REBID ADDENDUM NO. 2
TO
CONTRACT DOCUMENTS, SPECIFICATIONS AND PLANS
FOR IMPROVEMENTS TO THE
ST. JOSEPH ROSECRANS MEMORIAL AIRPORT
ST. JOSEPH, MISSOURI
MODOT PROJECT NO. 22-012A-1

To All Bidders: You are requested to make all changes and/or additions contained in this addendum to the Bidding Documents. Failure to acknowledge this Addendum in Proposal shall result in rejection of bid. Bidders are informed that the above referenced Contract Documents, Specifications, and Plans are modified as follows as of January 10th, 2023.

Contract Documents:

1. Pre-bid agenda with meeting minutes & sign-in sheet included

2. Contract Documents
   Revision: Section 60-05 has been updated to " the contractor is **not** required to provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. "

Specifications:

3. Specifications:
   Revision: Added Revised Version of L-130 Lighting Control System Specification

4. Specifications:
   Revision: Added Section 04 20 00 Unit Masonry

5. Specifications:
   Revision: Added Section 04 43 16 Adhered Masonry Veneer

6. Specifications:
   Revision: Added Section 07 84 00 00 Firestopping

QUESTIONS:

7. The plans for the Electrical Vault, sheet E-300, under "ALCMS Notes" identify two ALCMS stations: tower cab & vault. The specs sec 130-1.5.5.d.7 identifies that the ARFF should have wireless connectivity to the system. Spec sec 130-2.1.c.1 states that the ALCMS stations shall be the tower cab, vault, and administration building. Sec 130-2.2.2 states the wireless connection shall be between the tower and administration building. It's unclear what quantity of stations are required, where those stations are, and how they should all be connected.

   a) Only two control stations will be required, one in the tower cab and one in the vault. Specification L-130 has been modified to remove references to an ARFF control station and wireless communication.

8. Spec sec 130-3.3.2 states that there should be circuit alarms in this ALCMS despite it being categorized as an L-890 Type A in sec 130-2.1.a. Should this be a Type B system or should this section be omitted?

   a) This should be a type A system, section 130-3.3.2 has been deleted.

9. The plans for the Electrical Vault, sheet E-350, sec 4 show the wall including the ALCMS cab. There is a note/callout stating "ROUTE 8 PAIR /18 TWISTED-SHIELDED PAIR CABLE THROUGH ALCMS ENCLOSURE TO RUNWAY LIGHT INTENSITY MONITOR" – can it be confirmed whether or not there is intent to connect the RVR equipment to the ALCMS?

   a) The RVR equipment is not intended to be connected to the ALCMS. It is only indented that the control cable for the RVR runway light intensity monitor will pass through the ALCMS equipment enclosure.

10. Is the March Networks X1248 Series Hybrid Recorder an acceptable substitution for the network video recorder for the security camera system in the terminal?

    a) Yes, this is acceptable.

11. Are 4mm ACM Panels acceptable instead of 6 mm Panels?

    a) Yes, this is acceptable.

12. Is specification section 034500 Precast Architectural Concrete referencing the brick? If not I do not see any precast concrete called out on the drawings. If there is, please clarify.

    a) Please reference precast sandstone cap along all exterior conditions at ramp, patio, and fence walls. For bricks specifications please reference Sections 04 20 00 and 04 43 16

13. Is the vapor barrier on the outside of the rigid insulation?

    a) The vapor barrier should be applied directly to the wall substrate. At foundation walls, cold fluid applied waterproofing should be completed per plans and specifications.

14. Please confirm/locate if Intumescent fireproofing is needed, and at what locations, the desired hourly rating, and whether it should be cementitious or intumescent.?

    a) Please reference sheet LS101 for 1 hour fire rated gypsum walls in the corridor and 2 hour fire rated walls in the IT room. There is no intumescent fire proofing needed.

ST. JOSEPH ROSECRANS MEMORIAL AIRPORT RENOVATIONS PHASE 1
MODOT Project No. 22-012A-1
Pre-Bid Conference
January 5th, 2023, 2:00 P.M.
Call in +1 937-240-2430 PIN: 371188449#

SCHEDULE I a - Terminal Building: Solely the Terminal Building, Including the Foundation, Stairs and Ramps

SCHEDULE I b - All Kitchen, Restaurant, and Bar Equipment. Including all Restaurant Booths / Casework and Restaurant Floor Finishes

SCHEDULE I c - Terminal Access Road and Parking Lot. Including aggregate base, pavement and pavement markings

SCHEDULE II a - Relocate all utilities and site work; including grading and drainage infrastructure

SCHEDULE II b - Relocate electrical vault

1. RECORDING OF ATTENDEES

A. Recording of attendees, firm represented, email, address and phone number.
B. Attendance and Meeting Minutes will be sent by addendum to all plan holders.

2. INTRODUCTIONS & PROJECT DESCRIPTION

A. Airport Representatives
   1. Julius Rice, Airport Manager
   2. Chris Cordonnier, Airport Operations Manager
   3. Abe Forney, Public Works Director
   4. Chance Gallengher , Deputy Director of Transportation

B. MoDOT Representatives
   5. Andrew Hanks, Aviation Programs Manager

C. Airport Engineering / Architect – Jviation, A Woolpert Company;
   1. Joe Pestka, Program Director
   2. Adam Acree, Team Lead
   3. Kevin Costello, Architectural Project Manager
   4. Kevin Scherr, Engineering Project Manager
   5. Joel Wiechmann, P.E., Electrical Engineer

D. Project Overview –
   a. **Schedule I: New Terminal Building, Kitchen, Restaurant, Bar Equipment, Access Road and Parking Lot**
      i. A portion of the work is Federally Funded
      ii. The existing administrative building and ATCT will be used and occupied throughout the project. Entry and parking in front of the building must be left accessible throughout the life of the project.
      iii. No movable furniture is included in the contract

iv. All Restaurant Booths as well as Bar and Restaurant Floor Finishes are included in Schedule 1b
v. All Restaurant, Bar, and Kitchen equipment (new and taken from the existing building) are included in Schedule 1b.
vi. All Rough-Ins for Restaurant, Bar, and Kitchen Equipment are included in Schedule 1a

b. Schedule II: All Site and Utility Work, Relocating the Electrical Vault

i. A portion of the work is Federally Funded
ii. The 1st step in phasing must be installing the replacement AHU's for the existing building to replace the existing building's AHU's per the phasing plan.
iii. The existing Power Building will be used throughout the life of the Project. Runway Lighting Power, Lighting Controls, and Glideslope power will only be switched over as the final step in construction.
iv. Utility Routes (conduit underneath runway)
v. Utility terminations for Phase II
vi. Contractor accessibility and security access
vii. FOD Control
viii. Site Work / Drainage
ix. Working near and around an active AOA
x. Haul Routes, roadwork, and contractor accessibility
xi. Silt Fences and Barricades

3. BID OPENING DATE & TIME

A. Date: **Due by Jan 20th, 2023 at 1:00 P.M.**
B. Mailed to: City of St. Joseph at Purchasing Room 201, 1100 Frederick Ave, St. Joseph, MO 64503
C. Opened at: City of St. Joseph at Purchasing Room 201
D. Bid security: 5% of bid amount.
E. Bid proposal: Complete and Bid Proposal Summary including Schedule I and II Total.
F. Award: The bid will be based on the total base bid for all awarded schedules and or sub schedules based on the availability of funding.

4. DBE GOALS

A. 4.00% of the contract amount.

5. QUALIFICATION OF BIDDERS

A. Qualifications shall be furnished per Section 20-02. Each bidder shall furnish the Owner satisfactory evidence of his or her competency and financial responsibility to perform the proposed work.

6. CRITICAL CONTRACT DATES

A. Notice of Award: Late January 2023 to Mid-April 2023
B. Notice to Proceed: To be determined with contractor based on what is awarded and lead times for material.
C. Project Time: 300 **Working** Days for Construction completion.

7. BONDING

A. Payment Bond: 100% of Bid Amount.
B. Performance Bond: 100% of Bid Amount

8. ARCHITECT/ENGINEER'S/ RPR's FIELD OFFICE

~~A. Required. Per section 60-05 of the Contract Documents~~

9. LIQUIDATED DAMAGES

A. As compensation per the Contract Document, the Contractor shall be assessed a liquidated damage of $750 per calendar day for each day that the work remains uncompleted beyond the contract period.

10. ADDENDUM UPDATE

A. Addendum # 1 was provided on January 3rd.
B. Addendum # 2 will follow. It will include all of the meeting minutes along with questions and answers, and answers not given at the meeting.

11. MISCELLANEOUS

A. Construction and building materials sold to the contractors and subcontractors for use on public works owned by City of St. Joseph, are exempt from State Sales and Use Taxes. However, such materials will be subject to any Sales and Use Taxes imposed by local cities and counties.
B. Quality Acceptance Testing and required Special Inspections shall be performed by an independent testing agency employed by the Engineer.

12. QUESTIONS

A. Questions will be taken via email until COB on **Monday January 16, 2023.**

13. PROJECT SITE TOUR

14. Meeting Minutes:

- CALL IN ATTENDEES:
  Andrew Hanks – MoDOT
  Kevin Costello – Jviation
  Adam Acree – Jviation
- It was stated the main difference in this rebid was the breaking out of Schedules I & II because there is grant money associated to all the utility work.
- The goal is still to award the entire project
- Schedule II includes all utilities including grading as well as the Vault itself
- It was stated it is hopeful that vault work can be coordinated with the runway project that is planned to be starting in the spring, currently planned to begin March 20th. If so, it would be much easier to work around a closed runway.
- The bid opening is now Jan 20th which is the latest possible date for funding purposes
- The question was asked if there will be one contract or will the project be awarded separately and there will be separate contracts. The answer given was Schedule IIA will be awarded. Schedule I was broken out so if funding was not available for all certain parts may be excluded.
- When reviewing the agenda it was noted there will not be a need to provide a field office for the Architect / Engineer's / RPR Office. That will also be communicated in the following addendum.
- It was stated that Federal Funding Depends on the DBE Goal being met. Due to the schedule of the project, the DBE Good Faith Effort Letter will not have enough time to be reviewed and approved to award the project.
- It was asked if certain parts of the sub-schedules that the DBE Work was put into are not awarded, will that impact the project award? It was answered that DBE sub work should certainly be included in both schedule IA and IIA. Optimally, DBE work needs to be included in all Schedules and Sub-Schedules.
- It was noted Jviation is trying to work with contractors to ease concern and reduce liquidated damages.

JVIATION
A WOOLPERT COMPANY

Pre-Bid Meeting Sign In

Meeting Date / Location: Thursday January 5, 2023 / Rosecrans Memorial Airport Terminal Building

Time: 2:00 P.M.

Project Name: Construct New Terminal Building and Electrical Vault

Project #: MODOT Project No. 22-012A-01

Name	Company	Telephone No.	E-mail
Kevin Scherr	Jviation	720-628-3530	Kevin.Scherr@Woolpert.com
Joe Cobb	Brooner	816-232-5418	jcobb@broonerconstruction.com
Shawn Smith	Brooner	816-752-4037	ssmith@broonerconstruction.com
Wade Harms	E.L. Crawford	816 233-2596	wade@elcrawford.com
Bryan Wiedmer	Lee Grover Const.	(816) 279-7919	bryanw_lgce@sbcglobal.net
Eric Uehlin	Leh Construction	816-232-4431	eric@lehconstruction.com
Nick Nigh	Hoerner Const.	816 261 5348	nick@hoernerconstruction.com
Richard Sadler	AL J Mueller	816-233-6058	RSADLER@ALJMUELLER.COM

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 PLANT INSPECTION. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.

b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications

60-05 ENGINEER/RESIDENT PROJECT REPRESENTATIVE (RPR) FIELD OFFICE. The Contractor is <u>not</u> required to provide a dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project.

ITEM L-130 AIRFIELD LIGHTING CONTROL AND MONITORING SYSTEM

INTRODUCTION

130-1.1 QUALIFICATIONS.

a. The ALCMS manufacturer shall be listed in the FAA Approved Equipment List, AC 150/5345-53 (current edition) as a FAA approved supplier of L-890 Airfield Lighting Computer and Monitoring Systems in accordance with AC 150/5345-56 (current edition).

130-1.2 PROJECT SCOPE.

a. The ALCMS Manufacturer shall furnish and commission a complete and functional computerized distributed control and monitoring airfield lighting system based on an industry standard Ethernet network.

b. This project shall include software, programming, computers, manuals, on-site commissioning, on-site testing, on-site training and any other materials, tools and equipment to provide a fully functional system to the satisfaction of the owner.

130-1.3 PROJECT COORDINATION.

a. The ALCMS Manufacturer shall provide an experienced and qualified Engineering, Sales and Service staff to support the contractor and airport throughout the installation and life of the system.

b. The project shall follow this basic cycle of events:

	MILESTONE	DESCRIPTION
1.	Submittal	The ALCMS Manufacturer shall submit ALCMS specifications to the contractor.
2.	Submittal Review and Approval	Submittal is reviewed by the contractor, airport, and engineer(s).
3.	Production Release	The ALCMS Manufacturer shall release approved system to manufacturing.
4.	Software Demo 35% Software Completion	The ALCMS Manufacturer shall send to the contractor, airport, and engineers a demo of the planned layout of the touchscreen that will be used for the control of the ALCMS system.
5.	Production	System is manufactured.
6.	Production Testing	System is tested by the ALCMS Manufacturer.
7.	Factory Acceptance Testing	System is available for Factory Acceptance Testing (FAT) witnessed by airport/owner.
8.	Shipment of system	Approved system is shipped to installation site.

	MILESTONE	DESCRIPTION
9.	Installation	Contractor installs equipment and completes external wiring.
10.	Commissioning	The ALCMS Manufacturer shall arrive at installation site to complete commissioning of system and verify contractor installation and wiring.
11.	System Readiness Check	The ALCMS Manufacturer shall perform a system readiness check to verify proper operation of all equipment prior to cut over.
12.	System Cut-over	The ALCMS Manufacturer and Contractor shall cut over the new system and bring it on-line and operational.
13.	System Acceptance Testing	System is available for System Acceptance Testing (SAT) which shall be witnessed the by airport/owner and/or engineer.
14.	Manuals / As-Built drawings	The ALCMS Manufacturer shall issue operator manuals, maintenance manuals and ATC manuals and final as-built drawings.
15.	On-Site Training	The ALCMS Manufacturer shall complete on-site training of maintenance, Operations, and ATC personnel.
16.	Final Owner Acceptance	Upon completion of all contractual requirements, system is accepted in writing by the airport/owner.
17.	Warranty and Support	The ALCMS Manufacturer shall provide warranty and support per the contractual requirements.

130-1.4 FACTORY ACCEPTANCE TEST (FAT).

a. Before shipment, the ALCMS system shall be assembled as an operating system at the ALCMS Manufacturer's test facilities.

b. At a minimum, the FAT shall allow for one (1) day of testing and review, but may require additional time depending on the results of the testing.

c. During the FAT, minor software comments shall be finalized and incorporated into the final system.

130-1.5 CONTRACTOR INSTALLATION REQUIREMENTS

a. The contractor shall be responsible for the physical installation of all associated ALCMS components. At a minimum, this includes the Constant Current Regulators (CCRs), computer cabinets, Touchscreen control stations and Distributed Control and Monitoring Equipment (DCME).

b. The Contractor shall furnish, install, relocate, connect and test all equipment, equipment accessories, conduit cables, wires, buses, grounds and support necessary to insure a complete and operable electrical distribution facility for the airport lighting system as specified in the submittal package.

c. The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction.

130-1.5.1 WIRE AND CONNECTIONS

a. The Contractor shall make all necessary electrical connections at each location in accordance with the ALCMS manufacturer's wiring diagrams.

b. All wires called out in the drawings associated with equipment that is to be controlled or monitored should be pulled, terminated and dressed at the appropriate terminal blocks and at the associated equipment.

c. The Contractor shall leave sufficient extra wire length on each control/monitoring lead to make future changes in connections at the terminal block.

130-1.5.2 MARKING AND LABELING

a. All equipment, control wires, terminal blocks, etc., shall be tagged, marked or labeled as specified below:

1. Wire Identification: The Contractor shall furnish and install labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks.

2. Wire labels, if used, shall be of the self-sticking, pre-printed type and of the manufacturer's recommended size for the wire involved. Identification markings designated in the plans shall be followed.

3. Tags, if used, shall be nonferrous metal or plastic. Each tag shall be securely tied to the proper wire by a nonmetallic cord or plastic wire tie.

130-1.5.3 INSTALLATION OF DATA CABLES

a. The Contractor shall install, terminate and test all data cables required for the project. This includes all of the following components: Data cables, terminal cabinets and jumper cables.

b. All associated data cables shall be tested upon completion of the cable installation and termination of connectors.

c. Tests shall include verification of point-point continuity of each wire.

d. All test data shall be recorded and included in a test report that shall be submitted to the engineer for approval.

e. Commissioning of the system shall not begin until all test reports are submitted and approved, and a copy provided to ALCMS Manufacturer.

130-1.5.4 CONTRACTOR HARD WIRE DATA CABLE INSTALLATION

a. The Contractor shall install, terminate and test all hard-wire communications required for the project. This includes all of the following components:

1. ALCMS manufacturer specified data cable
2. Data cable termination panels
3. Data cable jumper cables

4. Connectors / couplings
5. Junction boxes

b. All associated cabling, splices and jumper cable shall be tested upon completion of the cable installation and termination of connectors.

c. Tests shall include verification that the signal strength loss is within acceptable limits versus the distance of the cable pull.

d. All test data shall be recorded and included in a test report that shall be submitted to the engineer for approval.

e. Commissioning of the system shall not begin until all test reports have been submitted and approved.

130-1.6 ALCMS MANUFACTURER COMMISSIONING

a. The ALCMS Manufacturer shall perform the following installation and commissioning tasks:

1. Verify Contractor connections including power, control and monitoring.
2. Verify proper labeling of equipment.
3. Verify communication connections.
4. Perform system testing including control, monitoring and diagnostics.
5. Training on ALCMS related equipment.
6. Perform System Acceptance Testing (SAT).

130-1.7 SYSTEM ACCEPTANCE TEST (SAT)

a. Following the final installation and commissioning of the system, the ALCMS Manufacturer shall perform a demonstration of the system performance. This demonstration shall include the following:

1. Lighting control functions
2. Monitoring functions
3. Alarm functions
4. Print and Display functions

b. The ALCMS Manufacturer shall develop a SAT test plan in accordance with the specifications and issue this to the contractor for approval from the airport engineer.

c. The SAT shall be witnessed by owner representatives, the contractor and the engineer.

130-1.8 MANUALS

130-1.8.1 MAINTENANCE MANUALS

a. The ALCMS Manufacturer shall provide four (4) hard copies of the operation and maintenance manuals that are hard-covered and suitable for daily operation and maintenance of the system. The manuals shall include the following information:

1. Operational overview and system description
2. Graphical User Interface (GUI) Screen operation
3. System Block Diagram

4. Detailed external wiring diagrams (Electrical Contractor wiring)
5. Detailed input/output terminal diagrams
6. Detailed assembly drawings and wiring diagrams
7. Original Equipment Manufacturer (OEM) Manuals

b. The manuals shall be spiral bound or supplied in 3-ring binders. The cover of each binder shall be labeled with all project-related information.

130-1.8.2 FAA AIR TRAFFIC CONTROL MANUALS

a. The ALCMS Manufacturer shall provide four (4) hard copies of the operation manuals for Air Traffic Controller (ATC) use. The manuals shall be hard-covered and suitable for daily operation of the system. At a minimum, the manuals shall include the following information:

1. Touchscreen operation (graphical user interface)
2. Touchscreen maintenance (i.e. calibration)

b. The manuals shall be spiral bound or supplied in 3-ring binders. The cover of each binder shall be labeled with all project-related information.

130-1.9 AS-INSTALLED DRAWINGS

a. The ALCMS Manufacturer shall provide six (6) hard copies of As-Installed drawings after system acceptance. The As-Installed drawings shall include the following information:

1. System Block Diagram (1-line drawings)
2. System External Wiring Diagrams
3. Assembly Drawings
4. Assembly Wiring Diagrams

b. The As-Installed drawings shall be 11” X 17” in size and shall be spiral bound or supplied in 3-ring binders. The cover of each binder shall be labeled with all project-related information.

130-1.10 ON-SITE TRAINING

a. The ALCMS Manufacturer shall provide to the contractor a final training course syllabus and training schedule thirty (30) days before on-site training.

b. All training sessions shall be held in a facility provided by the airport. This facility should have tables, chairs, projection screen and sufficient space to lay out manuals and drawings. The ALCMS Manufacturer shall provide all required visual aids and projectors.

130-1.10.1 FAA TRAINING

a. The ALCMS Manufacturer shall provide two (2), 1 hour User Training Class for Air Traffic Control (ATC) personnel. ATC Training Coordinator should be present for both classes. This training shall include discussion and review of the following:

1. ALCMS General System Overview
2. Touchscreen Operations
3. Using the Control System (GUI)

4. Command and Control Sequences
5. Alarm and Warning Messages
6. Failsafe Conditions
7. Granting Local Control to the Vaults

b. Training classes for FAA ATC personnel should be limited to a maximum of 4-6 people per class.

130-1.10.2 MAINTENANCE TRAINING

a. The ALCMS Manufacturer shall provide one (1), 8 hour (one day) training class for maintenance personnel. This training shall include discussion and review of the following:

1. System Block Diagram
2. System Assemblies and Wiring Diagrams
3. Touchscreen Operation
4. Graphical User Interface (GUI) Screens
5. Maintenance and Troubleshooting
6. Granting Local Control to the Vaults
7. Power Up and Power Down Sequences
8. Failsafe Operations
9. Implementing Airfield Lighting Changes
10. Maintenance Report Generation

b. Training classes for maintenance personnel should be limited to a maximum of 4-6 people per class.

130-1.11 OWNER SYSTEM ACCEPTANCE AND WARRANTY START DATE

a. Upon successful completion of the SAT and on-site training the owner shall issue the ALCMS Manufacturer a written notice of system acceptance within five (5) working days.

b. The date the final acceptance letter is received or five (5) days following successful completion of the SAT (whichever occurs first) represents the start of the warranty period. Please refer to the Warranty section for more information regarding the ALCMS warranty guarantee.

130-1.12 SYSTEM WARRANTY

a. All equipment shall be warranted against defects in workmanship, hardware and software for a period of one (1) year from final acceptance of the system.

b. During this time period the ALCMS manufacturer shall provide all parts, labor and technical support with the following conditions:

1. The manufacturer shall correct by repair or replacement, at its option, equipment or parts which fail because of mechanical, electrical or physical defects, provided that the goods have been properly handled and stored prior to installation, properly installed and properly operated after installation, provided further that Buyer gives manufacturer written notice of such defects after delivery of the goods to Buyer.

2. The manufacturer may examine any goods upon which a claim is made in the same condition as when defect therein is discovered, and may require the return of the goods to establish any claim.

3. The manufacturer's liability under no circumstances shall exceed the contract price of goods claimed to be defective.

130-1.13 SYSTEM SERVICE AND SUPPORT

a. The ALCMS Manufacturer shall provide technical assistance and support during the warranty period.

b. The ALCMS Manufacturer shall provide a 7 day a week / 24 hours a day support phone line.

c. The ALCMS Manufacturer shall provide technical phone support within four (4) hours of the initial call.

d. The ALCMS Manufacturer shall provide free phone consultation and technical support as required during the warranty period and if necessary shall be on-site within 48 hours.

e. At the request of the airport/owner, the ALCMS Manufacturer shall provide information about preventative maintenance programs and extended warranty packages.

130-1.14 SPARE PARTS

a. A recommended spare parts list shall be included with the Submittal including part numbers and pricing. These prices shall be valid for (12) months from date of system acceptance.

EQUIPMENT AND MATERIALS

130-2.1 GENERAL

a. The ALCMS system may be based on PLC architecture or be a PC-based system. The ALCMS system shall meet the requirement of AC 150/5345-56B. The ALCMS shall include Type A monitoring (control only) and have a Type A failsafe system (preset).

b. An Ethernet or other approved communication network shall be used for data transfer between the electrical vault, control tower and any other designated work station location.

c. At a minimum the system shall have the following major components:

1. Touchscreen control stations located in control tower cab and in vault building.
2. Equipment enclosures containing PLC modules, relays, PC components, power supplies, and any other required equipment. Enclosures shall be located in vault building and in tower equipment room.

d. The system shall monitor the operation of the various lighting systems per AC 150/5345-10 (current edition) requirements.

e. The ALCMS system shall contain all hardware and software necessary to control the following constant current regulators, airfield lighting, and NAVAIDS:

Control Type	Item
L-828 Constant Current Regulator – 5 Step	CCR 1 – Rwy 17-35 Edge
L-828 Constant Current Regulator – 3 Step	CCR 2 – Taxiway A Edge CCR 3 – Rwy 13-31 Edge CCR 4 – Spare CCR 5-6 – Reserved for Future
Contactor – On/Off Control	Beacon Wind Cone PAPI 13 PAPI 31 Spare

130-2.2 UNINTERRUPTABLE POWER SUPPLY

a. Provide uninterruptable power supplies for all components of the ALCMS system, including touch screen control stations, communications equipment, all PC or PLC components, and other miscellaneous components.
b. Uninterruptable power supplies shall provide power to keep all components of the ALCMS system operational for a minimum of 10 minutes in the event of a power failure.

130-2.3 COMMUNICATION NETWORK

a. The tower and electrical vault computers shall communicate with each other via a wired Ethernet network.

1. A wired Ethernet network (or other network protocol approved by the ALCMS manufacturer) shall be used to communicate between the electrical vault and air traffic control tower. A redundant link with automatic switchover in the event of a failure of the primary link shall be provided.

130-2.3.1 WIRED ETHERNET NETWORK

a. A wired network shall be provided between the air traffic control tower and the electrical vault.

b. Copper network cables shall be unshielded twisted pair meeting CAT 5e or CAT 6 requirements. Other communications protocols and cables types are acceptable provided they meet the requirements of the ALCMS manufacturer.

c. Where distance between facilities exceeds the maximum allowable distance for copper unshielded twisted pair ethernet cables (100 meters), fiber optic cables shall be used.
    a. Fiber optic cables shall be single-mode, loose tube, gel filled, double jacket, non-armored type with a minimum of 24 optical fiber strands.
    b. Provide fiber optic media converters as required by ALCMS manufacturer.

d. Network cables installed in underground conduits shall be rated for direct burial and shall be of a type approved by the ALCMS manufacturer.

e. Upon completion of network cable installation, the contractor shall provide the engineer with a test report stating that the cables meet the requirements of the ALCMS manufacturer.

130-2.4 PRESET FAILSAFE

a. Upon a failsafe condition, all ALCMS controlled devices must switch to a pre-defined state.

b. The pre-defined failsafe state shall be per the table below:

Circuit	Failsafe Step
CCR 1 – Rwy 17-35 Edge	3
CCR 2 – Taxiway A Edge CCR 3 – Rwy 13-31 Edge	2
CCR 4 – Spare	OFF
Beacon Wind Cone PAPI 13 PAPI 31	ON

GRAPHICAL USER INTERFACE OPERATION

130-3.1 GENERAL

a. The Tower Touchscreen display shall control and monitor the airfield lighting system. The display shall show real-time information on the operational status of the airfield lighting systems.

b. The Touchscreen control stations shall consist of multiple Touchscreen 'pages' each with a specific function. These Touchscreen 'pages' are defined as follows:

1. Preset: Consists of pre-defined preset buttons used to simplify airfield lighting control commands.
2. Runway Lights: Consists of runway control touch buttons used to individually control runway circuits. Multiple runway pages may be necessary for airports with several runways.
3. Taxiway Lights: Consists of taxiway control touch buttons used to individually control taxiway circuits if required.
4. Utilities: Consists of miscellaneous functions for calibrating the Touchscreen, granting lighting control to other locations, setting the date and time, etc.

c. All preset and control configurations shall be defined by the airport/owner in conjunction with Air Traffic Control requirements.

d. The ALCMS manufacturer shall provide preset tables to be used by the airport/owner to define the configuration settings.

130-3.2 OVERVIEW OF OPERATION

a. Airfield lighting control commands are entered into the system by touching the corresponding touch button on the Touchscreen video display. When a command is entered, the Touchscreen shall respond by graphically displaying the button as being depressed and change the button color.

b. The associated circuit graphics shall alternately flash indicating the airfield lighting section that shall be affected when this command is "confirmed".

c. Once confirmed, the Tower Touchscreen shall register the command, generate a data instruction and transmit the command to the vault computer for implementation. The command is also simultaneously transmitted to the maintenance computer and all other computers connected to the network.

d. The tower Touchscreen shall receive confirmation from the vault that the corresponding equipment has responded to the control command and displays the current system status on the Touchscreen display.

e. In the event that communications is lost between the tower and vault, an alarm is indicated at each computer location.

f. In the event of a predefined alarm condition, the effected airfield lighting circuit graphic shall flash red and an audible alarm tone shall alert operators to the alarm condition.

130-3.3 ALCMS ALARM FUNCTIONS

130-3.3.1 TOUCHSCREEN AUDIBLE ALARM

a. The audible alarm shall sound at each Touchscreen display when an alarm condition occurs. In addition, the 'ALARM ACK' button shall flash and the associated airfield circuit graphics shall change to red.

b. The audible alarm shall stop automatically after three (3) seconds unless the 'ALARM ACK' button is pressed.

c. If the alarm is not acknowledged, the audible shall cease for sixty (60) seconds while the 'ALARM ACK' continues to flash. If the 'ALARM ACK' is still not pressed after the sixty (60) seconds, the audible shall sound again for three (3) seconds.

d. This sequence shall repeat indefinitely until the alarm is acknowledged.

130-3.4 TOUCHSCREEN PRESET SEQUENCES

a. The Touchscreen control station shall allow simultaneous airfield lighting circuit changes to be accomplished using preset lighting sequences.

b. The preset lighting sequences shall be defined by the airport in airfield lighting preset tables.

c. Each preset lighting change shall be based on the following operator inputs:

1. Active Runway Selection: Operator selects the runway(s) that shall be active. This is based on runway direction (i.e. "RWY 9")
2. Day/Night Setting: Operator selects the day/night setting. The day/night setting shall control the intensity of the circuits.
3. Visibility: Operator selects a single visibility setting that is based upon the current airport visibility.
4. Confirm/Reject: Operator selects the 'CONFIRM' button to accept the preset selections and initiate the lighting change. Operator selects the 'REJECT' button to cancel the selections and make another preset selection.

d. Upon confirmation of the preset selections, the intensity of all the circuits associated with the preset condition shall automatically change to match the visibility requirement.

e. The preset visibility setting of the CCRs is based on FAA document 7110.65X. Presets shall also be coordinated with the airport and the FAA to properly define airfield lighting operational usage.

f. The visibility settings shall include Intensity and Preset Invalid monitoring. This indicates when a preset or intensity setting on the airfield is different than the selected preset intensity.

g. According to FAA document 7110.65X, the visibility settings for the 5-step CCRs shall be based on the following table:

Visibility	Day (Brightness step)	Night (Brightness step)
Less than 1 mile	5	4
1 to but not including 2 miles	4	3
2 to but not including 3 miles	3	3
3 to 5 miles inclusive	0	2
More than 5 miles	0	1

5-step Regulators

h. According to FAA document 7110.65X, the visibility settings for the 3-step CCRs shall be based on the following table:

Visibility	Day (Brightness step)	Night (Brightness step)
Less than 1 mile	3	2
1 to but not including 2 miles	0	1
2 to but not including 3 miles	0	1
3 to 5 miles inclusive	0	1
More than 5 miles	0	1

3-step Regulators

i. According to FAA document 7110.65X, the visibility settings for the 1-step CCRs shall be based on the following table:

Visibility	Day (Brightness step)	Night (Brightness step)
Less than 1 mile	1	1
1 to but not including 2 miles	0	1
2 to but not including 3 miles	0	1
3 to 5 miles inclusive	0	1
More than 5 miles	0	1

1-step Regulators

j. According to FAA document 7110.65X, the visibility settings for the Rotating Beacon shall be based on the following table:

Visibility	Day (Brightness step)	Night (Brightness step)
Less than 1 mile	ON	ON
1 to but not including 2 miles	ON	ON
2 to but not including 3 miles	ON	ON
3 to 5 miles inclusive	OFF	ON
More than 5 miles	OFF	ON

Beacon

130-3.5 GRAPHICAL AIRPORT PICTORIAL

a. The ALCMS display screens shall display a graphical pictorial representation of the airport runways, taxiways and other requested airport features.

b. When there is a change in lighting system status, the appropriate graphical detail shall indicate the status by changing color.

130-3.6 VAULT EMERGENCY GENERATOR CONTROL

a. The ALCMS shall provide control of the emergency diesel generator located next to the airfield lighting vault from all of the control stations.

b. The ALCMS shall provide one (1) dry-contact output point at the Vault.

c. The ALCMS shall close the output to command the generator ON and open the output to turn the generator OFF.

d. Locating and wiring of the output points within the Generator equipment shall be completed by the Contractor in coordination with the airport/engineer and equipment manufacturer (if required).

130-3.7 VAULT AUTOMATIC TRANSFER SWITH (ATS) AND GENERATOR MONITORING

a. The ALCMS system shall provide the digital inputs to monitor the following feedback points:

1. Utility Available
2. Utility On-line
3. Generator Available
4. Generator On-line
5. Generator Alarm

b. Locating and wiring of the monitoring points within the ATS and generator equipment shall be completed by the contractor in coordination with the airport/engineer and equipment manufacturer.

130-3.8 BEACON CONTROL

a. The ALCMS shall provide control of the rotating beacon from the Tower ALCMS node.

b. The ALCMS shall provide one (1) dry-contact output point at the Vault. The contact shall be rated 1A at 120Vac (min.).

c. The ALCMS shall close the output to command the beacon ON and open the output to turn the beacon OFF. The contractor shall provide an interface relay/contactor to connect power to the beacon.

d. The contractor shall install a photoelectric cell on the Vault roof. The ALCMS shall be configured to allow automatic (photoelectric cell) control or manual control of the rotating beacon. The ALCMS system shall be equipped with an input node for the photoelectric cell.

130-3.9 NAVIGATIONAL AID CONTROL

a. The ALCMS shall provide control of the rotating beacon, Runways 13 and 31 PAPIs, and primary wind cone from all of the control stations.

b. The ALCMS shall provide one (1), dry-contact output point(s) at the Vault for each NAVAID.

c. The ALCMS shall close the output to command the device ON and open the output to turn the device OFF.

130-3.10 RADIO CONTROL ENABLED CONTROL METHODOLOGY

a. The ALCMS shall provide an interface to the L-854 radio control equipment.

b. One (1) button labeled "Radio Control" will be programmed to allow air-to-ground radio control after normal Tower operating hours.

c. When the radio control button is pressed, all preset settings are changed for radio operations according to the preset control methodology.

d. Radio Control preset lighting settings shall be specified by the airport.

130-3.10.1 RADIO CONTROL INTERFACE

1. The ALCMS system shall provide six (6) inputs for radio control commands. Radio control inputs shall be connected to the control system at the vault. Both the civilian and military L-854 radio controllers shall be connected to the ALCMS.

2. The ALCMS shall monitor the inputs and adjust the airfield lighting according to the Radio Control preset table.

3. The ALCMS shall only monitor for the radio control inputs when the "Radio Control" button is enabled at the Tower.

4. Locating and wiring of Radio Control output points shall be completed by the contractor in coordination with the airport/engineer and equipment manufacturer (if required).

130-3.10.2 RADIO CONTROL OPERATIONS

1. The ALCMS system shall interface to the radio controllers and control the airfield lighting according to the preset control table below.

Touchscreen Button Name	Circuit(s) to Control	Default Step	Low (3 click)	Medium (3 click)	High (3 click)
Radio Control Enabled	CCR 1 – Rwy 17-35 Edge	1	1	3	5
	CCR 2 – Taxiway A Edge	1	1	2	3
	CCR 3 – Rwy 13-31 Edge	OFF	1	2	3

	CCR 4 – Spare	OFF	OFF	OFF	OFF
	Beacon	AUTO	AUTO	AUTO	AUTO
	PAPI 13 PAPI 31 Wind Cone	OFF	ON	ON	ON

SECTION 04 20 00 - UNIT MASONRY

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. Building (common) brick.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Ties and anchors.
6. Embedded flashing.
7. Miscellaneous masonry accessories.
8. Masonry-cell fill.

B. Products Installed but not Furnished under This Section:
1. Steel lintels in unit masonry.
2. Steel shelf angles for supporting unit masonry.
3. Cavity wall insulation.

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Selection:

1. Concrete face brick, in the form of small-scale units.
2. Face brick
3. Colored mortar.
4. Weep holes/cavity vents.

1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C67.

2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for brick to match existing Admin. brick
2. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
3. Clean exposed faces of panels with masonry cleaner indicated.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

6. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
7. Clean exposed faces of mockups with masonry cleaner as indicated.
8. Protect accepted mockups from the elements with weather-resistant membrane.
9. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

10. 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. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide [structural] unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.

3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
5. Contractor to provide color to match other adjacent brick to project site.

B. Building Common Jumbo Brick: ASTM C62,

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2100 psi (14.48 MPa)
2. Size: Match size of existing jumbo face brick.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

E. Mortar Cement: ASTM C1329/C1329M.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

G. Colored Cement Products: Packaged blend made from portland cement and hydrated lime] or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.

H. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Aggregate for Grout: ASTM C404.

J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

K. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

L. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: See structural drawings for reinforcement requirements.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.7 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Stainless Steel Wire: ASTM A580/A580M, Type 30.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

   1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick.
   2. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
   3. Fabricate through-wall flashing with drip edge indicated. Fabricate by extending flashing 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees.
   4. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
   5. Solder metal items at corners.

B. Flexible Flashing: Use[one of] the following unless otherwise indicated:

   1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
   2. Where flashing is indicated to receive counterflashing, use metal flashing.
   3. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.

4. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge with a sealant stop or flexible flashing with a metal drip edge or elastomeric thermoplastic flashing with a drip edge or flexible flashing with a metal sealant stop].

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

1. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
2. Solder for Copper: ASTM B32, Grade Sn50 with maximum lead content of 0.2 percent.

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

E. Termination Bars for Flexible Flashing: Aluminum Stainless steel bars 1/8 inch by 1 inch (3 mm by 25 mm).

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from[neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vent Products: Use[one of] the following unless otherwise indicated:
1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches (9 by 38 by 89 mm) long.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Configuration: Provide one of the following:

a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail-shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.

2.10 MASONRY-CELL FILL

A. Foam Insulation: Open cell

B. Lightweight-Aggregate Fill: ASTM C331/C331M.

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.12 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

B. Mortar for Unit Masonry: Comply with ASTM C270, Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type N.
3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For interior nonload-bearing partitions, Type O may be used instead of Type N.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch total.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in [running bond] [stack bond] [one-third running bond] [Flemish bond] [English bond] [bond pattern indicated on Drawings]; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive

mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay brick as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units and brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Lay structural clay tile as follows:

1. Lay vertical-cell units with full head joints unless otherwise indicated. Provide bed joints with full mortar coverage on face shells and webs.
2. Lay horizontal-cell units with full bed joints unless otherwise indicated. Keep drainage channels, if any, free of mortar. Form head joints with sufficient mortar so excess will be squeezed out as units are placed in position. Butter both sides of units to be placed, or butter one side of unit already in place and one side of unit to be placed.
3. Maintain joint thicknesses indicated except for minor variations required to maintain bond alignment. If not indicated, lay walls with 1/4- to 3/8-inch- (6- to 10-mm-) thick joints.

D. Set firebox brick in full bed of refractory mortar with full head joints. Form joints by buttering both surfaces of adjoining brick and sliding it into place. Make joints just wide enough to accommodate variations in size of brick, approximately 1/8 inch (3 mm). Tool joints smooth on surfaces exposed to fire or smoke.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Bond wythes of composite masonry together using bonding system indicated on Drawings.

H. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

I. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

3.6 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached and seismic anchors through sheathing to wall framing [and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed connector sections and continuous wire in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

5. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.7 MASONRY-JOINT REINFORCEMENT

A. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

B. Provide continuity at wall intersections by using prefabricated T-shaped units.

C. Provide continuity at corners by using prefabricated L-shaped units.

D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches (100 mm) in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch (10 mm. Revise subparagraph below to suit Project. Show locations of joints on Drawings.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer].
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches (100 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (50 mm) on interior face.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with

elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

5. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

E. Place cavity drainage material in cavities airspace behind veneer] to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.
1. Handbook."

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 04 43 13.16 - ADHERED MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Masonry adhered to cold-formed metal framing and sheathing.
2. Masonry adhered to unit masonry or concrete backup.

1.2 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples:

1. For masonry type indicated.
2. For color of mortar required.

1.3 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 Adhered Masonry Veneer – Contractor to provide color to match other adjacent brick on project site.

A. Material Standards

1. Maximum Absorption according to ASTM C97/C97M: 7.5
2. Minimum Compressive Strength according to ASTM C170/C170M: 4000 psi (28 MPa)

B. Basis of Design: General Shale – Type/Color: Ember 2 1/4H x 1/2W x 7 5/8L.

1. https://generalshale.com/products/ember/

2.2 MORTAR MATERIALS

A. Per manufacturer's recommendations.

B. Portland Cement or approved equal: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C114.

C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in stone masonry mortar.

1. Per stone manufacturer's recommendations. Color to be selected by architect to match existing site.

D. Aggregate: ASTM C144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
3. Per stone manufacturer's recommendations.

E. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

1. Per manufacturer's recommendations. Color to be selected by architect.

F. Water: Potable.

2.3 MISCELLANEOUS MASONRY ACCESSORIES

A. Expanded Metal Lath: 3.4 lb/sq. yd. (1.8 kg/sq. m), self-furring, diamond-mesh lath complying with ASTM C847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G60 (Z180).

B. Welded-Wire Lath: ASTM C933, fabricated into 2-by-2-inch (50-by-50-mm) mesh with minimum 0.0625-inch- (1.6-mm-) diameter, galvanized-steel wire.

2.4 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

1. Per manufacturer’s recommendations.

2.5 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Per manufacturer’s recommendations.
4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Masonry: Comply with ASTM C270, Proportion Specification.
1. Mortar: Type N

C. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

D. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.

1. For latex-modified portland cement, setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.

E. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.

F. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

G. Pigmented Mortar: Use colored cement product to match existing mortar at airport.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.

PART 3 - EXECUTION

3.1 SETTING MASONRY

A. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealant joints are specified in Section 079200 "Joint Sealants."

3.2 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (13 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more. Match style at existing airport stone wall.

B. Variation from Level: For bed joints and lines of exposed lintels, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more. Match style at existing airport stone wall.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (13 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more. Stone style to match existing airport stone wall

3.3 INSTALLATION OF ADHERED MASONRY VENEER

A. Install lath by fastening through sheathing into framing to comply with ASTM C1063.

B. Install lath and fasten over unit masonry and concrete to comply with ASTM C1063.

C. Install scratch coat over metal lath 3/8 inch (10 mm) thick to comply with ASTM C926.

D. Rake out joints for pointing with mortar to depth of not less than 3/4 inch (19 mm) before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.4 POINTING

A. Prepare joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch (10 mm) deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch (10 mm) deep. Compact each layer thoroughly, and allow to it become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: Smooth, flat face recessed 1/4 inch (6 mm) below edges Joint profile to match existing at airport. Field verify type.

3.5 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
3. Protect adjacent masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
5. Clean masonry with cleaner applied according to manufacturer's written instructions/recommendations.

3.6 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.

B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

END OF SECTION 04 43 13.16

SECTION 07 84 00 – FIRESTOPPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems, materials, and accessories.

B. Firestopping at electrical junction boxes in fire-rated walls.

C. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on Drawings or not, and other openings indicated.

D. Contractor's responsibility for determining required scope of firestopping system work, and for determining applicable tested/listed systems for the entire project, and for securing jurisdictional authority approval of firestopping systems.

1.02 REFERENCE STANDARDS

A. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

C. ASTM E1399 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

D. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

G. IFC - International Firestop Council Recommended Guidelines for Evaluating Firestop Systems Engineering Judgements.

H. ITS (DIR) - Directory of Listed Products.

I. FCIA - Firestop Contractors International Association Manual of Practice.

J. FM (AG) - FM Approval Guide.

K. UL 1479 - Standard for Fire Tests of Penetration Firestops.

L. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

M. UL (DIR) - Online Certifications Directory.

N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

O. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.

1.03 ADMINISTRATIVE REQUIREMENTS

Coordination: Coordinate installation of firestopping systems with affected trades and adjacent work.

Sequencing: Sequence work to permit firestopping materials to be installed after adjacent and

surrounding work is complete.

1. Do not cover or conceal firestopping installations until Owner's inspection agency and jurisdictional authority have inspected each installation.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Jurisdictional Authority Submittal: After review and approval of specified submittals by Architect, submit to jurisdictional authority and local fire department complete product data indicating proposed product characteristics, performance characteristics, limitation criteria, and documentation of proposed firestop materials and systems for actual project conditions.

1. Include manufacturer's complete installation instructions and UL Design or other approved testing agency data sheets for each proposed firestop system.
2. Include complete test data forms or jurisdictional acceptance for proposed assemblies not conforming to specific UL Design numbers or other approved testing agency system designs.
3. Submit certificate from authority having jurisdiction indicating approval of materials and systems to be used, with one complete copy, for information only, of the approved jurisdictional authority submittal.

G. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Installer Qualifications: Company specializing in performing the work of this Section and:

1. Trained by manufacturer.

C. Obtain firestop systems for each type and condition of penetration from a single manufacturer; intermixing of system components for each type and condition of penetration by different manufacturers is not permitted.

D. Listed and tested assemblies and systems must be utilized, if they exist, before alternative systems requiring Engineering Judgement (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) will be considered. Comply with IFC and FCIA for EJ and EFRRA design and submittal requirements.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Deliver materials in original unopened containers identified with manufacturer's brand designation and applicable UL label.

B. Do not use damaged or expired materials.

1.07 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Include agreement to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, general durability, or apparent deterioration beyond manufacturer's printed limitations for stipulated warranty period from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
- 3M Fire Protection Products: www.3m.com/firestop.
- A/D Fire Protection Systems Inc.: www.adfire.com.
- GCP Applied Technologies: www.gcpat.com.
- Hilti, Inc: www.us.hilti.com/#sle.
- Nelson FireStop Products: www.nelsonfirestop.com.
- Pecora Corporation: www.pecora.com.
- RectorSeal: www.rectorseal.com.
- Specified Technologies Inc.: www.stifirestop.com/#sle.
- Tremco Sealants and Coatings: www.tremcofirestop.com.
- USG: www.usg.com.
- Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS - GENERAL

A. Firestopping Materials: Any materials meeting requirements specified.
1. Comply with ASTM E814, UL 1479, and UL 2079 as applicable to achieve indicated fire ratings.

B. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

D. Fire Ratings: Refer to Drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. General: Use firestopping systems which are acceptable for those applications for which they are specifically designed. Use of other UL listed systems is Contractor's Option, subject to compliance with specified performance, regulatory, and quality assurance requirements.
1. Where there is no specific tested and classified firestop system for an indicated condition, obtain from the firestopping system manufacturer an Engineering Judgement (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) according to IFC and FCIA.

B. Scope: Install firestopping at all locations requiring protected openings where piping, conduit, cables, sleeves, ductwork and similar items penetrate fire-resistive, fire-rated, and smoke assemblies, including but not limited to:
   1. Penetrations through wall, floor, and roof assemblies, including empty openings and openings containing penetrations.
   2. Membrane penetrations where items penetrate one side of the barrier assembly.
   3. Joints, through-penetrations, and membrane penetrations in smoke-rated assemblies.

C. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.

D. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

E. Fire Rated Construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces and types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

F. Smoke Barrier Construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

G. Other General Characteristics:
   1. Surface Burning: ASTM E84 and UL 723; flame spread less than 25, smoke developed less than 450.
   2. Air Leakage of Perimeter Firestopping Barriers and Penetrations: UL 2079; L-rating less than 2.0 cfm/sf or 5.0 cfm/lf as applicable to the type and location of joint.
   3. Durability and Longevity: Permanent.
   4. Side Effects During Installation: Non-toxic.
   5. Side Effects Under Fire Exposure: Non-toxic.
   6. Long Term Side Effects: None.

2.04 MATERIALS

A. Putty Compound: 100 percent solids intumescent or vinyl-type formulation, free of asbestos, silicones, solvents, halogens, PCB's, and inorganic fibers; flame spread/smoke developed rating 0/0 when tested in accordance with ASTM E84; paintable, not sensitive to freezing after set.

B. Sealant Compound: One-part intumescent, endothermic, ablative, or elastomeric acrylic water-based calking material required by applicable UL Design; flame spread/smoke developed rating 0/0 when tested in accordance with ASTM E84.

C. Spray-Applied Compound: Water-based, flexible coating which drys to form a flexible seal;

tested in accordance with ASTM E1399, complying with wind sway and thermal category, 500 cycles at minimum 10 cycles/minute.

D. Foam Compound: Two-part, liquid-silicone elastomer formulated to foam in place when mixed; flame spread/smoke developed rating 0/0 when tested in accordance with ASTM E84.

E. Plastic Pipe Device: Intumescent strip material, factory or site fabricated in flexible metal collar with adjustable, screw-tightened stainless steel clamp; UL classified for use with PVC, CPVC, CCPVC, CCABS, PVDF, PP, PB, and FRPP plastic pipe.

F. Fire-Safing Insulation: ASTM C612, Type I; high-melt mineral fibers and resinous binders formed into blankets, density not less than 4.0 lbs/cu ft, tested for 3-hour fire containment for required depths and dimensions.

G. Firestopping Pads: Intumescent, dielectric fire putty formed to 7 x 7 or 9.5 x 9.5 inch self-adhering pads, 2-hour fire rating listed by UL.

2.05 ACCESSORIES

A. Provide necessary accessory materials specified in UL Design to achieve complete firestop system at each penetration. Include collars, sleeves, attachment devices, intumescent materials, and other items required.

B. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design, and as recommended by firestopping manufacturer for specific substrate surfaces.

C. Dam Material: Mineral fiberboard, mineral fiber matting, sheet metal, alumina silicate fire board, or other permanent material required as part of the firestopping system, or removable if not specifically required as part of the firestopping system.

D. Retainers: Impale type clips to support mineral fiber safing blankets.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this Section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing or damming materials required to arrest liquid material leakage.

3.03 INSTALLATION - GENERAL

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Apply firestopping materials in sufficient thicknesses to achieve scheduled fire ratings, to uniform density and texture.

C. Install material at openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.

D. Remove dam material after firestopping material has cured only if dam material is not

required as part of the firestopping system; otherwise dam material to remain permanently in place.

E. Do not cover installed firestopping until inspected by authorities having jurisdiction.

F. Install labeling required by code.

3.04 INSTALLATION - FIRE SAFING INSULATION

A. Install safing insulation to completely fill spaces between floor slab edges and spandrel construction as detailed.

B. Install safing insulation to completely fill voids between floor and roof deck flutes and top of wall construction where wall ratings are indicated.

C. Install and support safing insulation permanently in position to comply with tested fire assembly and applicable building code requirements.

3.05 INSTALLATION - FIRESTOPPING PADS

A. Install firestopping pads on back side of electrical junction boxes in fire-rated walls where boxes are located in same stud space on opposite sides of same wall, and elsewhere required by jurisdictional authority and local fire department.

3.06 THROUGH-PENETRATION FIRESTOPPING IDENTIFICATION

Identify firestopping systems with pre-printed metal or plastic labels. Attach label permanently to surfaces immediately adjacent to and within 6 inches of edge of firestop installation so that label will be visible to anyone seeking to remove penetrating items or firestop system.

1. Metal Labels: Use mechanical fasteners.
2. Plastic Labels: Use self-adhering type with adhesive capable of permanently bonding lebel to substrate and, in combination with label material, will result in partial destruction of label if removal is attempted.

Include following information on each label:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Installing contractor's name, address, and phone number.
3. Firestop system designation, including applicable testing and inspection agency.
4. Date of installation.
5. Firestop system manufacturer's name.
6. Installer's name.

3.07 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.08 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 84 00