQL	Structured Query Language
VPN	Virtual Private Network
WYSIWYG	What-you-see-is-what-you-get
XML	Extensible Markup Language
XSL	Extensible Style sheet Language

1.3 SYSTEM DESCRIPTION

- A. Flexibility - The system must be scalable and easily adaptable to 3rd party add-ons - including multimedia advertising display and airline host interfaces - utilizing industry standard technologies. The database must be designed to extend through the MUFIDS field and lookup tables
- B. Open - The system must use industry standard language and interface standards language and tools.

- C. Cost Effective - The system provided must require minimal hardware and software overhead and include all necessary software and hardware for a fully functional flight information display system.
- D. Expandability - The system must accommodate application and hardware growth.. Hardware must be expandable by adding additional memory, disk, or processors, as well as by clustering multiple servers.
- E. Easy to Manage and Support - The MUFIDS operating system and database must provide a seamless solution. The MUFIDS provider must provide remote dial-in support to minimize involvement of airport's personnel.
- F. User friendly – The system must be easy to learn and use industry standard interfaces, including pop-up form windows, to minimize learning time. The Visual Page Designer must come supplied with many templates which can be modified in font, style, color, graphics and more
- G. Easy to Maintain – Operation and Maintenance Manuals must be provided for each piece of equipment. Cable pathways and identification must be recorded.

1.4 PERFORMANCE REQUIREMENTS

- A. The MUFIDS shall provide the following functionality:
 1. Manage flight schedules and data and distribute it to flight, gate, and baggage information displays throughout the terminal as indicated on drawings.
 2. Provide easy-to-use client access capability to allow users, with the appropriate security rights, to update, change, and modify master and daily schedules and security access, and generally administer the operation of the system.
 3. Provide a design tool which includes templates and allows a user to modify screen template designs for flat panels and video monitors. **Hosted system vendor shall include template modification and custom screen design on an ongoing basis at no additional cost.**
 4. Provide interface to generate and distribute current and accurate flight information to the Airport's existing Web site and cellular portable devices.
 5. Provide visual paging that is easily accessible from the client workstations.
 6. Provide an integrated solution to continuously monitor hardware, software application, system and database performance and availability. Provide an integrated automatic notification system to alert Operational, IT, or Administrative Personnel of any failure.
 7. Provide interface with each Airline MUFIDS system to receive automated flight information updates. **Hosted system vendor shall continuously procure real-time flight information through direct access to airlines systems.**
 8. Provide HTTP/XML Web Server for XML Airline Host feeds.
 9. **System shall display last available information upon temporary loss of internet connection.**

- B. Provide all supports and hardware required to install all devices in neat and workman-like manner. All exposed wiring to the devices shall be limited to final connection points to the devices.
- C. Provide housing and cabinets for display devices as shown on the drawings.

1.5 REFERENCES

- A. Electronic Industries Assn / Telecommunications Industries Assn (EIA/TIA)
 - 1. EIA/TIA 568 Commercial Building Communications Wiring Standards
 - 2. EIA/TIA 569 Commercial Building Standard for Telecommunications Pathways and Spaces
 - 3. EIA/TIA 606A Administrative Standard for Commercial Telecommunications Infrastructure
 - 4. EIA/TIA 607 Commercial Building Bonding and Grounding Requirements for Telecommunications
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 70 National Electric Code (NEC)
- C. Underwriters Laboratories (UL)
 - 1. UL 969 Marking and Labeling Systems

1.6 SUBMITTALS

- A. Shop Drawings: Submit complete including:
 - 1. System components detailed drawings and engineering data.
 - 2. Installation instruction for each piece of equipment.
 - 3. 1/8-inch scale, floor plan drawings, rack layouts and riser diagrams indicating detail wiring and system components.
 - 4. Software and firmware information.
- B. Product data in manufacturers catalog cuts, description and drawing components.
- C. Within thirty (30) days of the contract award, the Contractor shall submit a detailed work schedule and approach to the system installation.
- D. Qualification Data: For qualified Installer list experience and certifications. Personnel shall be trained and certified by manufacturer for installation of equipment required for this project.
- E. Software and Firmware Operational Documentation updated at project completion:
 - 1. Software operating and upgrade manuals.
 - 2. Operator Manuals, System Administrator Manual, and the off-the-shelf Manufacturers' Product Documentation.
 - 3. Manufacturer's documentation on the LAN, Operating System, Windows Applications, and database.
 - 4. Program Software Backup on compact disk, complete with data files.
 - 5. Printout of software application and graphic screens.
- F. Display Cabinets: Provide a 1/4" scale shop drawing for the display cabinet.

Provide all details indicating the mounting of the specified monitors.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Firm shall have at least five years successful installation experience with similar FID systems **or three years with three successfully completed installations at airports of similar or larger size**. Personnel shall be trained and certified by manufacturer of equipment required for this project.
- B. Compliance: Comply with the applicable requirements of the referenced standards and specifications.
- C. Source Limitations for FID System and Components: Obtain system from single source from single manufacturer.
- 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.

1.8 DELIVERY AND STORAGE

- A. Deliver all materials in manufacturer's packing in undamaged condition.
- B. Store all materials in clean, dry place and protect them from dirt, fumes, water, and physical damage.
- C. Handle components carefully to avoid damage to materials and finish.

1.9 WARRANTY AND SUPPORT

- A. The contract shall include a 12 month (one year **minimum**) warranty for all system software and hardware commencing with completion of the successful reliability test period. Warranty shall include twenty-four (24) hours a day, seven (7) days a week, 365 days a year Help Desk facility for remote hardware and software support, OEM return-to-factory repair, overnight parts replacement, and emergency on-site service. The Help Desk must have a toll-free telephone number and be staffed by the MUFIDS provider's own employees.
 - 1. All hardware support shall be handled via Help Desk support.
 - 2. The MUFIDS provider shall coordinate return-to-factory repair, if applicable.
 - 3. Primary software support will be handled by telephone and dial-up modem by manufacturer's expert technicians at no additional charge during the warranty period.
- B. Provide 24 months (two years) of warranty service in addition to the one year of full warranty on installation. The maintenance agreement shall include site visits, **if required by the airport**, at the 3rd month, 12th month and 24th month to update software and restore system performance (total 3 trips).
- C. Software: The upgrade of all software shall be performed at no cost to the Owner during the warranty and maintenance service period. The proposal shall include labor and material for three upgrades. The fixing of errors in the system shall not be considered an upgrade.

1. Provide all software licenses required for the project. All commercial software packages furnished as a part of the system shall have "Duluth Airport Authority" as the owner of the software. All original software (CD-Rom, media and documentation) shall be turned over to the Owner with O&M manuals.
2. Technical Support: Commencing with completion of the successful reliability test period, provide software support for three years.
3. Upgrade Service: Update software to latest version at project completion. Install and program software upgrades that become available within three years from date of Substantial Completion. Upgrading software shall include the operating system. Upgrades shall include new or revised licenses for use of software.
4. Provide thirty (30) days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide system by Com-Net or comparable product by one of the following:
 1. Air IT
 2. Com-Net Software Specialty, Inc.
 3. INFAX, Inc.
 4. ProDIGIQ, Inc. ProFIDS System
 5. Or approved equal.
- B. Display System Components:
 1. LED display panel shall be as manufactured by NEC, Sony, LG, or approved equal. Section 2.6 – Display Devices
 2. Device Display Controller (DDC) shall be a computer as manufactured by Dell, HP, IBM or approved equal per Section 2.5 – MUFIDS Hardware Description.
- C. Control System Products
 1. Control system servers and workstations shall be computers as manufactured by Dell, HP, IBM or approved equal per Section 2.5 – MUFIDS Hardware Description.
 2. System provided must be compatible with Windows Operating System.
 3. All computers including DDCs shall be manufactured by the same manufacturer

2.2 SYSTEM OVERVIEW

- A. System Requirements
 1. Whenever possible, the equipment and software specified with this system shall be off-the-shelf products from recognized sources in the industry
- B. System Architecture
 1. The architecture shall be client-server based and use industry-standard, off-the-shelf Internet/Web display tools and technologies. All display applications shall be developed with XML/XSL technology.

2. The architecture shall be scalable and expandable to accommodate hardware and application changes and growth.
 3. The server operating system shall be Windows Server or Linux.
 4. The client operating system shall be Microsoft Windows XP Professional. Microsoft Internet Explorer shall be installed on each client.
 5. The MUFIDS components shall use existing security network switches. Contractor shall program and utilize VLANs to separate networks. Contractor shall verify no inter-VLAN routing is turned on between the Security network and MUFIDS network. Provide additional network switches as required.
 6. The system shall be an open system that connects easily to external systems, such as airline host data feeds and gate management, interactive voice response (IVR), and MUSE/CUTE systems.
 7. The system's annual uptime shall be rated at 99.5% or better.
- C. System Management and Support
1. The system shall include system capability management tools, including Simple Network Management Protocol (SNMP)-compliant hardware and application-level support software. Approved tools include HP Openview or WhatsUp Gold.
 2. The MUFIDS provider must provide VPN or remote dial-in support to minimize involvement of Airport personnel
- D. Database management
1. The MUFIDS operating system and database must provide a seamless solution. The database management software used to store the MUFIDS operational data shall be an industry standard, scalable, reliable, relational, multi-user database, such as Microsoft SQL Server.
 2. The proposed MUFIDS must have the capability such that the MUFIDS provider can add database fields quickly without making changes to the MUFIDS application software or the database scheme.
- E. Operator Access
1. Operators shall access the system using client workstations. Each client workstations shall use XP Professional operating system and shall use Internet Explorer to access the MUFIDS application and flight information on the MUFIDS server. It shall be unnecessary for a MUFIDS client application to be installed on each workstation. An operator with the appropriate user privileges shall be able to access the MUFIDS application on the MUFIDS server from any browser-equipped client workstation on the MUFIDS network.
- F. Output Display Architecture & Formatting
1. Each device display controller (DDC) shall use the Windows XP Professional or Linux operating system and shall have its own TCP/IP address on the Ethernet-based LAN. The MUFIDS server transmits information, including public and private page data and miscellaneous system control information, to all display devices.
 2. To reduce network bandwidth and improve screen update speeds, the display device shall update only the areas that have actually changed rather than the entire page.

3. Display output shall use Web technologies, such as HTML/DHTML for pages on display devices and XML/XSL for portable data transfer and data transformation
- G. Remote Management of DDCs
1. Each device display controller (DDC) shall be accessible using remote management software from the MUFIDS server and Airport Operations Client workstations.
 2. Remote Management shall allow the operator to view and fully interact with each DDCs active desktop and remotely update software.
 3. Remote Management software shall be Radmin 3.2, VNC Enterprise edition or equal.

2.3 MUFIDS APPLICATION

- A. The MUFIDS application shall be a Windows or Linux Server-based, browser-based application, such as Com-Net's ECLIPSE system, ProDIGIQ ProFIDS, or equal by an approved manufacturer.
- B. Database
1. The MUFIDS application shall use two schedules to maintain flight information: a main (or master) schedule and a daily schedule. The main schedule shall be a long-term schedule from which the daily schedule is generated each day. The daily schedule shall allow the user to easily check schedules from yesterday, today and tomorrow. Both schedules shall be stored in the database and shall be maintained manually and through automated data feeds.
 2. The system shall not be designed with hard constraints that would limit the number of flights per day. The number of flights per day shall be only a matter of scalability based upon the hardware platform.
- C. User Interface
1. The user interface shall take advantage of the Windows and Web graphical user interface (GUI) standards as appropriate throughout the system. Whenever possible, pick lists, buttons, and dialog boxes shall be implemented to enhance data entry and reduce data entry time. The user interface shall be designed for ease of use to minimize training time.
 2. User Flight Data Input:
 - a. The user shall use the main and the daily schedules to view and modify flight information. To eliminate the need to scroll through a schedule to view or modify data, the user shall be able to open a form-like dialog box. The dialog box shall allow the user to enter and modify easily all information that is associated with a particular flight in the schedule.
 3. User Definable Interface:
 - a. The user shall be able to customize the appearance of the user interface based upon roles and individual needs. The user shall be able to filter the data displayed in main and daily schedules to only those fields that he wants to view, such as city, gate, and actual time.
 - b. The user shall be able to customize the appearance of the user interface by changing the character and background colors of the user interface. The system shall retain each user's

customizations, so that they are available to the user at any client workstation.

4. Display Attributes:
 - a. The user interface shall provide an easy-to-use tool to modify the display attributes of flight information. Depending on the capabilities of the display device (that is, flat panel display, monitor, LED) the user shall be able to display text as bold, underlined, italicized, and blinking or foreground or background text color change. For example, the user shall be able to change the flight status "boarding" to display as blinking text. The user shall be able to select the attributes from easy to use pick lists.
 5. Canned Reports:
 - a. The user interface shall allow the user to easily generate, view, and print standard reports containing on-time statistics and gate utilization, daily flight, and flight audit information. Only authorized users shall have access to the reporting feature
- D. Video Scheduling
1. The MUFIDS software shall provide a fully integrated video scheduling system with tracking and reporting for billing purposes, to display full-motion advertising videos on flat panel displays and video monitors during owner determined timeframes.
- E. Report Generator
1. A report generator shall be included with the MUFIDS. The report generator shall provide the ability to generate, and print custom information reports, using any data defined in the SQL database. Only authorized users shall have access to the reporting feature.
- F. World-Wide-Web Integration
1. The MUFIDS software shall generate and distribute current and accurate flight information in HTML or XML format to the Airport's existing Web site. MUFIDS information shall be updated automatically
- G. MUFIDS Monitoring
1. An integrated monitoring application shall be included to continuously monitor application, system, and database performance and availability. The monitoring application shall query the system's DDCs using SNMP methods. Other devices, such as print servers, shall also be monitored for availability.
 2. The monitoring application shall provide visual feedback and must be capable of automatically notifying the MUFIDS provider's Help Desk Facility if a failure occurs. A failure is defined as a minor event, such as a DDC failure, or a major event, such as server failure.
 3. The monitoring application shall allow a system administrator to configure the severity levels of error codes, the types of alerts, which diagnostic items you want to monitor, and the frequency level of each diagnostic check.
 4. Notification capabilities shall include e-mail, pager, network messaging, and SNMP forwarding to a higher-level network monitoring system.
- H. Visual Paging

1. The visual paging system must be a user friendly, integrated component of the MUFIDS client application. To create and display messages, the user shall be able to access the paging function from any client workstation.
2. The visual paging system shall provide a method of displaying a visual paging message, emergency messages, and other visual information to hearing-impaired travelers, accurately and completely via dynamic electronic display media. The visual paging system is intended for disabled passenger information paging and emergency messages only.
3. Free format messages shall be limited to text messages only. No animation display mode shall be used.
4. The user must have the option to display messages immediately or to schedule messages for timed display. Scheduling must allow the user to specify starting day and time and ending day and time.
5. The visual paging system must allow messages to be prioritized. These priorities control which messages get displayed first when there is not enough space to display all messages.
6. The system shall provide predefined messages that the user can select with point-and-click mouse action and use "as is" or modify as necessary. These predefined messages will be maintained in the system database.

I. Airline Host Data Feeds

1. A host data feed allows an airline to download its flight data to the MUFIDS database. The MUFIDS shall interface to and download flight data from host data feeds from the following airlines and their partner airlines:
 - a. American
 - b. Delta
 - c. United
 - d. Allegiant
2. Contractor shall contact each airline a minimum of 45 days prior to interfacing to allow for Airline provided equipment and configurations.
3. Contractor shall provide an HTTP server with customized web services for XML host data feeds.

J. Security

1. The MUFIDS shall support a minimum of 25 security levels. The system administrator shall be able to configure access restrictions for each user level.
2. Users shall have to log on the system by entering a user name and password, which shall be verified by the system.
3. Only the system administrator shall have rights to add and delete users, modify user rights, and access user names and passwords.
4. The system administrator shall be able to restrict a user's rights to any aspect of the MUFIDS, including specific airlines or multiple airlines, specific fields of information in the main and daily schedules, and read-only and read / write permissions.
5. The system administrator shall be able to define rights for single users and to establish roles for a group of users

K. System Administrator Controls

1. The system administrator shall have exclusive access for the modification of system parameters, system time, and system date. The MUFIDS shall

allow the system administrator to control access to the system in a number of areas. The system manager shall have the capability to issue and control the user names and passwords needed by users to access the features and functions of the MUFIDS. The system administrator shall have the ability to limit user access to flight data to an individual operator or a group of operators.

2. Additional menu items and entry screens shall be made available to the system administrator who will maintain various databases that are associated with MUFIDS operation. Data shall include (but not necessarily be limited to):
 - a. IATA Code / City Name
 - b. Airline Code / Airline
 - c. Status Code / Status Explanation
 - d. Remark Code / Remarks Text
 - e. Gate Remark Code / Gate Remark Text

L. Auditing

1. The MUFIDS shall provide an audit trail of all transactions. The audit trail in the form of a report shall indicate any changes that occurred to any of the databases and shall contain the date and time of the change, the user identification of the user who made the change, and the contents of the changed record.

M. Announcement Control System (ACS)

1. The MUFIDS system shall support an MUFIDS to ACS interface. This interface shall enable the Announcement Control System "Public Address" system to utilize MUFIDS information and for the Visual Paging/MUFIDS to utilize the ACS information.
2. The MUFIDS interface shall enable the ACS system to automatically share MUFIDS database information to ensure Flight Announcement System data is updated and accurate. As flight information is updated in the MUFIDS, this information shall automatically be transferred to the ACS database to prevent the need for duplicate data entry. The following minimum information shall be passed from the MUFIDS to the ACS:
 - a. Primary Airline.
 - b. Flight Number.
 - c. Effective Date.
 - d. Discontinued Date.
 - e. Operation Days of Week.
 - f. Scheduled Arrival Time.
 - g. Estimated Arrival Time.
 - h. Arrival Cities.
 - i. Scheduled Departure Time.
 - j. Estimated Departure Time.
 - k. Departure Cities.
 - l. Gate.
 - m. Baggage Carousel.
 - n. Codeshare Airlines.
 - o. Codeshare Flight Numbers.
 - p. Equipment Used (type of aircraft).
 - q. Gate ID (date / time gate usage starts / stops).
 - r. Baggage Carousel ID (date / time carousel usage starts / stops).
 - s. Frequent Flyer Miles (if available).

- t. Miscellaneous Audio Take Index (for compensation for overbooking, etc.) (if available).
- 2. The MUFIDS interface shall also transmit the airport Master Clock System data from Master Clock Network Time Protocol (NTP) Servers (or similar mutually acceptable protocol) to enable the various components of the ACS to be synchronized with other special systems in the terminal. The following information shall be requested by the ACS components via NTP over Ethernet:
 - a. Current Date and Time.
- 3. Data shall be passed from the MUFIDS to the ACS using a multiple one-way a two-way interface on a standard Ethernet connection utilizing one of the following methods:
 - a. Built-in features of message queuing (MQ) to guarantee delivery of messages, persistence in the event of power outages and other interruptions, via Microsoft's version of MQ, MSMQ. Message content placed in the queue shall be XML (eXtensible Markup Language) compliant text; or
 - b. A standard (proprietary) asynchronous message (using the UDP part of the TCP/IP).
 - c. Data transfers will be monitored and logged within the MUFIDS, including transfer and completion times. The paging system shall inform the MUFIDS that data has been successfully received.

2.4 SCREEN DESIGN APPLICATION

- A. The approved solution shall incorporate templates that can be modified by incorporating text, graphics, full-motion video clips, and even Web sites.

At anytime during the design process, the screen designer shall allow the user to easily preview the screen design, using actual MUFIDS data

- B. Display Pages and Devices:
 - 1. The screen designer shall be capable of modifying any type of display template; for example, a public arrival screen or gate departure screen. The screen designer shall accommodate page design for monitors, and flat panel displays. The screen designer shall include templates of single pages and split screens, for various aspect ratios and display resolutions, including aspect ratios of 16:9 and 4:3 and their varied corresponding resolutions
- C. Designer Tools
 - 1. The screen designer shall supply tools that allow the user to cut, copy, and paste both text and graphics.
 - 2. The user shall be able to place, drag, and size fields that allow graphics, text, columns of text, full-motion video clips, and even Web sites on a page. The user shall be able to reposition and resize these fields with ease. The screen designer shall include features, such as grid lines, sizing handles, and snap-to-grid action, for the easy placement and dynamic sizing of images, rows and text
- D. Screen Designer Features
 - 1. The screen designer shall offer a variety of Windows fonts and point sizes, and allow the user to specify bold, underlined, and blinking text.

2. Background and text colors shall be adjustable and shall be selectable from a palette of 16 million colors.
 3. The user shall be able to add time of day and date to each display page
- E. Graphics and Wallpaper
1. The screen designer shall allow the user to easily select and insert graphical images of a standard format; that is, JPG, PCX, BMP, and GIF. It shall allow multiple images to be placed on a page.
 2. The screen designer shall allow the user to easily select and insert background wallpaper graphical images of a standard format; that is, JPG, PCX, BMP, and GIF. It shall allow text and graphics to be placed over the wallpaper
- F. Full-Motion Video
1. The screen designer shall allow the user to easily select and insert full-motion video clips on a flat panel display or monitor page.
- G. Web pages
1. The screen designer shall allow the user to easily select and insert a Web site URL to display an actual Web page on a flat panel display or monitor page
- H. Additional Features
1. The screen designer shall accommodate code sharing on a display by allowing the user to display airline logos or names and flight numbers and cities on the same line or on separate lines or by using a transition that alternately displays code-sharing information, fading from one to the other.
 2. The screen designer shall provide templates that have split-screen displays. Screens must be able to be split into two, three, or four sections for a different display of information in each section. Each section must be individually addressable.
 3. Page templates should be available to ensure uniformity in the appearance of displays throughout the Airport
- I. Live Data Display
1. At anytime during the design process, the screen designer shall allow the user to easily preview the screen design, using actual MUFIDS data.
- J. Templates
1. Include in the scope of work for the production of six templates (3 MUFIDS and 3 BIDS) to be available no later than 30 days before the installation. The Airport administration will provide digitized graphics to be placed into the software for display throughout the system.

2.5 MUFIDS HARDWARE DESCRIPTION

- A. MUFIDS Server
1. The MUFIDS server shall be Windows 2003-certified computers.
 2. MUFIDS Server shall be redundant server configuration.
 3. At a minimum, the servers shall include the following:
 - a. Dual-Core Intel Xeon 5160, 3.0GHz
 - b. 1 GB 667MHz (2 x 512MB), Single Ranked DIMMs

- c. (3) 80GB 7.2K RPM Serial ATA 3GB/s Hard Drives in a RAID5 configuration
 - d. Dual 10/100/1000 Ethernet network interface cards
 - e. 24X CD-RW/DVD ROM
 - f. 4USB 2.0 Ports
 - g. 2U Rackmounted Chassis
 - h. Windows Server 2003, R2, Standard Edition with SP2 and CALS as required.
 - i. Dell PowerEdge 2950 III or equal.
- B. Client Workstation
- 1. The client workstations shall be Windows XP-certified computers.
 - 2. At a minimum, each client workstation shall include the following:
 - a. Pentium processor, 3.0GHz, 512MB RAM, or greater
 - b. 80GB hard drive
 - c. Ethernet network interface card (100/1000)
 - d. Keyboard, mouse
 - e. 17-inch LCD-TFT flat panel monitor
 - f. 48X CD-R/RW/DVD-ROM Combo drive
 - g. 2 USB 2.0 Ports
 - h. Small or Ultra Small Form Factor Chassis.
- C. Device Display Controller (DDC)
- 1. Device Display Controller (DDC) computers will provide the interface between the data network and the display devices. DDCs will decode the data and generate the necessary control signals to drive the display devices.
 - 2. DDCs shall be Windows XP-certified computers. Each DDC must be capable of being upgraded with the addition of video cards, to drive one to four display devices.
 - 3. The minimum DDC specifications are as follows:
 - a. Intel Core 2 Duo E8400 3.0 GHz, 6MB, 1333 FSB
 - b. 2GB DDR2 Non-ECC SDRAM, 800MHz
 - c. 80GB SATA 3.0Gb/s, 8MB Cache hard drive
 - d. 10/100/1000 Ethernet network interface
 - e. 8X DVD+/-RW drive, SATA
 - f. 90% Efficient Power Supply
 - g. PCIe riser for Full Height/Half Length Card Support if required.
 - h. 512MB NVIDIA NVS 420 PCIe with quad DVI output or approved equivalent
 - i. 4 USB 2.0 Ports
 - j. Rackmount Shelf
 - k. DDC shall be Dell Optiplex 960 Desktop, SFF or equal.
 - l. Connect DDC onboard video to KVM.
 - 4. DDCs shall use DVI over CAT6 Video Extenders for video distribution to monitors. The minimum video extender specifications are as follows:
 - a. Video Transmitter
 - 1. Video Support: DVI UXGA
 - 2. Resolution: 1600 x 1200 @ 60 Hz & HD modes
 - 3. Rackmountable Kit, 1U (3 TX units) OR 2U (6 TX units)
 - 4. Transmitter shall be Magenta Infinea DVI Tx UTP or equal.
 - b. Video Receiver
 - 1. Video Support: DVI UXGA

2. Resolution: 1600 x 1200 @ 60 Hz & HD modes
3. Distance: 500 ft.
4. Receiver shall be Magenta Infinea DVI Rx UTP or equal.

D. HTTP Server

1. A HTTP server shall be provided to handle XML Posts and Requests from Airline Host feeds that support XML.
2. Contractor shall create XML Web Services as required to interface each airline host feed.
3. HTTP Server shall be located behind a firewall in a DMZ.
4. HTTP Server shall be hosted on a non standard port in the range of 1024-9999 unless standard port is required by airline feed.
5. Coordinate with network scope.
6. HTTP Server shall run Apache Server 2.2 or Microsoft IIS 5.1 HTTP Services.
7. The HTTP server shall be Windows XP-certified.
The minimum HTTP Server specifications are as follows:
 - a. Intel Pentium Dual Core E2180 2.0 GHz, 1MB, 800 FSB
 - b. 1GB DDR2 Non-ECC SDRAM, 677MHz
 - c. 80GB SATA 3.0Gb/s, 8MB Cache hard drive
 - d. 10/100/1000 Ethernet network interface
 - e. 48X CD-ROM drive, SATA
 - f. Integrated Video Graphics
 - g. 4 USB 2.0 Ports
 - h. Rackmount Shelf
 - i. DDC shall be Dell Optiplex 755 Desktop or equal.
 - j. Connect HTTP Server to KVM.

E. Network Hardware

1. See Network Scope on sheet E6-04.

F. KVM (Keyboard, Video Mouse)

1. Contractor shall connect to 17" LCD w/ KVM in the MDF rack as indicated on E5-02.

G. Gate Departure Control System

1. The gate departure control system shall display gate-specific flight departure information. The system shall be controlled from the MUFIDS server. A micro-terminal shall allow podium personnel to modify and update flight information.
2. The system shall utilize a display device, numeric-key input micro-terminal, and a DDC. Provide display devices as shown on the drawings.
3. The display device shall display the following information: airline logo (full graphics), flight number, airline designator, departure time, status, and remarks. The DDC shall have sufficient memory capacity to store a minimum of 250 logos and images.
4. The display devices shall operate automatically, displaying the correct data from the MUFIDS server.
5. There shall be one display device, DDC, and micro-terminal provided at each podium position as indicated on the drawings.

Selective inputs made at the gate micro-terminals shall change the MUFIDS database and all other displays on the airport system. The gate

micro-terminals shall be capable of changing flight status fields, actual times and / or gate remarks.

2.6 DISPLAY DEVICES

- A. LCD Flat Panel Displays. The flat panel LCD displays shall be as manufactured by NEC, Mitsubishi, Samsung, LG, Philips or approved equal. The units shall not cause any permanent image burn-in. The displays shall have multi-screen capabilities and full motion video. Contractor shall present various multiscreen options to "DLH" for approval. The screen layout configurations shown on the drawings are for example only. "DLH" will select final configuration after the presentation.
- B. See plans for model numbers.
- C. Provide supports and mounting brackets for all monitors as indicated on the drawings.

2.7 SPARE PARTS:

- A. Provide the following spare parts.
 - 1. One (1) DDC controllers.
 - 2. One (1) LCD Monitor of each size used.
 - 3. Two (2) Video Extender kits.

PART 3 - EXECUTION

3.1 PLANNING

- A. Prior to beginning of the work detailed planning and lay-out shall be performed to meet schedule and ensure proper installation of MUFID system.
- B. The MUFIDS Contractor shall plan conduit layout, power requirements, exact termination of the conduit and wiring to provide clean installation. No surface mounted conduit shall be installed without prior approval of Architect / Engineer.

3.2 COORDINATION

- A. The Contractor shall coordinate all work efforts with the Owner, A/E and other trades. The phasing-in schedule for the new system shall be submitted within 30 days of the contract award for approval.
- B. Conduit pathways and cable identification shall be coordinated with other contractors and A/E.

3.3 EQUIPMENT INSTALLATION

- A. The contractor shall provide all supports and installation hardware for the equipment furnished under the contract. The installation shall be in neat and workmanlike manner. The exact monitor location, height and other items shall be field coordinated with the A/E and owner.

- B. Locations of all cutting and patching shall be approved by the Architect / Engineer and Owner. All repairs must match the surrounding surfaces.
- C. Install all equipment in accordance with the manufacturer's written instructions.
- D. Install a complete and operational MUFID System.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."
- B. Provide 'as-built' record of wiring pathways and cable identification in dwf or dwg CAD format on CD.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Field tests shall be witnessed by Design Engineer or designated alternate.
- B. Visual Inspection: Conduct visual inspection prior to testing.

3.6 FINAL TESTS AND DEMONSTRATION

- A. Final tests and inspection shall be held in the presence of Architect/Engineers and Owner's representatives and to their satisfaction. The Contractor shall supply personnel and required auxiliary equipment for this test without additional cost.
- B. Conduct reliability test for two months to indicate compliance with 99.5 percent system reliability requirements. The reliability shall be determined as follows:
Reliability Test
 - 1. The Contractor shall demonstrate a continuous operation of the MUFIDS at the site over a period of 1,440 hours (60 days) with an availability of 99.5 percent or more to include all supplied hardware and software. This shall be demonstrated after the Acceptance Test of the MUFIDS.
 - 2. Availability shall be calculated as follows:

$$\text{Availability} = \text{Percent } \frac{\text{TDT} - \text{AOT}}{\text{TDT}} \times 100$$
 - a. Test Duration Time (TDT) is the total elapsed time from start of the test to completion of the test. This time shall be a minimum of 1,440 hours.
 - b. Downtime shall be calculated according to the following rules:
 - 3. The duration of any outage shall be calculated from the time that a functional deficiency is first recognized to the time the deficiency has been corrected to the satisfaction of "DLH".
 - 4. If an intermittent failure (those which occur and then disappear 3 or more times) occurs, the problem shall be isolated and repaired. The system shall be considered unavailable while corrective maintenance is being performed.

5. Central processor failure not specifically attributed to system hardware malfunctions shall be considered a system failure and downtime shall be accumulated when it occurs at any rate greater than once per week.
 6. No minimum time shall be charged against any occurrence.
 7. All time shall be recorded to the nearest minute.
 8. In the event of the failure of existing equipment, site conditions and / or accidental operator damage to the equipment caused by actions of "DLH", its agents or employees, the effect of which is to render the equipment unavailable as described above, the testing shall cease. Upon return to normal operation, the testing shall resume again. No downtime shall be accumulated during this outage.
- C. Test Report: A copy of the test report shall be submitted documenting the test procedure and detail results, indicating proper functioning of system, and conformance to the specifications. System shall be left in operating condition.

3.7 TRAINING

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain MUFID system.
- B. The MUFIDS contractor shall provide 2 day(s) of on-site training for the airport staff on each operating shift. Each class shall contain both lecture discussions and hands-on experience and shall last approximately three to four hours. Each class shall be no larger than ten (10) students
- C. Provide one 12 hour training for airport personnel. The training shall be video recorded for future use and shall include the following.
 1. MUFIDS operation.
 2. Review the documentation and software submitted to test and manage the system.
 3. Operation of network equipment.
 4. Review maintenance procedures, labeling orientation, communication closets and equipment rooms.
 5. Trouble shooting of signal and power cabling.
 6. The training shall be conducted by qualified personnel. Submit qualification of the trainer for approval by Architect / Engineer.
- D. Send a letter to the Owner, for Owner's signature, acknowledging that instruction in system operation has been received. One copy to be retained by Owner and one copy sent to Contractor.

END OF SECTION 13742

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

**SECTION 14240 - HYDRAULIC
ELEVATORS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes hydraulic passenger elevators.
 - 1. Engineering, equipment, labor and permits required to satisfactorily complete elevator installation as required by contract documents.
 - 2. Hydraulic elevator system: hydraulic elevators with double and single entrances.
 - 3. Standard elevator car enclosures, hoistway entrances and signal equipment
 - 4. Motor and pump, jack(s), operation and control systems, hoistway equipment, and accessories as required to complete the elevator installation.
 - 5. Accessibility provisions for physically disabled persons.
 - 6. Maintenance service as described herein.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Section 05500 "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Hoist beams.
 - c. Structural-steel shapes for subsills.
 - d. Pit ladders.
 - e. Cants in hoistways made from steel sheet.
 - 2. Section 05700 "Ornamental Metal" for combination hall push-button stations.
 - 3. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
 - 4. Ventilation of hoistway(s) and machine room(s) is specified in Division 15.
 - 5. Electrical service to each elevator, including fused disconnect switch, is specified in Division 16 sections.

1.3 DEFINITIONS

- A. Hydraulic elevators are hereby defined to include systems in which cars are hoisted either directly or indirectly by action of a hydraulic plunger and cylinder (jack); with other components of the work including fluid storage tank, pump, piping, valves, car enclosures, hoistway entrances, control systems, signal equipment, guide rails, electrical wiring, roping, buffers, and devices for operating,

dispatching, safety, security, leveling, alarm, maintenance, and similar required performances and capabilities.

- B. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
- C. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 REFERENCES:

- A. ADAAG - Americans with Disabilities Act Accessibility Guidelines.
- B. AISC - Design, Fabrication and Erection of Structural Steel for Buildings.
- C. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
- D. ANSI/ASME A17.1 - Safety Code for Elevators and Escalators, latest edition or as required by the local authority having jurisdiction.
- E. ANSI/ASME A17.2 - Inspector's Manual For Elevators and Escalators 1996 Edition.
- F. ANSI/ASME A17.5 - Elevator and Escalator electrical Equipment.
- G. ANSI/AWS D1.1 - Structural Welding Code, Steel.
- H. ANSI/NFPA 70 - National Electrical Code.
- I. ANSI/NFPA 80 - Fire Doors and Windows.
- J. ANSI/UL 10B - Fire Tests of Door Assemblies.
- K. APA - American Plywood Association.
- L. ASTM A 36 - Structural Steel.
- M. ASTM A 53 - Pipe, Steel, Black and Hot Dipped Zinc-Coated, Welded and Seamless.
- N. ASTM A139- Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4-in. and Over).
- O. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- P. ASTM A 366 - Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
- Q. ASTM A 446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- R. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- S. NEMA LD3 - High Pressure Decorative Laminates.

- T. NEMA MG1 - Motors and Generators.
- U. NFPA 101 Life Safety Code.
- V. Steel Structures Painting Council (SSPC) - Steel Structures Painting Manual.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Elevator schedule indicates required performances, controls, capacities, features, and finishes for each elevator or group of elevators and are included at end of this section.

1.6 ACTION SUBMITTALS

- A. Product Data for each principal component or product of each elevator, including certified test reports on required testing. Indicate capacities, sizes, performance and operating characteristics, features of control system, finishes, and similar information. Indicate any variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and locations of signals. Include maximum and average power demands.
- B. Shop Drawings:
 - 1. Include dimensioned drawings showing plans, elevations, sections and large-scale details indicating service at each landing, coordination with building structure and relationships with other construction, locations of equipment and details of car enclosures and hoistway entrances.
 - a. Complete Shop Drawings of elevator car enclosures, showing details of construction and location of signal and car equipment.
 - b. Complete Shop Drawings of elevator hoistway entrances and doors, showing method of operation, details of construction, and method of fastening to structural members.
 - 2. Include elevating diagrams to indicate elevator service to each level. Illustrate clearly connection of rail supports to building structure.
 - 3. Submit layout of graphics components for coordination by the Architect.
 - 4. Submission of manufacturer's "generic" non-project-specific shop drawings, not showing actual project hoistways will be considered nonresponsive and returned.
- C. Samples for Initial Selection: For finishes involving color selection.
- D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 4-inch-square Samples of sheet materials; and 8-inch lengths of running trim members.
- E. Wiring diagram detailing wiring for power, signal and control systems differentiating clearly between manufacturer-installed wiring and field-installed wiring. Indicate maximum and average power demands. Each device on wiring diagram shall be properly identified by name, letter, or standard symbol identical with markings on devices or controller panel.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- C. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Manuals: Bound manual for elevator, with operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing for major and critical components, emergency instructions, and similar information.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Fabrication of hydraulic elevators shall be performed only by a qualified fabricator. The term qualified means experienced in performing the Work required by this section. The qualified fabricator shall have experience on Projects similar in size and scope to this Project. The fabricator shall submit evidence of such qualifications upon request.
- B. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer and who has completed elevator installations similar in material, design, and extent to that indicated for Project which have resulted in installations with a record of successful in-service performance. The installer shall submit evidence of such qualifications upon request.
- C. Regulatory Requirements: Comply with applicable requirements of ASME/ANSI A17.1, Safety Code for Elevators and Escalators, in addition to local governing regulations including Minnesota Rules, Chapter 1307, Elevators and Related Devices. All work performed shall be in strict accordance with applicable codes including all maintenance and testing requirements.
- D. Document Verification: in order to discover and resolve conflicts or lack of definition which might create problems, review contract documents for compatibility with proposed product prior to bidding. Review structural, architectural, electrical and mechanical documents, and elevator specification.
- E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
 - 1. Arrange for inspections and make required tests.
 - 2. Deliver to the Owner upon completion and acceptance of elevator work.

1.10 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.

1.11 COORDINATION

- B. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.12 WARRANTY

- A. General Warranty: The elevator warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Project Warranty: Provide special project warranty, signed by Contractor, installer, and manufacturer, agreeing to replace, repair, or restore defective materials and workmanship of elevator work during warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.
 - 1. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, 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 is twelve (12) months starting on date of Substantial Completion.
- C. Warranties: Provide coincidental product warranties where available for major components of elevator work. Submit with maintenance manuals.

1.13 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Provide full maintenance service by skilled, competent employees of the elevator installer for period of 12 months following Date of Substantial Completion. Include monthly preventive maintenance performed during normal working hours. Include repair or replacement of worn or defective parts or components and lubricating, cleaning, and adjusting as required for proper elevator operation in conformance with specified requirements. Include 24-hours-per-day, 7-days-per-week emergency callback service with a response time of 2 hours or less. Exclude only repair or replacement due to misuse, abuse, accidents, or neglect caused by persons other than installer's personnel.

- B. Continuing Maintenance Service: Installer shall provide a continuing maintenance proposal to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date construction contract maintenance requirements are concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.14 SPECIAL REQUIREMENTS

- D. Field Measurements: Before proceeding with the fabrication of the hydraulic elevator work, verify all dimensions and take such measurements as are required for proper fabrication and erection of the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Otis Elevator Co.
 2. Schindler Elevator Corp.
 3. ThyssenKrupp Elevator.
- B. Source Limitations: Obtain elevators from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

2.3 MATERIALS AND COMPONENTS

- A. General Requirement: Unless otherwise indicated, provide manufacturer's standard pre-engineered elevator systems that will comply with or fulfill the requirements of elevator schedule sheet at end of this section or, at manufacturer's option, provide custom-manufactured elevator systems that will fulfill requirements. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.
- B. Hydraulic Machines and Elevator Equipment: Provide manufacturer's standard two jack holeless hydraulic plunger-cylinder units for each elevator, with electric pump-tank-control system equipment in machine room as indicated.
- C. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
- D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide isolation couplings to prevent sound / vibration transmissions from power unit.

- E. Hydraulic Fluid: Elevator manufacturer's standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.
- F. Car Frame and Platform: Manufacturer's standard welded steel units, unless otherwise indicated.
- G. Guides: Roller guides; polymer-coated, nonlubricated sliding guides; or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.4 CONTROL SYSTEMS

- A. General: Provide manufacturer's standard microprocessor-based operation system for each elevator as required to provide automatic operation of the type indicated and defined in the Code as "Operations."
- B. Single Elevator Control - Passenger: Provide solid-state "Selective Collective Automatic Operation," as defined in the Code.
- C. Auxiliary Operations / Controls: In addition to primary control system features, provide the following controls or operational features for elevators, except where otherwise indicated:
 - 1. Single-Car Standby-Powered Lowering: On activation of standby power, car is lowered to the lowest floor, opens its doors, and shuts down..
 - 2. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car responds only to car calls, not to hall calls.
 - 3. Independent service.
 - 4. Automatic 2-way leveling.
 - 5. Automatic dispatching of loaded car, in conjunction with load weighing device.
- D. Security Features: In addition to above operational features, provide the following security features for passenger elevators, except where otherwise indicated. Security features shall not affect emergency firefighter's service.
 - 1. Keyswitch operation feature with car and hall pushbuttons activated and deactivated by security keyswitches. Key is removable only in the deactivated position.
 - 2. Anticrime feature activated by a keyswitch that causes car to return immediately to a predetermined floor and open door for inspection. On deactivation by keyswitch, car completes calls registered before keyswitch activation and resumes normal operation.
- E. Firefighter's Service: Elevator to be provided with firefighter service and shall conform to Rule 211.3 "Firefighter Service" of ASME A17.1.

2.5 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for elevator to comply with requirements indicated below.
 - 1. Provide illuminated hall-call and car-call buttons that light up when activated and remain lighted until call or other function has been fulfilled; fabricate of acrylic or other permanent translucent plastic.

2. Except for buttons and illuminated signal elements, fabricate signal equipment with exposed surfaces of stainless steel with manufacturer's standard directional polish or satin finish.
3. Car Control Stations: Provide car control station in each car with flush-mounted metal faceplates containing illuminated halo call button for each landing served and other buttons, switches, and controls required for specified car operation and control. Mount as shown or scheduled at height complying with ASME/ANSI A117.1. If not otherwise indicated, mount in return panel adjacent to car door. Provide operating device symbols as required by Code. Mark other buttons and switches with manufacturer's standard identification for required use or function.
4. Car Position Indicator: For passenger elevator cars, provide either illuminated-signal type or digital-display type, located near top of each car or in car control station. Include direction-of-next-travel signal if not provided in car control station.
 - a. In addition to visual indicator, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
5. Hall Push-Button Station: Provide hall push-button station at each landing.
 - a. Locate as is most convenient for approaching passengers. Provide unit with flat faceplate designed for flush-mounting on wall with body of unit recessed in wall.
 - b. Provide 2-button station where passengers can travel either direction; 1-button station where only one direction of travel is available and indicate which direction that is.
6. Hall Lanterns: Provide units with illuminated "up" and "down" signal arrows, but provide single arrow where only one direction is possible. Provide units projecting from faceplate for ease of angular viewing, except provide flush units where a location in hoistway entrance frame is indicated. Match materials, finishes, and mounting method of hall push-button stations.
 - a. At manufacturer's option, hall lantern signals may be placed either above or beside each hoistway entrance or in both jambs of entrance frame for each elevator. Mount at minimum of 6 feet - 0 inches above finished floor.
 - b. In conjunction with each hall lantern device, provide an audible signal to indicate that a car is arriving in response to a hall call and to indicate direction of car travel. Signal shall sound once for up direction of travel and twice for down direction.
7. Hall Position Indicator: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Match materials, finishes, and mounting method of hall push-button stations.
 - a. Integrate ground-floor hall lanterns with hall position indicators.
8. Telephone: Provide manufacturer's standard ADA-compliant, vandal-resistant telephone system contained in flush-mounted cabinet and complete with identification and instructions for use.
9. Alarm System: Provide emergency alarm bell properly located within building and audible outside hoistways, equipped to sound automatically in response to emergency stops and in response to "Alarm" button on each car control station.
10. Car-Top Alarm: Provide switches on top emergency exits that will cause alarm to sound when cover is opened.

2.6 ELEVATOR CAR ENCLOSURES

- A. General: Provide car enclosures as indicated. Include ventilation, lighting, ceiling finish, wall finish, access doors, doors, power door operators, sill (threshold), trim, accessories, and floor finish unless indicated as not work of this section. Unless indicated otherwise, provide horizontal sliding doors of manufacturer's standard flush panel type, with operation and number of panels as indicated. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.
 - 1. Materials and Fabrication: Provide selections as indicated for each car enclosure surface; unless otherwise indicated provide manufacturer's standards, but not less than the following:
 - a. Stainless Steel: AISI Type 302/304 with No. 4 satin finish.
 - b. Aluminum Sills: Extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.
 - c. Plastic Laminate: High-pressure type complying with NEMA LD3, Type GP-50; color, texture and pattern to match wood panel wall system – vertical applied panels.
 - d. Fabricate car door frame integrally with front wall of car.
 - e. Fabricate car with recesses and cutouts for signal equipment.
 - f. Low voltage downlight ceiling with stainless steel laminate.

2.7 PERSONAL PROTECTIVE DEVICES

- A. Handrails: Unless indicated otherwise, provide manufacturer's round tubular stainless steel handrails on side walls and back wall either continuous or segmented units.
- B. Door Edge Protective Device: Provide retractable edge shoe on leading edges of elevator entrance doors that causes doors to stop and reopen upon contacting an obstruction in entrance.
- C. Photo-Eye Detection Device: Provide electronic photo-eye device with timed cutout, projecting dual light beams across car entrance at 5 inch and 29 inch heights, that when interrupted will cause closing doors to stop and reopen. Provide keyed switch in car operating panel or toggle switch in service cabinet for disconnecting photo-eye protective device.
- D. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time period, through activation of detection device or door edge protective device, a loud buzzer shall sound and doors shall begin to close at reduced rate of speed. Doors shall continue to close unless door edge protective device is activated, which shall cause doors to reopen. Process shall repeat continuously until obstruction is removed from entrance.

2.8 PASSENGER HOISTWAY ENTRANCES

- A. General: Unless indicated otherwise, provide manufacturer's standard, pre-engineered, hollow metal type, sliding, door-and-frame hoistway entrances complete with track systems, hardware, safeties, sills, and accessories. Match car enclosure doors for size, number of door panels, and door panel movement. Provide frame-section size and profile to coordinate with hoistway wall construction as indicated.

- B. Materials and Fabrication: Provide selections indicated that comply with manufacturer's standards, but not less than the following:
1. Stainless Steel Frames: Formed stainless steel sheet, AISI Type 302/304 with No. 4 satin finish.
 2. Satin Stainless Steel Door Panels: Flush stainless steel construction, AISI Type 302/304 with manufacturer's standard directional polish or satin finish.
 3. Aluminum Sills: Extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.
 4. Nonshrink, Nonmetallic Grout: Factory packaged nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for grouting door sills and similar applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to commencing elevator installation, examine hoistways, hoistway openings, pits, and machine rooms, as constructed; verify all critical dimensions and examine supporting structure and all other conditions under which elevator work is to be installed. Notify Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 INSTALLATION OF ELEVATOR SYSTEM

- A. General: Comply with manufacturer's instructions and recommendations for work required during installation.
- B. Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place.
- C. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- D. Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by Contractor to ensure dimensional coordination of the work.
- E. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure and thereby to eliminate sources of structure-borne noise from elevator system.
- F. Install piping without routing underground, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.

- G. Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.
- H. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- I. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
- J. Set sills flush with finished floor surface at landings. Coordinate with other trades to facilitate and ensure proper grouting of sills.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: Upon nominal completion of each elevator installation, and before permitting use of elevator (either temporary or permanent), perform acceptance tests as required and recommended by Code and by governing regulations or agencies.
- B. Operating Tests: Load each elevator to its rated capacity and operate continuously for 30 minutes over its full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of pump motor (except submerged pumps) during 30 minute test period. Record failures of elevator to perform as required.
- C. Advise Contractor, Owner, Architect, and inspection department of governing agencies in advance of dates and times tests are to be performed on elevators.

3.4 PROTECTION

- A. At time of Substantial Completion of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs, or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.
- B. Provide similar protective measures for elevator units that will be placed in temporary service, including inspection and maintenance service during period of temporary service.

3.5 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and just prior to date of Substantial Completion. Determine that control systems and operating devices are functioning properly.

ELEVATOR SCHEDULE - HYDRAULIC PASSENGER ELEVATORS:

EV-1 (Elevator 154)

Capacity:	3,500 pounds center opening.
Speed:	100 / 125 fpm.
Travel:	33'-8"
Landings Served:	3.
Openings:	
Front:	3.
Rear:	2.
Power Supplied:	480 volts AC, 3 phase, 60 hertz.
Machinery:	Twinpost, telescoping holeless hydraulic jacks, positive-displacement pump, AC motor.
Car Enclosure:	6'-8" wide by 5'-5" deep min. clear inside dimensions. 3'-6" wide by 7'-0" high stainless steel car doors. Center opening. Stainless steel front walls with integral stainless steel car door frames. Ceiling: Manufacturer's low voltage downlight with satin stainless steel laminate. Side and Rear Walls: Vertical applied panels with decorative trim – Mart wood panel wall system. Operating Panel: Satin stainless steel finish. Floor prepared to receive thinset resinous epoxy terrazzo. Handrail: 2" flat stainless steel bar w/ No. 4 satin finish.
Hoistway Entrances:	3'-6" wide by 7'-0" high. Satin stainless steel entrance doors and frames, rated and labeled for 30-minute temperature rise of 650 degrees F.
Fixture & Button Style:	Vandal Resistant Signal Fixtures. Card reader rear door hall call.
Special Operations:	Card reader operation of rear openings with lock-out of front openings in rear opening mode. See security drawings.
Additional Requirements:	Protective blanket hooks in car, 1 complete set of full-height blankets, dark tan color.

EV-2 (Elevator 118)

Capacity:	3,500 pounds center opening.
Speed:	100 / 125 fpm.
Travel:	17'-0"
Landings Served:	2.
Openings:	
Front:	2.
Rear:	None.
Power Supplied:	480 volts AC, 3 phase, 60 hertz.
Machinery:	Twinpost, telescoping holeless hydraulic jacks, positive-displacement pump, AC motor.
Car Enclosure:	6'-8" wide by 5'-5" deep min. clear inside dimensions. 3'-6" wide by 7'-0" high stainless steel car doors. Center opening. Stainless steel front walls with integral stainless steel car door frames. Ceiling: Manufacturer's low voltage downlight with satin stainless steel laminate.

Hoistway Entrances:	Side and Rear Walls: Vertical applied panels with decorative trim – Mart wood panel wall system.
	Operating Panel: Satin stainless steel finish.
	Floor prepared to receive thinset resinous epoxy terrazzo.
	Handrail: 2" flat stainless steel bar w/ No. 4 satin finish.
	3'-6" wide by 7'-0" high. Satin stainless steel entrance doors and frames, rated and labeled for 30-minute temperature rise of 650 degrees F.
Fixture & Button Style:	Vandal Resistant Signal Fixtures. Card reader hall call at first floor.
Special Operations:	None.
Additional Requirements:	Protective blanket hooks in car, 1 complete set of full-height blankets, dark tan color.

EV-3 (Elevator 105)

Capacity:	3,500 pounds center opening.
Speed:	100 / 125 fpm.
Travel:	17'-0"
Landings Served:	2.
Openings:	
Front:	1.
Rear:	1.
Power Supplied:	480 volts AC, 3 phase, 60 hertz.
Machinery:	Twinpost, telescoping holeless hydraulic jacks, positive-displacement pump, AC motor.
Car Enclosure:	6'-8" wide by 5'-5" deep min. clear inside dimensions.
	3'-6" wide by 7'-0" high stainless steel car doors. Center opening.
	Glazed front and rear walls with stainless steel trim and integral stainless steel car door frames.
	Ceiling: Manufacturer's low voltage downlight with satin stainless steel laminate.
	Side Walls: Glazed w/ stainless steel trim.
	Operating Panel: Satin stainless steel finish.
	Floor prepared to receive thinset resinous epoxy terrazzo.
	Handrails: 2" flat stainless steel bar w/ No. 4 satin finish.
	3'-6" wide by 7'-0" high. Satin stainless steel entrance doors and frames, rated and labeled for 30-minute temperature rise of 650 degrees F.
Hoistway Entrances:	Vandal Resistant Signal Fixtures.
Fixture & Button Style:	Keyed operation of rear openings with lock-out of front openings in rear opening mode.
Special Operations:	
Additional Requirements:	Protective blanket hooks in car, 1 complete set of full-height blankets, dark tan color.

END OF SECTION 14240

**NEW PASSENGER TERMINAL
DULUTH INTERNATIONAL AIRPORT
DULUTH, MINNESOTA**

SECTION 14310 - ESCALATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes high-traffic escalators, including but not limited to the following:
 - 1. Escalators and support trusses, sprocket assemblies, step chains, steps, treads, tracks, handrails with guides and drive, comb plates, driving machine, drip pans, controller, signals, control devices, etc.
 - 2. Glass balustrades, interior panels, mouldings, deck covers, skirt boards, fillers, skirt lighting, exterior balustrades and vertical walls
 - 3. Stainless steel side panels and soffit panels
 - 4. Floor plates and access panels in floors.
 - 5. Angles, clips, and fasteners.
 - 6. Machines, motors and safety devices.
 - 7. Electrical equipment and connections, including switches, electrical circuits and outlets for special use as required; also whatever cutouts, circuit breakers, starters, or other devices which are necessary to meet local code requirements.
 - 8. Engineering, equipment, labor and permits required to satisfactorily complete elevator installation as required by contract documents.
- B. Related Requirements:
 - 1. Division 5 Section "Metal Fabrications" for attachment plates, angle brackets, and other provisions to support escalator trusses.
 - 2. Division 5 Section "Ornamental Handrails and Railings" for guardrails attached to escalator trusses at top landings.
 - 3. Division 16 Sections for electrical service to escalators, including disconnect switches.

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 DESIGN REQUIREMENTS

- A. Terms used are defined in the latest edition of the safety code for Elevators and Escalators, ASME A17.1, A17.2, A17.5, NFPA 70, NFPA 101, ADA and the codes having legal jurisdiction.

- B. Designs, clearances, construction, workmanship, and material, unless specifically excepted, shall be in accordance with ANSI/ASME A17.1, except where codes having legal jurisdiction include more rigid requirements or conflict with ANSI/ASME A17.1.
- C. Each escalator shall be a self-contained unit consisting of truss, tracks, step drive units, steps, plates, balustrades, handrails, driving machine, controller, safety devices, and other required parts. The escalator shall operate with quietness, smoothness, and safety.
- D. Pits have been designed to accommodate largest, current, equipment of specified manufacturers. If less space is needed, provide and install attachment plates, angle brackets, and other preparation of structure as required to adequately support escalator trusses and install the escalators and associated equipment.

1.5 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, safety features, finishes, and similar information.
- B. Shop Drawings:
 - 1. Provide complete dimensioned layout of each escalator installation. 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 Verification: For exposed escalator finishes, 8-inch-square Samples of sheet materials, and 12-inch lengths of running trim members.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. 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.
- C. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For escalators to include in emergency, operation, and maintenance manuals.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted escalator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard two-year maintenance agreement, starting on date initial maintenance service is concluded. State

services, obligations, conditions, and terms for agreement period and for future renewal options.

1.8 QUALITY ASSURANCE

- A. **Installer Qualifications:** Escalator manufacturer or an authorized representative who is trained and approved by manufacturer. The installer shall have experience on Projects similar in size and scope to this Project. The installer shall submit evidence of such qualifications upon request.
- B. **Document Verification:** Review contract documents for compatibility with proposed product prior to bidding.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturers protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.10 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 sumps and floor drains in pits; electrical service; and electrical outlets, lights, and switches in pits.

1.11 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:** One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - 1. Fujitec America, Inc.
 - 2. KONE Inc.
 - 3. Otis Elevator Co.

4. Schindler Elevator Corp.
5. 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./s^2 .
- C. 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 1.5 times the design loads required by ASME A17.1/CSA B44.
- D. 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. 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.
- B. Design and equip escalators to run in either direction.
- C. Provide escalators with two flat steps at top and bottom landings.
- D. Rated Speed: 90 fpm.

2.4 COMPONENTS

- A. Fabricate exposed metalwork, including deck covers, side panels, soffit 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.
 1. Fabricate side panels of stainless steel panels of size and jointing as shown and to fit the actual construction.
 2. Fabricate soffit panels of stainless steel panels of size and jointing as shown and to fit the actual construction.
 3. Joints in exposed metal work, unless otherwise shown or specified, shall be accurately fitted and rigidly secured with hairline contacts.
- 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.
- C. Guards at Ceiling Intersection: Clear plastic.

- D. Handrails: Smooth, jointless, reinforced neoprene.
 - 1. Color: Black.
- E. Deck Covers and Trim: Satin stainless steel, No. 4 finish.
- F. Skirt Panels, if Applicable: Manufacturer's standard low-friction material.
- G. Skirt Deflector Devices: Manufacturer's standard brush-type device.
- H. Steps: One-piece, die-cast aluminum with demarcation grooves at front and rear of tread surface.
 - 1. Finish: Powder-coated, gray.
 - 2. Step Demarcation: 1-1/2- to 2-inch-wide yellow stripe at sides and backs of step treads.
 - 3. Nosing Demarcation: 2-inch-wide yellow stripe at nosings of step treads.
- I. Combs: Integrally colored structural plastic.
 - 1. Comb Color: Yellow.
- J. Combplate Lights: Provide recessed light fixtures with flush lenses mounted in skirt panels at each side of combplates, designed to illuminate combplate steps.
- K. Floor Plates: Grooved or patterned surface with abrasive material embedded in or metallically bonded to floor-plate surface.

2.5 FEATURES

- A. Operational Control: Provide key-operated starter switches 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 on a 1.0-sq. ft. 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 112 lbf at either side or exceeding 225 lbf at center of front edge of combplate, or a resultant force in upward direction is applied exceeding 150 lbf 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.
- B. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. 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, Architect, 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, adjust, and maintain escalators.
- 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. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of six hours or less.

END OF SECTION 14310

