

ADDENDUM No. 3

for

**AIP #3-23-0005-070-2016
Gate 3 Passenger Boarding Bridge & Holding Area**

at Bangor International Airport – Bangor, ME

Due to be opened 2:00 p.m., Tuesday May 3, 2016

Date: _____ **April 28, 2016** _____

The attention of firms submitting proposals for the work named above is called to the following modifications to the documents as were issued.

The items set forth herein, whether of clarification, omission, addition and/or substitution, shall be included and form a part of the Proposer's submitted materials and the corresponding contract when issued. No claim for additional compensation, due to lack of knowledge of the contents of this Addendum will be considered.

All Proposer's are advised that receipt of this notice and all attached material must be duly acknowledged in the space provided on the signature page of the proposal documents, and **by the insertion of this sheet, signed, and submitted with your Proposal package.**

This form must be signed and attached to the original copy of your submission.

The attached sheets contain information or clarifications requested or discussed.

Receipt of Addendum No. 3 to the REQUEST FOR PROPOSALS for **AIP # 3-23-0005-070-2016 Gate 3 Passenger Boarding Bridge & Holding Area** at Bangor International Airport is hereby acknowledged.

COMPANY NAME: _____

SIGNED BY: _____

NAME AND TITLE PRINTED: _____

TELEPHONE: _____ FAX: _____

CLARIFICATIONS

Addendum Item No.1 -

Submitted Question:

In regards to 00 73 00 Section 90-06 Partial Payments, We respectfully ask that Owner shall make monthly progress payments as agreed upon in schedule of values. We respectfully ask that Owner also agrees to pay for the value of work in process, in transit and for any cost incurred and all work Contractor has performed up to date of the termination plus a reasonable rate of profit for the work performed. Please confirm that it will be acceptable to include progress billings for engineering, material, and labor costs incurred during the manufacturing process and prior to delivery.

Clarification/Reply:

Monthly progress payments will be made in accordance with the approved schedule of values and Section 90-06 *Partial Payments*. The schedule of values shall be prepared and submitted by the Contractor. Special consideration shall be given to the passenger boarding bridge. Please see the revised method of payment section under 14 00 00 *PASSENGER BOARDING BRIDGE* issued as an attachment to this addendum.

Addendum Item No.2 -

Submitted Question:

In regards to 00 73 01 section A23 Termination of Contract, Please amend so in the event the Owner terminates the order for any reason, the Owner agrees to pay the Contractor the proportional contract value of work performed, including but not limited to the value of work in process, in transit, delivered to site, or in storage, and for any costs incurred and all work that the Contractor has performed up to the date of termination plus a reasonable rate of profit for the work performed. In addition, the Contractor reserves the right to assess other costs if the Owner terminates for convenience. Except as specifically agreed in writing, termination shall not relieve either party of any obligation arising out of work performed prior to the date of termination. The Owner agrees to limit possession to work and materials previously paid for by the Owner to the Contractor

Clarification/Reply:

Section A23 *Termination of Contract* is a Federal Contract Requirement and cannot be changed. The Owner agrees to pay the Contractor, Manufacturer, or other in accordance with the provision. The use of this provision is highly unlikely and has never been exercised by the Owner.

Addendum Item No.3 -

Submitted Question:

In regards to 01 14 01 Section 13.0 *Insurance*, Please amend this paragraph as follows:

REMOVE the following from section g:

CONTRACTOR also agrees to bear all other costs and expense related thereto, even if the claim or claims alleged are groundless, false or fraudulent.

ADD the following to section g:

Contractor shall not be obligated or liable for errors, inconsistencies, or omissions produced by Owner or others.

CONSIDER allowing Commercial Property Insurance in lieu of Builder's Risk Insurance.

REMOVE "material change" from section g.

Clarification/Reply:

REMOVE Section 13.0 *Insurance* from specification section 01 14 01 and replace with the revised specification section provided as an attachment to this addendum.

Addendum Item No.4 -

Submitted Question:

In regards to 00 52 00 *CONTRACT*, We respectfully ask the liquidated damages be limited with 0.1% per day and capped at 10% of the contract value.

Clarification/Reply:

Liquidated damages will remain set at \$1,500 for each and every calendar day the work remains incomplete. A maximum amount equal to 10% of the contract value will be instated.

Addendum Item No.5 -

Submitted Question:

In regards to 14 00 00, Page 1 of 24, Item 1.1.B.3: This item includes the design and installation of all supports, columns, anchor bolts, foundations and incidentals necessary to support the passenger boarding bridge and fixed tunnel. Being that we are an equipment manufacturer, we request that the design and installation of the PBB and Fixed Walkway foundations be provided by others. We will provide coordination, loading information, columns, anchor bolts (based on design) and nuts and washers, foundation template.

Clarification/Reply:

The design and installation of the passenger boarding bridge foundation and fixed walkway foundation do not need to be performed by the Passenger Boarding Bridge Manufacturer. These tasks may be performed by other firms however those other firms should be subcontracted by the Manufacturer or General Contractor. No separate contract with the Owner will be executed for the design and installation of the foundations; rather it will be part of the overall project contract.

Addendum Item No.6 -

Submitted Question:

In regards to Section 14 00 00, Page 5 of 24, Item 1.10.B.1.b: A roof (snow load) of 56 pounds per square foot. We request that the roof snow load be 25 pounds per square foot, as this is the industry standard since the equipment is not considered part of the building and not subject to local building codes. We have installed bridges throughout the world, including New York, Boston, Toronto, Ottawa, Montreal, Moscow and many others where there may high levels of snow with no issues.

Clarification/Reply:

The passenger boarding bridge roof snow load shall be 25 pounds per square foot.

Addendum Item No.7 -

Submitted Question:

In regards to Section 14 00 00, Page 8 of 24, Item 1.10.C.2.g: The standard sub-floor within the tunnels shall be $\frac{3}{4}$ " thick marine grade plywood. The adjoining plywood sheets shall be supported and suitably fastened to a common member to provide smooth, even joints. An 18 gauge painted galvanized skin shall be installed underneath the plywood. Sub-floor is needed if corrugated steel panels are used for the main floor structure. Our main floor structure is a smooth 14 gauge galvanealed steel C-pan floor which does not require a sub-floor. Floor coverings are applied directly to the steel floor, which also makes it easy to remove and replace without the need to replace the sub floor. We ask that our standard to be allowed.

Clarification/Reply:

3/4" thick marine grade plywood with 18 gauge painted galvanized skin installed underneath and 14 gauge galvanealed steel C-pan floor without sub-floor are acceptable.

Addendum Item No.8 -

Submitted Question:

In regards to Passenger Boarding Bridge 14 00 00-1.10-A-5: The aircraft list includes a B-757 but doesn't state whether a B-757-300 is included. Whether or not it's included makes an important difference on what size PCA unit we quote. Please clarify.

Clarification/Reply:

The PCA unit size does not need to consider the B757-300.

Addendum Item No.9 -

Submitted Question:

Fiber between closets.....how many strands, what kind, type of connectors, etc.?

Clarification/Reply:

The fiber optic cable has been eliminated by this addendum.

Addendum Item No.10 -

Submitted Question:

Note #4 E-004/provide switch with fiber connection.....what kind of switch?

Clarification/Reply:

The switches have been eliminated by this addendum.

Addendum Item No.11 -

Submitted Question:

Note #8/Provide voIP phone.....what kind and who configures it?

Clarification/Reply:

The VOIP phone will be provided and configured by the City.

Addendum Item No.12 -

Submitted Question:

General Electrical Notes.....a lot of closet relocations but no scope to determine the difficulty?

Clarification/Reply:

General Electrical System Note numbers 4, 5 & 6 were removed under Addendum No. 1 issued on 4.18.2016. These notes do not apply to this project.

CHANGES TO SPECIFICATIONS

Addendum Item No.13 -

REMOVE and REPLACE Specification Section 23 09 93 *SEQUENCE OF OPERATION FOR HVAC CONTROLS* with the revised Specification provided as an attachment to this addendum.

Changes include revising the HVAC controls.

Addendum Item No.14 -

REMOVE and REPLACE Specification Section 14 00 00 *PASSENGER BOARDING BRIDGE* with the revised specification provided as an attachment to this addendum.

Changes include addition of partial payment procedures, revised the telephone circuit requirements, revised sub-floor requirements, and revised snow load. ***Please note***: The phone in the passenger boarding bridge will require a CAT 6 cable to be run from the operating console of the passenger boarding bridge to I.T. Room South. It is anticipated that the CAT 6 cable interior to the terminal building will be installed by the communications contractor (not the passenger boarding bridge Contractor).

Addendum Item No.15 -

REMOVE and REPLACE Section 13.0 *Insurance* from specification 01 14 01 with the revised section provided as an attachment to this addendum.

Addendum Item No.16 -

REMOVE and REPLACE Section 80-08 *Failure to complete on time* from specification 00 73 00 with the revised section provided as an attachment to this addendum.

Changes include limiting the maximum liquidated damages.

CHANGES TO DRAWINGS

Addendum Item No.17 -

REMOVE and REPLACE Drawing No. M-007 *MECHANICAL DETAILS* with the revised drawing provided as an attachment to this addendum.

Changes to the drawing include revisions to the hot water heating coil piping schematic.

Addendum Item No.18 -

REMOVE and REPLACE Drawing No. M-008 *MECHANICAL CONTROLS* with the revised drawing provided as an attachment to this addendum.

Changes to the drawing include revisions to the controls on the new roof top unit.

Addendum Item No.19 -

REMOVE and REPLACE Drawing No. E-005 *ELECTRICAL PLAN FIRST FLOOR* with the revised drawing provided as an attachment to this addendum.

Changes to the drawing include removal of the fiber optic cable and switches from the project.

END OF ADDENDUM #3 AFTER ATTACHMENTS

ATTACHMENTS

Section 23 09 93

SEQUENCE OF OPERATION FOR HVAC CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

1. This Section includes control sequences for HVAC systems, subsystems, and equipment.
2. Related Sections include the following:
 1. Division 1 Section 019113 "General Commissioning Requirements".
 2. Division 23 Section "Instrumentation and Control for HVAC" for control equipment and devices and for submittal requirements.

1.3 DEFINITIONS

1. DDC: Direct digital control.

1.4 HEATING SYSTEM CONTROL SEQUENCES

1. Steam – Hot water Converter: (Here for reference of existing system)
 1. Steam control valves (1/3 -2/3 arrangement) shall modulate to maintain outlet water temperature setpoint (adjustable).
2. Hot Water Supply Temperature Control: (Here for reference)
 1. Provide a sensor in the hot water supply to reset the hot water supply verses outside air. The steam control valve(s) shall modulate to provide the reset water schedule as follows:

Outside air temperature	Hot water supply temperature
-20°F	195°F
75°F	130°F
3. Terminal Expansion Zone Heating Pump Control: (P-1, P-2) (Here for reference)
 1. Pump shall be energized to operate continuously when outdoor air temperature is below 60 deg F (adjustable).
 2. Pumps shall have VFD's. Provide a differential pressure sensor to control the system pressure by modulating the respective pump VFD. Provide on and off function and lead/lag and rotation of pumps. Provide a current sensor for each pump to monitor and report status. If either pump fails then the other pump shall start and an alarm shall go to the DDC Host computer. Provide a dead band in the programming to prevent short cycling. The respective pumps shall rotate on a monthly basis.

4. RTU-15 Heating Coil Glycol Loop: (HE-3 and P-4)
 1. Plate heat exchanger glycol loop side constant volume pump (P-4) shall be energized to operate continuously when outdoor air temperature is below 60 deg F (adjustable). Refer to Schematic.
 2. Plate heat exchanger hot converter water side (180 F adjustable) control valve shall modulate to maintain glycol loop supply temperature setpoint (175 F adjustable). Refer to Schematic.
5. Heating System Control points to be provided and shown on the graphic page are as follows:
 1. Inlet steam pressure.
 2. Steam control valve position(s).
 3. Hot water supply temperature.
 4. Hot water return temperature.
 5. Hot water supply schedule.
 6. Glycol loop supply temperature.
 7. Glycol loop supply schedule.
 8. On / off status for each pump.
 9. VFD speed for each pump.
 10. Differential pressure for each heating system zone.
 11. Lead/Lag and rotation schedule.

1.5 AIR HANDLING UNIT CONTROL SEQUENCE (RTU-15)

- A. Air handling system shall start through DDC system provided all safeties have been satisfied.
- B. Occupied: The supply fan shall be enabled during occupied mode. A space sensor shall maintain occupied set point when the fan is in the occupied mode by modulating the economizer dampers and the heating valve (duct-mounted), DX cooling, in sequence to maintain space temperature.
- C. Fan Control: When the fan starts during the occupied mode the outside air, return air, and exhaust air dampers shall open to their minimum. The VFD on the supply fan shall provide for a soft start and provide the required cfm's for a minimum setting. A CO2 sensor in the return air duct shall increase the fan speeds and also control the outside air, return air, and relief air based on CO2 levels in the Terminal area.
- D. Stop Mode: The supply fan will be off, the outside air damper will be closed, and the heating valve will be full open.
- E. Smoke detection: Stop fans, and return system to STOP mode upon a signal from the fire alarm system. Wiring from the fire alarm device to the motor starters provided under Division 26. Provide status of each fan and alarm the DDC system if a fan fails to start.
- F. Freeze Protection: Provide a manual reset freeze stat across the heating coil to stop the fan, close the outside air damper and alarm the DDC system if the freeze stat trips. Smoke detectors shall stop the fan and close the dampers if smoke is detected.
- G. Hot Water/Glycol Heating Coil: During occupied periods system modulates control valve to maintain supply air temperature occupied setpoint. During unoccupied periods, cycle valve to maintain unoccupied setpoint. A discharge air sensor shall provide a discharge air low limit by

modulating the heating valve to prevent the discharge air from falling below set point. A mixed air sensor located in the mixing box, averaging type, shall monitor the mixed air temperature. Provide mixed air reset.

- H. DX Cooling: Cycle compressors to maintain space setpoint.
- I. Unoccupied: Supply fan shall remain off. The outside air, return air, and exhaust air dampers shall be in their normal state. The space sensor shall cycle the fan, at minimal speed, and heating valve to maintain night set back temperature. A push button override on the space sensor shall allow the Air Handler to operate in the occupied mode for a predetermined time.
- J. Emergency Power Integration: Upon loss of normal power RTU-15 cooling (compressors) shall be disabled through the DDC system for load shedding. Fans shall continue to operate per sequence of operation.
- K. Control points to be provided and shown on the graphic page are as follows:
 - 1. DDC system graphic.
 - 2. DDC system on-off indication.
 - 3. DDC system occupied/unoccupied mode.
 - 4. Outdoor-air-temperature indication.
 - 5. Exhaust air-temperature indication.
 - 6. Supply-air-temperature indication.
 - 7. Supply-air-temperature setpoint.
 - 8. Return air-temperature indication.
 - 9. Heating-coil control-valve position.
 - 10. DX cooling stage(s).
 - 11. Smoke detection alarm.
 - 12. Each Fan Status.
 - 13. Each Fan Speed.
 - 14. VFD frequency and % speed.
 - 15. Mixed Air Damper Position Status.
 - 16. Mixed Air Temperature.
 - 17. Mixed Air Temperature Set Point.
 - 18. Freeze Protection Alarm.
 - 19. CO2 Level.
 - 20. Space Temperature Set Point.
 - 21. Space Temperature.

1.6 TERMINAL UNIT CONTROL SEQUENCES

- A. Unit Heaters:
 - 1. A space thermostat, non-DDC, shall cycle the fan on a call for heat subject to an aquastat on the hot water return pipe sensing that there is hot water available.

1.7 MONITORING

- A. In addition to the points indicated in this section for specific equipment sequences and operation, provide Monitoring of Mechanical & Electrical Systems, per Division 23 Section "Instrumentation and Control for HVAC".

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

End of Section

Section 14 00 00
PASSENGER BOARDING BRIDGE

PART 1 – GENERAL

1.1 SUMMARY

- A. The work covered by this specification includes the furnishing of all labor, materials, equipment, services and incidentals in connection with furnishing and installing one apron drive passenger boarding bridge and related items as indicated in the drawings and/or specified herein. All components shall be delivered to and installed at the Bangor International Airport located in Bangor Maine.
- B. This section consists of furnishing and installation of one passenger boarding bridge and all associated work and related items as specified herein, and includes but is not limited to the following:
 - 1. The passenger boarding bridge (hereafter referred to as PBB) covered by this Specification shall be designed to extend to the aircraft door enabling passengers to enplane and deplane during normal or emergency operations while providing an environment which is protected from hazardous and atmospheric conditions. The complete assembly shall be protected against inclement weather conditions, both when sealed against an aircraft and when parked with the weather door closed.
 - 2. This item includes the design and installation of a stationary tunnel section (hereafter referred to as the fixed tunnel). The fixed tunnel shall be designed to extend from a second-floor terminal departure holding area doorway to the rotunda of the passenger boarding bridge. For the purposes of this specification all applicable requirements for the passenger boarding bridge shall also apply to the fixed tunnel section.
 - 3. This item includes the design and installation of all supports, columns, anchor bolts, foundations and incidentals necessary to support the passenger boarding bridge and fixed tunnel.
 - 4. This item includes all options and additional equipment as specified.
 - 5. The work includes configuring, setup, programming, and testing of all necessary components to produce one complete unit ready for operation.
 - 6. It shall be the Contractor's responsibility to verify existing site conditions prior to the design, manufacture, and installation of the PBB and foundations.

1.2 REGULATIONS AND CODE COMPLIANCE

- A. The design, manufacture, construction, and installation of the passenger boarding bridge, fixed tunnel, and associated items must comply with the latest edition of the following. If a conflict between documents exists, the more stringent shall apply.

1. National Electric Code (NEC)
2. American Institute of Steel Construction (AISC)
3. American Society of Mechanical Engineers (ASME)
4. American Welding Society or approved Equivalent
5. National Electrical Manufacturers Association
6. Occupational Safety and Health Administration
7. Society of Automotive Engineers
8. NFPA 415 – National Fire Protection Agency
9. FAA Advisory Circular 150/5220-21 Aircraft Boarding Equipment
10. City of Bangor and State of Maine design and building code

1.3 FEES, PERMITS, AND LICENSES

- A. The Contractor shall be responsible for any and all fees, permits, special inspections, and licenses required.

1.4 MANUALS AND TRAINING

- A. The Contractor shall supply two (2) Operation and Maintenance Manuals and one (1) Operation and Maintenance Training Manual specific to the Passenger Boarding Bridge furnished. The Manuals shall follow the intent of the Air Transport Association (ATA) Specification 101. The O&M manual shall include preventative maintenance requirements, trouble shooting procedures, repair procedures, and illustrated parts drawings.
- B. The Contractor shall provide a minimum of 8 hours of operator training and 8 hours of maintenance training, in separate sessions conducted by a qualified Contractors representative, for the PBB provided under this Contract. Training shall be conducted at the installation site in a location as designated by the Owner. Operation training shall also include proper training of the operators on correct bridge operations to avoid damaging the equipment by improper use of the controls. The Contractor shall also provide a complete operation-training program and maintenance training program both recorded on separate videotapes to enable the owner to train additional employees in the future. The Contractor and the Owner or Owner's designated representative shall mutually agree upon training dates. All training must be completed prior to scheduled commercial service.

1.5 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications.
 1. Alterations to the existing exterior wall of the terminal building as detailed in the Architectural plans and associated specifications.
 2. Removal of the existing precast concrete ramp as detailed in the civil drawings and specified under separate section.
 3. Installation of the power feeds interior to the terminal building as detailed in the electrical plans and specified under separate sections.
 4. General requirements for the purchase of electrical equipment under Section 26 05 00.
 5. Furnishing and installation of raceways and pullboxes under Section 26 05 33 & 26 05 43.

6. Furnishing and installation of electrical component identification under Section 26 05 53.
7. Furnishing and installation of supporting devices under Section 26 05 29.

1.6 COORDINATION

- A. The Contractor's attention is directed to the Buy American contract requirements of Section 00 73 01.
- B. Alterations to the existing exterior wall of the terminal building are detailed in the Architectural plans and associated specifications. The Contractor shall coordinate the exact location of the passenger boarding bridge and foundations with the new Gate 3 door.
- C. It is the Contractor's responsibility to verify all site conditions prior to beginning design, manufacturing and installation.
- D. The approximate locations of all known underground utilities are shown in the civil plans. The Contractor is responsible for locating, marking, and protecting all utilities. The Contractor shall repair any damage to utilities at no cost to the Owner.
- E. The Contractor is responsible for providing all electrical conduit, cable, enclosures, and incidentals for a complete operating system. Power sources and routing inside the terminal building is shown in the electrical plans. All infrastructure exterior to the building not shown on the plans is to be per the Manufacturer's requirements and applicable codes.
- F. The installation Contractor is subject to all insurance and general project requirements.
- G. All airfield safety and phasing requirements must be in place and approved by the Owner prior to beginning the installation.
- H. The Contractor shall be responsible for coordinating the schedule for the installation of the passenger boarding bridge and associated components with the construction of the interior holding room.
- I. The Contractor's attention is directed to the extended time required for the manufacture of the bridge and tunnel. The Contractor shall coordinate the installation of the foundations accordingly and shall make every effort to avoid installation of the foundations and site restoration in sub freezing temperatures. No additional compensation will be made for installation during "winter conditions".

1.7 QUALITY ASSURANCE, QUALIFICATIONS, AND CERTIFICATIONS

- A. The Manufacturer must provide at least five references where similar units have been installed at U.S. Airports in the last 5-years, including airport, contact person, title, phone numbers and e-mail address.
- B. The Installation Contractor and/or subcontractors shall have successfully installed similar components on a previous project of comparable size and complexity. A list of proposed subcontractors and complete description of the proposed scope of work shall be submitted. The Owner reserves the right to reject any installer for which evidence of a successful prior installation performed by the Contractor cannot be provided.

- C. The Manufacturer shall have a representative on-site during the installation, testing, and training.
- D. The Contractor shall warrant in writing, that the components and accessories furnished and installed are new, fully comply with the contract documents, applicable codes and regulations, and are free of any defect in design, material or workmanship.
- E. Prior to final acceptance and payment, the Contractor shall submit a written document certifying all labor and materials are free of liens or encumbrances of any kind.

1.8 WARRANTY

- A. The Contractor shall warranty in writing all parts, components, materials, installation and workmanship for a period of one (1) year from date of acceptance.

1.9 SUBMITTALS

- A. Prior to manufacturing submit detailed shop drawings, and data sheets and supporting documents for the following:
 - 1. Apron drive passenger boarding bridge
 - 2. Fixed tunnel
 - 3. Pre conditioned air (PCA) unit
 - 4. Ground power unit (GPU)
 - 5. PBB Cooling unit
 - 6. PBB Forced hot air unit
 - 7. Foundation reinforcing steel
 - 8. Foundation anchor bolts
- B. Prior to installation submit drawings, structural details, calculations, and specifications for the following items. Each shall bear the stamp and signature of a Professional Engineer licensed in the State of Maine.
 - 1. Rotunda foundation
 - 2. Fixed tunnel foundation
- C. Submit data sheet on the following items used for the power supply between the terminal and the disconnects to be mounted on the rotunda column.
 - 1. Conduit
 - 2. Enclosures and junction boxes
 - 3. Panels
 - 4. Disconnects
 - 5. Wire
- D. Submit structural concrete mix design and test results for all materials used in concrete as specified in the cast in place structural concrete specification.
- E. Submit Buy American certifications for steel and manufactured products.

1.10 PERFORMANCE REQUIREMENTS

- A. The PBB shall be a three tunnel with apron drive. It shall be designed to service regional jets and up to a minimum aircraft sill height of 14-feet. This includes but is not limited to the following aircraft:

1. E-140 & E-145
2. EMB 170 & EMB 190
3. CRJ-200, CRJ-700 & CRJ-900
4. MD-80/83 & MD-88
5. B-717, B-737, & B-757
6. A-318, A319, A-320 & A-321

The PBB shall have a minimum manufacturer recommended operational extension of 125-ft.

- B. The PBB shall be designed using common engineering practices and the standards developed and adopted by the passenger boarding bridge industry. The PBB must be designed in accordance with the current edition of AC 150/5220-21, and all applicable codes and regulations. The following criteria shall be considered minimums:
1. Structural Loads – The PBB shall support the following loads. These loads may be applied in total or in part, singularly or simultaneously. The design shall be based on the combination that imposes the most adverse loading condition. In addition to the dead loads and strain caused by movement, the entire passenger boarding bridge shall support:
 - a. A live load of 40 pounds per square foot including the edges of equipment that is adjacent to the aircraft door.
 - b. A roof (snow load) of ~~56~~ 25 pounds per square foot.
 - c. Wind Load up to 90 mph, for 3 second gusts, while in use and occupied; and up to 70 mph for sustained winds.
 - d. A retracted and stowed wind velocity of 90 mph.
 - e. The PBB shall be supported from beneath by dual structural columns affixed to the drive wheel bogey system and a pedestal located underneath the rotunda assembly.
 2. The structural design shall provide sufficient torsional rigidity to avoid excessive sway when the PBB is brought to a gradual stop.
 3. All mechanisms for actuating, guiding and restraining the PBB and its components shall be designed so that no noise, sway or sense of insecurity is apparent to passengers. No operating vibrations or loads shall be transmitted to the terminal building.
 4. The PBB shall be designed to accommodate the added loads of the ground power unit (GPU), 28 Volt DC equipment, and a 60-ton pre-conditioned air (PCA) equipment. The GPU unit shall be undercarriage or side mounted and the 28VDC

unit shall be side mounted. The PCA shall be either roof or undercarriage mounted. The PBB shall also be designed for the added loads of the PBB heating and cooling equipment. Whenever possible, equipment shall be undercarriage mounted.

6. Environmental Considerations

- a. The PBB shall operate satisfactorily under ambient temperatures from negative 40° F to +125° F and relative humidity of 5% to 90%. It shall withstand wind loads of up to 90 mph, for 3 second gusts, while in use and occupied and a sustained wind of up to 70 mph. All of the PBB components and materials either individually or collectively shall be designed for long service life under such conditions with a total life of at least 20 years.
- b. The PBB assembly shall be designed to provide a clean, structurally sound, comfortable, and functional transition between the aircraft and the terminal building.
- c. The entire PBB shall be weatherproof and any equipment or controls that are exposed to the weather shall be weatherproof type or housed in weatherproof boxes (NEMA 3R enclosures).

7. Interior Dimensions - The following shall be minimum interior clear dimensions:

- a. Minimal Tunnel (A-Tunnel) width – 60.0 inches
- b. Minimal Tunnel (A-Tunnel) width with handrail option – 53.0 inches
- c. Minimum Tunnel (A-Tunnel) height – 83.0 inches
- d. Optional interface walkway width - 71.0 inches or 88.0 inches
- e. Optional interface walkway width with handrail option – 64.0 inches or 81.0 inches
- f. Optional interface walkway height – 89.5 inches

8. Building Connection

- a. The PBB and fixed tunnel shall be designated as equipment and as such shall receive no structural support from the terminal building to which it will be attached. They shall transmit no vibration to the terminal building.
- b. An aluminum metal threshold diamond checker plate shall be installed over the gap between the terminal building and the adjacent bridge interface. Interior metal and exterior flexible flashing shall be used between the bridge and the building to provide a waterproof connection.
- c. The bridge interface shall be designed to fit the terminal door size and existing terminal exterior. The door size is as specified in the Architectural plans.

9. Maximum Floor Slope - The maximum tunnel floor slope shall not exceed 8.33% from horizontal. Slopes, transitions, and changes in levels shall comply with the current edition of AC 150/5220-21.

C. PBB MAIN COMPONENTS

1. Rotunda Assembly

- a. The rotunda assembly shall be made up of a corridor, rotunda and support pedestal. The assembly shall be designed so that it does not transmit any live or dead loads or vibrations to the terminal building.
- b. The rotunda assembly shall be designed as the terminal end pivot for the PBB vertical and horizontal motion. The rotunda shall be fixed to either a pedestal or directly to the apron and provide the main pivot point that allows the PBB to rotate. Slat type curtains and flexible panels attached to the rotunda shall maintain the seal as the PBB is rotated, raised or lowered.
- c. Over-travel and operational swing limits shall be located within the rotunda assembly. The operational swing limit shall be adjustable to meet local operating conditions and requirements.
- d. The rotunda shall be connected to the terminal, a fixed tunnel, or an optional interface unit, on the fixed side. The rotunda shall be connected to the telescoping tunnel assembly on the rotation side.
- e. The corridor shall provide the interface between rotunda and terminal building. The corridor shall have minimum inside dimensions of 52 inches by 83 inches. The design of the corridor and walkway shall allow the installation of flexible weather seals and floor threshold to the face of the building. It shall include an interior metal transition piece that shall be used between the bridge, fixed tunnel, or interface unit and the building door frame.
- f. The rotunda floor shall remain level at all times and provide a smooth transition between the terminal, fixed tunnel, or interface unit and the telescoping bridge tunnel. Flap type seals shall provide weather protection between the rotunda and the hinged telescoping tunnel section.

2. Telescopic Tunnel Assembly

- a. The telescopic tunnel assembly shall attach between the rotunda assembly and the aircraft cab assembly. The telescoping tunnels, A (smallest), B (mid-size), and C (largest) are rectangular in cross section. The tunnel with the largest cross section is closest to the aircraft.
- b. The PBB telescopic tunnel walls and roof shall be constructed from a minimum of 14-gauge (0.079" thick) flat steel.
- c. A transition ramp shall accommodate the difference in elevation where the telescoping tunnel sections overlap. Handrails shall be provided on both sides of the tunnel in the ramp area.

- d. Roof drainage and seals between tunnels shall be designed and constructed to prevent leakage of water runoff into the interior of the bridge.
- e. All metal surfaces shall be prepared, primed, and painted in accordance with the current edition of FAA AC 150/5220-21 and industry standards.
- f. The minimum interior clear dimensions of the tunnel (A Tunnel) shall be 83.0 inches in height and 60.0 inches in width.
- g. The standard sub-floor within the tunnels shall be $\frac{3}{4}$ " thick marine grade plywood. The adjoining plywood sheets shall be supported and suitably fastened to a common member to provide smooth, even joints. An 18 gauge painted galvanized skin shall be installed underneath the plywood. [In lieu of the above, 14 gauge galvanealed steel c-pan floor without plywood sub-floor is acceptable.](#)
- h. The interior tunnel wall treatment shall consist of floor to ceiling 7/16" fire-rated high pressure laminate phenolic and melamine panels or painted galvanized sheet metal with insulation backing. Plastic laminate (NEMA LD-3, Grade FR32, comply with UL 723) shall be adhered to an NFPA 415 approved backing-board (comply with UL 723). The design shall allow each panel to be removed individually.
- i. The ceiling shall be a continuous interconnecting plank type. The ceiling panels shall be able to be removed individually. The ceiling material shall be linear plank-type panel manufactured from .020-inch thick aluminum with a white baked-on enamel finish or 20ga. painted galvanized steel panels. These panels shall run perpendicular to the tunnel centerline and shall be continuous from wall to wall. A suitable molding shall be provided along the longitudinal corners of the ceiling finish. Plank type ceiling insulation shall be 0.50 in thick, black, fire resistant fiberglass.
- j. Commercial double tube, flush-recessed, fluorescent lighting fixtures with plastic diffusers shall be provided perpendicular to the long dimension of the tunnels spaced on 6'-0" centers. The double tube shall provide a minimum light intensity of 30-foot candles at the floor.

3. Head Assembly

- a. The PBB head assembly shall be comprised of the fixed head tunnel, rotating cab and the components associated with these structures. The head assembly shall be attached to the telescopic tunnel assembly between the largest telescopic tunnel and fixed head tunnel. The rotating cab shall be attached to the fixed head tunnel.
- b. The face of the cab that interfaces with an aircraft shall have a minimum inside width of 96.0 inches and a minimum inside height of 96.0 inches (2438 mm). The minimum interior cab height shall be 80.0 inches (2032 mm) and comply with NFPA-415 guidelines pertaining to the emergency egress of passengers.

- c. All interior finishes within the fixed head tunnel shall be identical to those of the tunnel assembly.
- d. Corrugated black ribbed rubber 3/16" minimum thick, shall be provided on the floor of the cab. Flashing shall be provided at all edges of the flooring.
- e. A bumper shall be fitted across the front edge of the cab floor to ensure no metal contact between the PBB and the aircraft being served. The bumper material shall meet the fire protection specifications of NFPA-415 and shall be sufficiently flexible and non-abrasive to prevent scratching or other damage to the aircraft fuselage.
- f. Slat-type cab curtains shall allow for the rotation of the cab counter-clockwise and clockwise. One row of wire reinforced glass windows of uniform size and shape shall be provided in the curtains to provide better visibility of the ramp area.
- g. The rotation of the cab shall be 2 to 2.5 degrees per second.
- h. A weather door on the front of the cab shall be provided to seal and secure the interior when the PBB is not in use. The door shall be double swing, a minimum of 60.0 inches by 82.0 inches, and swing inward away from the aircraft. Latching mechanisms shall be provided so that the doors can be held in the open and closed position.
- i. The outermost edge of the cab shall be equipped with an articulating floor that adjusts to level for various aircraft floor heights. It shall level automatically and be equipped with a manual override. Additionally, an automatic adjustable leveling system shall be provided that adjusts the floor level to adapt to changes in the aircraft elevation during loading and unloading.
- j. A Passenger Guide Rail (PGR) shall be provided. The PGR shall be able to swing out from the side of the cab door and form a barrier between passengers and the side of the exterior cab floor.
- k. A cab floor de-icer shall be provided exterior of the weather cab door. This device shall be thermostatically controlled with a manual on/off switch mounted inside the control console cabinet.
- l. Outdoor rated lighting shall be provided to illuminate the interior aircraft interface area of the cab and the control console.
- m. Two pairs of adjustable flood lamps shall be mounted to illuminate the ramp ahead and behind the cab. Another pair of adjustable flood lamps shall be mounted above the control panel window. Additional lights shall light the wheel bogey area.
- n. One weatherproof light shall be provided at the top landing of the service stairs. An interior switch shall be located adjacent to the right-hand side of the service door.

- o. An amber rotating beacon light shall be mounted underneath cab in a visually prominent location. The beacon light shall indicate that power to the PBB is on and movement can occur at any moment.
- p. An audible hazard bell (98 db at 10 feet) shall be mounted underneath the bridge and is activated when the PBB is moving. An additional bell located inside the rotunda shall ring at a minimum of 70 decibels at 10 feet.
- q. For CRJ aircraft with pull down stairs:
 - 1) The cab floor shall be configured to avoid placing excessive pressure on the aircraft door, and shall protect the aircraft door cable from inadvertent contact
 - 2) Handrails shall be provided to guide passengers during transition from cab floor to top step of aircraft door, and shall be removable for stowage when not in use.

4. Canopy

- a. The aircraft end of the cab shall be equipped with a folding bellows aircraft closure (canopy). When fitted against the fuselage, the canopy shall surround both the open aircraft door and the doorway to provide shelter for the passengers transferring between the PBB and the aircraft. The canopy shall be positioned using the control panel located in the cab unit.
- b. The exterior covering shall not absorb water and shall be highly tear resistant. The contacting seal shall be made of soft material to prevent scratching or damage to the aircraft skin. The seal shall be segmented and easy to remove for replacement. Each side of the canopy shall be capable of independently sealing against the aircraft contours.
- c. A flame retardant material, compliant with NFPA 415 requirements, shall be sandwiched between the two exterior surfaces of the canopy.

5. Control Station

- a. The control station shall be located at the cab end of the PBB. It shall provide the operator with a control console, service utilities, and control interlocks required to accomplish the PBB operations. The control console shall be oriented facing forward in full view of the aircraft during the maneuvering and docking operations.
- b. Windows shall be provided beside the control panel, in both exterior cab side walls and in the cab door and partition wall. This shall provide the operator with full view of the aircraft during bridge operations. A cab window de-icer shall be installed to keep the operator's viewing window free from ice, condensation, or frost.
- c. The control console shall be designed to allow easy operation by personnel possessing no special skills and with minimal training. All controls necessary for the operation and control of the PBB shall be located on or near the control console face and shall be grouped on the

faceplate in functional groups. The control console shall include the following controls:

- 1) A three-position master key switch used to select "OFF", "ON", or "AUTO" (automatic leveling). The key shall be able to be removed only in the "OFF" or "AUTO" positions.
- 2) Emergency Stop Button used to shut off power to all drive systems; it also shall shut off the Auto Leveler system and activate an audible alarm.
- 3) Raise and Lower buttons to raise or lower the cab to match the mating aircraft doorsill level.
- 4) Rotate Head Left and Rotate Head Right buttons to activate an electrical driven motor that rotates the cab head left or right.
- 5) A joystick shall be used to control all forward and reverse motion. The speed of travel shall be proportional to the movement of the joystick. This input shall allow the bogie wheel speed to ramp up or down to provide smooth starts and stops. Steering of the bogie shall be controlled by a rocker switch located on the joystick. In lieu of the rocker switch, a four way joystick may be provided.
- 6) The Canopy In button that retracts the canopy.
- 7) The Canopy Out button that extends the canopy towards the mating aircraft.
- 8) The Canopy Up button shall be used to move the canopy up into position.
- 9) The Canopy Down button shall be used to move the canopy down into position.
- 10) Adjustable Cab Floor switch shall be used to select the mode of operation of the adjustable floor. There shall be two settings on the power switch, MAN and AUTO. The MAN setting shall be for manual operation of the adjustable floor. The AUTO setting shall enable the adjustable floor to automatically raise or lower, keeping it parallel to the aircraft doorsill as the PBB is raised or lowered.
- 11) Adjustable Up floor button and Down floor button shall be used to raise and lower the adjustable floor manually so it is parallel to the aircraft door sill.
- 12) Platform Out button shall be used to extend the cab floor left hand side extendable platform out toward the aircraft.
- 13) Platform In button shall be used to retract the cab floor left hand side extendable platform.

14) Exterior Bridge Lights button shall be used to turn on the exterior flood lights to illuminate the apron.

d. The control console shall have several indicators that display current status of the PBB functions and ancillary components. At a minimum, these indicators shall be as specified in the current Advisory Circular 150/5220-21. Additional indicators shall be as follows:

1) Servicing required indicator light shall illuminate when there is a malfunction in the system.

2) Handrail Contact indicator light shall illuminate when the sensor comes in contact with the aircraft handrail.

3) Auto Leveler Fault indicator red light shall illuminate, as well as provide an audible warning, when there is a malfunction with the auto leveler.

4) Bridge Swing Limit indicator light shall illuminate when the PBB over rotates and trips the limit switches in the rotunda. When the limit switch is tripped, it shall shut down all functions.

5) A cab floor height indicator shall show when the cab floor elevation is at the proper height (theoretically correct) for each aircraft to be serviced.

6) A wheel position indicator shall show the orientation of the wheels along with the true tunnel centerline, regardless of the cab's rotational position.

7) Auto Leveler ON indicator amber light shall illuminate when the auto leveler is activated. This function maintains the PBB level with the aircraft door.

8) Canopy Extended indicator red light shall illuminate when the canopy is extended to the aircraft. When the canopy is deployed, the movement of the PBB shall be shut down until the canopy is in the fully retracted position.

9) Cable Hoist Extended indicator red light shall illuminate when the Cable Hoist is extended and the Ground Power Unit is running. The light shall extinguish only when the Cable Hoist is completely retracted. The bridge movement controls shall be deactivated when this indicator light is on.

10) PCA Unit On Indicator shall illuminate when the bridge and/or the aircraft are using the PCA unit. The bridge movement controls shall be deactivated when this light indicator is on.

11) Cab Floor De-Icer On amber indicator light shall illuminate when the Cab Floor De-Icer is on.

6. Service Access

a. A service door, landing and stairs leading to the apron areas shall constitute the service access. The service access must have provisions to

be located on either the right hand or the left hand side of the fixed tunnel unit as determined by the owner. The service door shall provide access between the PBB and apron for authorized personnel.

- b. The service door shall meet the following specifications:
- 1) A minimum 36" by 80" steel, hollow core, ¾ hour fire rated with a wire reinforced glass window (658 sq.in min.) and stainless steel kick plate.
 - 2) Exterior gutter or drip diverter over the service door.
 - 3) Weatherproof, heavy-duty, door closer with commercial hardware.
 - 4) Vertically adjustable door-bottom weather stripping installed on the inside of the door.
 - 5) Weather stripping installed on the inside of the door.
 - 6) A cipher door lock shall be provided to the Owner's specification.
- c. The service stair landing shall be parallel to the adjacent fixed tunnel unit floor. The landing shall be made of hot dipped galvanized steel, open mesh grating. The landing shall be protected on the open sides by tubular steel painted handrails that meet OSHA standards. A switch operated weatherproof light shall be located above the landing. The switch shall be located inside the service door.
- d. The service stairs shall provide access from the ramp to the service door landing and shall be equipped with self-adjusting risers and tread made from expanded metal with a serrated edge for a gripping surface. All steps shall have an equal rise. The minimum tread width shall be 28.0 inches. The length of the stair stringers shall vary depending on the type of aircraft serviced. The service stair shall be protected on each side by handrails. The service steps shall be hot dipped galvanized steel and the handrails shall be painted to match the exterior bridge color.
- e. A service ladder shall provide maintenance access to the roof. The permanent steel ladder with a safety cage shall be designed to extend from the service stair platform to a catwalk mounted to the roof of the PBB. The catwalk shall provide access to servicing of the lift motors and a roof mounted pre-conditioned air unit if supplied. The catwalk shall be made of hot dipped galvanized steel, open mesh grating. Painted tubular handrails shall surround the catwalk. The ladder and catwalk shall comply with OSHA standards.

7. Vertical Drive System

- a. The vertical drive system shall be an electrical/mechanical, hydraulic, or approved equal and meet the minimum requirements of the current edition of FAA AC 150/5220-21. It shall protect against uncontrolled movement in the event of a power or mechanical failure. If a hydraulic system is provided it shall include low-temperature hydraulic fluid.

8. Horizontal Drive System

- a. The horizontal drive system shall meet the minimum requirements of the current edition of FAA AC 150/5220-21. It shall be protected against uncontrolled movement during a power or mechanical failure. If a hydraulic drive system is provided it shall include low-temperature hydraulic fluid.
- b. The horizontal drive shall have a variable speed capability and have smooth starts and stops.
- c. The PBB shall have solid rubber tires.

D. ELECTRICAL SYSTEMS AND CONTROLS

1. Power and Wiring Requirements

- a. The standard bridge main power circuit shall be a 480 volt, 3 phase, 4 wire, 60 Hz, 60 amps, with ground.
- b. Power from the terminal is detailed in the electrical drawings. It is provided via a panel/junction mounted to the exterior of the building. It is the PBB installation Contractors to extend the electrical service from the panel/junction mounted to the exterior of the building.

2. Duplex Receptacles

- a. Interior - Two (2) 120 volt, U ground, 15 amp, three-conductor duplex receptacles shall be provided inside bridge. One shall be located in the rotating cab section near the control console and the other in the corridor of the rotunda assembly.
- b. Exterior - One (1) weatherproof, GFI protected, 120 volt, U ground, 15 amp, three-conductor duplex receptacle shall be located on the bogey system.

3. Telephone Circuit - ~~A six pair (twelve conductor) wire outlet for installation of telephone or intercom equipment shall be located near the control console.~~ Provide and wire an outlet/jack for installation of a telephone to be provided by the Owner. The outlet shall be located near the control console. Provide one CAT 6 cable from the terminal building to the cab of the passenger boarding bridge. Provide junction boxes, pull boxes, etc. as needed. Interior to the terminal building, this cable shall terminate in I.T. Room south.

4. Switches

- a. Interior Lighting

- 1) Three-way switches shall be provided for the interior lighting at two locations, with one at the terminal door and the other in the rotating cab of the PBB.
 - b. Exterior Lighting
 - 1) A pushbutton to control the flood lamps shall be located on the control console.
 - 2) The exterior rotating cab light switch shall be located in the cab near the control console.
 - 3) The service stairs light switch shall be located inside next to the service door.
 - c. Limit Switches – At a minimum, the following limit switches shall be required:
 - 1) Swing limit switches to prevent over rotation of the bridge.
 - 2) Swing limit switches set on site to provide operational site specific site limits.
 - 3) Swing limit switches to prevent over rotation of the cab.
 - 4) Vertical limit switches to detect maximum and minimum travel of the vertical drive system.
 - 5) Canopy limit switches for operational limits on the canopy travel.
 - 6) Telescopic tunnel limit switches to prevent over-travel of the tunnels.
 - 7) Optional sensors for handrail (pressure sensor) and aircraft door safety shoe sensor are available.
5. Auto Level
- a. The PBB shall be equipped with an automatic leveling system. This system shall allow the bridge to follow changes in the aircraft elevation that occur during aircraft boarding and unloading. The wheel-type-leveling sensor shall be located on the right-hand side of the cab and be in full view of the operator at the control console. The autolever shall be engaged when the master key switch is positioned to “AUTO”.
 - b. The auto level system shall be designed in accordance with the following specifications:
 - 1) In the event of a main bridge circuit failure, an alarm shall be triggered to indicate that all functions are inoperable.

- 2) Shall stop vertical travel in the event the system does not neutralize within a pre-set adjustable distance of 1-inch to 6-inch or of a certain time limit (6 seconds maximum).
- 3) Returning the auto level switch to the "OFF" position shall reset the system.
- 4) An audible and visual warning device shall be installed at the control console.

6. Interlocks and Sensors

- a. Interlocks shall be installed to ensure safe operation of the PBB. Interlocks and indicators for the PCA, GPU, service door, shall be standard as part of the equipment.
- b. The canopy shall be interlocked to prevent forward movement of the PBB unless the canopy is in the retracted position.
- c. The PBB shall be equipped with sensors to prevent dangerous contact with aircraft during docking.

E. 400Hz / 28.5 VDC POINT OF USE AIRPORT GROUND POWER (GPU)

1. The Contractor shall furnish and install a bridge-mounted ground power unit capable of providing 400 Hz and 28.5 VDC to parked aircraft. The Contractor shall propose the size of the unit according to the range of aircraft specified herein. Minimum output current shall be 90kVA (260Amps) at .8 power factor load continuous. The systems shall be designed to meet the following criteria and be fully installed and tested by the Contractor.
 - a. 400 Hz/ and 28.5 VDC in a single package
 - b. Shall be a low profile type and mounted to the PBB.
 - c. Shall be constructed in a weatherproof lightweight cabinet.
 - d. Shall be designed to match the aircraft listed herein.
 - e. Shall include two (2) Operation and Maintenance Manuals
 - f. The contractor shall provide an on-site training to the Owner prior to commercial use of the equipment.
 - g. Shall have overall efficiency of at least 91% at 50%-load and 95% at full load.
 - h. The 400 Hz power system shall at a minimum be capable of the following overload capacities:
 - 125% for 10 minutes
 - 150% for 30 seconds

- 200% for 10 seconds
 - i. The 28.5 VDC power system shall at a minimum be capable of the following overload ratings:
 - 28.5 VDC
 - 600 amps Continuous
 - 2500 amp starting current
 - j. Shall operate at an ambient temperature range from -40° F to +120°F
 - k. Shall be capable of operating with an input of 480 VAC, ranging from 45-65 Hz.
 - l. Output shall be 115/200 VAC, adjustable by +/- 10%. Additionally, the unit shall be capable of providing 28.5 VDC for aircraft startup.
 - m. The unit shall utilize fault monitoring systems capable of detecting, at a minimum, input/output voltage deviations, overload conditions, faulty circuits, and overheating conditions. The unit shall automatically shut down in the event of a fault, and shall display the fault in text on the control panel.
 - n. Controls for the unit shall include a start push button and a stop/reset push button.
 - o. Provide output cables, cable hoist and cable sling. The 400 Hz/28.5 VDC cable hoist shall provide a convenient means to stow a ground power cable while not connected to the aircraft. The hoist shall retrieve and deliver the ground power cable between the passenger boarding bridge roof and the parking ramp. Remote controls for the hoist shall be located at the apron level. The ground power cable shall be able to be removed temporarily from the hoist mechanism by ramp personnel. This shall allow service to the aircraft mix while the passenger boarding bridge is docked to the aircraft. The cable hoist shall be a self-contained assembly that requires only fused 480/60 Hz input power and control signals.
 - p. The Contractor shall provide and install all input power to the GPU unit including over current protection and disconnects mounted on the rotunda column.
- F. POINT OF USE PRECONDITIONED AIR SYSTEM (PCA)
 - 1. The Contractor shall furnish and install a bridge-mounted pre-conditioned air unit. The unit shall be automatically controlled, bridge-mounted, electric air conditioning unit that provides ventilation, cooling, dehumidifying, filtering, and heating of air supplied to the passenger boarding bridge and parked aircraft. The pre-conditioned air unit shall be designed to provide comfortable passenger boarding bridge and cabin temperatures for passengers and crew during pre-flight, turn-around, overnight parking, and maintenance operations for the specified aircraft types year-round. In addition, the Contractor shall provide a push-button control system capable of serving the range of aircraft specified, and shall provide appropriately sized ramp-level duct storage. The Contractor shall be responsible

for sizing the unit based on the proposed boarding bridge, the range of aircraft specified, and seasonal climatic variations in Bangor Maine. The preconditioned air system shall be designed to meet the following criteria and be fully installed and tested by the Contractor.

- a. shall be bridge-mounted, fixed package air-cooled direct expansion or air handling unit and associated controls and accessories capable of the cooling, heating and ventilation of commercial aircraft docked at the PBB. It shall include bridge heat/cool options for supplying conditioned air to the PBB prior to aircraft's arrival. The heat/cool option shall be used to minimize the size of the PBB heating and cooling units.
- b. Shall include cabin temperature sensor, electrical, and mounting.
- c. The Contractor shall ensure that the PCA is rated for and capable of providing sufficient cooling, heating, and ventilation to service the list of aircraft specified herein. At minimum, a 30-ton unit shall be provided.
- d. The Contractor shall provide on-site training prior to commercial use of the equipment.
- e. Shall include a hose basket and all required accessories for complete functioning system not limited to supply hoses and necessary reducers/adaptors for the aircraft listed herein.
- f. Shall provide two (2) Operation and Maintenance Manuals.
- g. The Contractor shall provide and install all input power to the PCA unit including over current protection and disconnects to be located on the rotunda column.

G. PBB COOLING UNIT

The Contractor shall furnish and fully install a cooling unit for the passenger boarding bridge. The unit shall be automatically controlled, bridge-mounted, electric air conditioning unit that provides ventilation, cooling, air supplied to the passenger boarding bridge. The Contractor shall be responsible for sizing the unit based on the size of the proposed boarding bridge, fixed tunnel, PCA bridge heating/cooling option, and seasonal temperatures in Bangor Maine. At a minimum this shall be a 5-ton unit.

H. PBB FORCED HOT AIR HEATING UNIT

The Contractor shall furnish and fully install a heating unit for the passenger boarding bridge. The unit shall be automatically controlled, bridge-mounted, electric forced air unit that provides heating of air supplied to the passenger boarding bridge. The Contractor shall be responsible for sizing the unit based on the size of the proposed boarding bridge, fixed tunnel, PCA bridge heating/cooling option, and seasonal temperatures in Bangor Maine.

I. MISCELLANEOUS OWNER SELECTED OPTIONS

All options shall meet industry standards. It is the Owner's intent to include all of the following options if sufficient funding is available. If sufficient funding is not available the

Owner may eliminate some or all of the following options to bring the contract within available funding. Should such instance occur, the Contractor shall provide a schedule of values for each item, and the Owner will select the items to be removed. The cost associated with the removed items will be deducted from the lump sum bid price.

1. One "Mobile Jet bridge Adaptor" as required for boarding regional jets listed herein. The Adaptor shall meet the requirements of AC 150/5220-21.
2. All flooring shall be rubber.
3. Bird nest prevention package.
4. Include bag slide mounting provisions for future bag slide.
5. Provide auto positioning presets for the Aircraft listed herein. Presets shall be programmed by the Manufacturer and adjustable in the field.
6. R8 ceiling and wall insulation upgrade
7. LED lighting upgrade
8. Towbar and tow lugs
9. Fire extinguishers
10. Heated convex mirror for the PBB operator
11. Handrails both sides at transitions
12. Bogey wheel cover

PART 2 – MATERIALS

2.1 PASSENGER BOARDING BRIDGE AND FIXED TUNEL

- A. Materials used to construct the passenger boarding bridge and fixed tunnel shall meet the minimum requirements of FAA Advisory Circular 150/5520-21C, NFPA 415, and applicable codes and standards.

2.2 CONCRETE

- A. Concrete used to construct the foundations shall meet the requirements of 03 30 00 Cast-in-place concrete. (FAA Specification P-610 Structural Portland Cement Concrete).
- B. Unless specified otherwise by the Contractor's foundation designer reinforcing steel used to construct the foundations shall meet the requirements of ASTM A 615 Grade 60.

2.2 RIGID STEEL CONDUIT

- A. All rigid steel conduits shall be furnished and installed in accordance with Section 26 05 33 or 26 05 43 of these Specifications or wherever else such conduit may be deemed necessary to facilitate the proper installation of the various components of the required work.
- B. Rigid steel conduit shall be used for the power supply between the terminal and the panels or disconnects mounted to the rotunda column.
- C. Conduits shall be continuous to outlets and from outlets to cabinets, junction or pull boxes and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from service to all outlets. Terminations of all conduits shall be furnished with double-lock nuts and grounding bushings.

2.3 ALUMINUM CONDUIT

- A. All aluminum conduits shall be furnished and installed in accordance with Section 25 05 33 of these Specifications, where indicated on the Drawings, or wherever else such conduit may be deemed necessary to facilitate the proper installation of the various components of the required work.
- B. Aluminum conduit may be used for branch circuits and main feeders to light and power panels where wiring is to be installed exposed and in mechanical spaces.
- C. Conduit shall be continuous between outlets, making a continuous electrical system for bonding.
- D. Connector and couplings shall be water tight set screw style, except in explosion-proof and water tight locations.

2.4 WIRES AND CABLES

- A. All conductor wire and cable shall consist of 98% conductivity copper with 600 volt insulation manufactured in strict accordance with the requirements of the Board of Underwriters and AIEE.
- B. No wires smaller than No. 12 AWG shall be used for any branch circuit unless notes on plans for special system circuits. Larger sizes shall be used where so indicated.
- C. All 600 volt wire and cable shall be single conductor suitable for use in wet areas and dry locations, shall have an insulation that is moisture and heat resistant cross links thermosetting polyethylene without an outer jacket, shall be type "THNN" as manufactured by General Electric, Collyer or Rome Cable "or equal" wire sized No. 12 and No. 10 AWG shall be solid. Sizes 8 and larger shall be standard.

2.5 JUNCTION AND PULL BOXES

- A. Junction or pull boxes shall be furnished and installed according to Section 26 05 33 of these Specifications, where indicated and wherever else such a box may be deemed necessary to facilitate the pulling or splicing of wires or cables.
- B. The covers of the boxes shall be designed for quick removal. Where junction boxes are required for a splicing box for special recessed fixtures, consult the Engineer before installing boxes for these fixtures and determine the exact location of the boxes.
- C. Each feeder passing through a pull box shall be tagged or designated in some other approved manner. If tags are used, they shall be of fire-proof material.
- D. Locations of junction boxes and pull boxes shall meet the approval of the Engineer. Generally, junction boxes and pull boxes shall not be exposed in finished spaces; where necessary, reroute conduits or make other arrangements to meet the approval of the Owner.
- E. Exterior junction boxes will be gasketed and weather tight.

2.6 DISCONNECT SWITCHES

- A. Disconnect switches for all motors shall be furnished and installed where indicated and wherever else such a switch may be deemed necessary to facilitate the proper installation of the required electrical equipment.

2.7 ENCLOSURES

- A. All power supply enclosures, panels, disconnects, junction boxes, and the like exposed to direct weather shall be NEMA 4X.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. The entire work provided in the Specification shall be constructed and finished in every respect in a workmanlike and substantial manner. It is not intended that the Specifications shall detail every pipe, fitting and appliance, but this subcontractor shall furnish and install all such parts as may be necessary to complete the system in accordance with applicable codes, the best trade practice, and satisfaction of the Owner.

3.2 PROCEDURE

- A. No work shall begin until the airfield safety and phasing items are installed and accepted by the Owner. All work must be completed in accordance with the construction safety and phasing plan, the Contractor's safety plan compliance document, and all SIDA rules.
- B. The Contractor shall provide all labor and materials necessary for the complete and substantial execution of the Work including all transportation, scaffolding, apparatus, utensils, tools etc. required for the faithful performance of the Work to the true intent and meaning of the Specifications and instructions. All workmanship and materials shall be of the best of their respective kinds.
- B. The Contractor shall store his/her materials and equipment prior to installation only where designated by the Owner. He shall be responsible for all his/her property stored on the premises and shall hold the Owner free from liability for loss by theft or carelessness of employees of the Owner or of other Contractors. The Contractor must take particular care to protect any finished work from injury or defacement and must remedy, at his/her own expense, any injury caused thereto by his/her operations. After completion of the Work, the Contractor shall remove all waste, rubbish and other materials left as a result of his/her operations and leave the premises in clean condition.

3.3 FIELD MEASUREMENTS

- A. The Contractor shall verify in the field all measurements necessary for his/her Work and shall assume responsibility for this accuracy.

3.4 EXAMINATION OF THE SITE AND CONTRCT DOCUMENTS

- A. Before submitting prices or beginning work, the Contractor shall make a thorough examination of the Contract Documents.

- B. No claim for extra compensation will be recognized if difficulties are encountered which examination of the Contract Documents or site prior to executing contract would have revealed.

3.5 CLEANING AND PROTECTION

- A. All materials and equipment shall be carefully protected during shipment and protected during installation and properly handled and stored at the job site so as to prevent damage. The Contractor shall assume full responsibility for protection of work until its completion and final acceptance.
- B. Upon completion of the Work, the Contractor shall clean all fixtures and equipment and replace damaged parts. If the Contractor fails to fulfill his/her obligation, this Work will be taken care of at his/her expense.

3.6 FOUNDATIONS

- A. The new support columns shall be affixed to new foundations. Foundations shall be designed and installed by the Contractor. No separate measurement or payment will be made for location of utilities, pavement removal, excavation, dewatering, backfill, pavement restoration or other incidentals required to construct the foundations.

3.7 WIRING AND CONDUIT

- A. In general, all conduits shall be concealed unless otherwise indicated to be run exposed.
- B. Exposed conduits shall be run parallel to or at right angles to the walls of the building and all bends shall be made with standard conduit ells or conduits bent to not less than the same radius. Horizontal runs of exposed conduits shall be close to the ceiling beams, passing over water or other piping where possible and shall be supported by pipe straps or other approved means, not more than 5 ft. apart. Installation of exposed conduits in finished areas of the building shall be checked with the pattern of the structural members and, when completed, is to present the most unobtrusive appearance possible. No exposed conduits will be permitted on walls or partitions in public areas (Owner's approval required).
- C. In no place shall a conduit be run within 3 in. of a hot water pipe or appliance except where crossing is unavoidable and, in that case, the conduit shall be kept at least 1 in. from covering or pipe crossed.
- D. Conduits shall be supported on approved type of galvanized wall brackets, ceiling trapeze, strap hangers or pipe straps, secured by means of toggle bolts on hollow masonry units or expansion bolts in concrete or brick, matching screws or metal surfaces and wood screws on wood construction. No nails shall be used as a means of fastening boxes or conduits. Refer to Section 26 05 29 of these Specifications.
- E. In general, no splices or joints will be permitted in either feeder or branches except at outlets or accessible junction boxes.
- F. All splices in wire #8 AWG and smaller shall be standard pigtail made mechanically tight, soldered and insulated with proper thickness of insulating tape. Wire splicing nuts as manufactured by Minnesota Mining Co. (Scotch Lock), Ideal wire nuts (or approved equal) may be used, subject to the local wire inspector.

- G. Wire #6 and larger shall be connected to panels and apparatus by means of approved lugs or connectors. Connectors shall be solderless type, sufficiently large to enclose all strands of the conductor and securely fastened.
- H. A separate green ground conductor shall be provided with every home run. The conduit will not be used as a ground connection.

3.8 GROUNDING

- A. The Contractor shall furnish and install all fittings, clamps, conduits and wire of proper size to make ground connections between all apparatus and conduit required by these Specifications and by the latest edition of the National Electrical Code. Any ground wires shall be run in conduit of size required by the National Electric Code.

3.9 FINAL INSPECTION AND TESTING

- A. Prior to electrical test, feeders and branches shall be continuous from service contact point to each outlet; all panels, feeders and devices connected and fuses in plane. Test system free from short circuits and grounds with insulation resistances not less than outlined in the National Electric Code. Provide testing equipment necessary and conduct test in presence of the Owner's authorized representative.
- A. The Manufacturer or manufacturer's representative shall perform thorough operational tests on all systems and components. This shall include but is not limited to demonstrating that that all presets and safety systems are in proper working order.
- B. The Contractor shall furnish all labor, materials, instruments, supplies and service and bear all costs for the accomplishment of tests herein specified. Correct all defects appearing under test and repeat the tests until no defects are disclosed. Leave the equipment clean and ready for use.

METHOD OF MEASUREMENT

The quantity installed shall be measured as completed units in place, accepted, tested and ready for operation. This shall include the following items.

1. New Apron-Drive PBB
2. Rotunda Foundation.
3. Fixed Tunnel
4. Fixed Tunnel Foundation
5. 400Hz/28.5vDC ground power unit (GPU)
6. Pre-conditioned Air Unit (PCA)
7. PBB air conditioning (cooling) unit
8. PBB forced hot air heating unit
9. Miscellaneous Owner Selected Options

METHOD OF PAYMENT

Payment shall be made at the Contract unit price for the items as described above, which price and payment thereof shall constitute full compensation for all labor, materials, equipment, delivery, expenses,

tools and incidentals necessary for completing the installation of the PBB to the complete satisfaction of the Owner.

The Owner will make partial payments on the passenger boarding bridge items in accordance with the agreed upon schedule of values. Progress payments shall be made for the value of work in process, in transit, delivered or installed, plus a 20% profit for the work performed. Progress payments may include site investigations, engineering, materials, and labor costs incurred during the manufacturing process and prior to delivery and installation. The Owner may request documentation to substantiate the value of requested progress payments.

Payment shall be made under:

Item 14 00 00-1	Apron Drive Passenger Boarding Bridge	per Lump Sum
Item 14 00 00-2	Rotunda Foundation	per Lump Sum
Item 14 00 00-3	Fixed Tunnel	per Lump Sum
Item 14 00 00-4	Fixed Tunnel Foundation	per Lump Sum
Item 14 00 00-5	400Hz/28.5vDC Ground Power Unit (GPU)	per Lump Sum
Item 14 00 00-6	Pre-Conditioned Air Unit (PCA)	per Lump Sum
Item 14 00 00-7	PBB air conditioning (cooling) unit	per Lump Sum
Item 14 00 00-8	PBB forced hot air heating unit	per Lump Sum
Item 14 00 00-9	Miscellaneous Owner Selected PBB Options	per Lump Sum

END OF SECTION 14 00 00

13.0 - Insurance.

CONTRACTOR AGREEMENT

INDEMNIFICATION AND INSURANCE REQUIREMENTS:

In consideration of the utilization of Contractor's services by the City of Bangor and other valuable considerations, the receipt of which is hereby acknowledged, Contractor agrees that all persons furnished by Contractor shall be considered the Contractor's employees or agents and that Contractor shall be responsible for payment of all unemployment, social security and other payroll taxes including contributions from them when required by law.

CONTRACTOR hereby agrees to protect, defend, indemnify and hold the Owner and Architect/Engineer and their respective employees, agents, officers and servants free and harmless from any and all losses, claims, liens, demands and causes of action of every kind and character including but not limited to, the amounts of judgments, penalties, interests, court costs, legal fees and all other expenses incurred by the Owner and Architect/Engineer arising in favor of any party, including claims, liens, debts, personal injuries, including employees of the Owner or Architect/Engineer death or damages to property (including property of the Owner, Authority or Architect/Engineer) and without limitation by enumeration, all other claims or demands of every character occurring or in any way incident to, in connection with or arising or directly indirectly out of this Contractor Agreement. CONTRACTOR agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands or suits at the sole handle, of the CONTRACTOR. [The CONTRACTOR's aforesaid indemnity and hold harmless agreement shall not be applicable based upon the sole negligence of the Owner or its Architect/Engineer.](#) This provision is not intended to create any cause of action in favor of any third party against Contractor or the City or to enlarge in any way the CONTRACTOR'S liability but is intended solely to provide for indemnification of the City from liability for damages or injuries to third persons or property arising from CONTRACTOR'S performance hereunder.

CONTRACTOR agrees to maintain in full force and effect:

- a. Comprehensive General Liability insurance written on occurrence form, including completed operations coverage, personal injury liability coverage, broad form property damage liability coverage, XCU coverage and contractual liability coverage insuring the agreements contained herein. The minimum limits of liability carried on such insurance shall be \$5,000,000 each occurrence and, where applicable, in the aggregate combined single limit for bodily injury and property damage liability; \$5,000,000 annual aggregate personal injury liability.
- b. Automobile liability insurance for owned, non-owned and hired vehicles. The minimum limit of liability carried on such insurance shall be \$1,000,000 each accident, combined single limits for bodily injury and property damage. The City of Bangor must be listed as a Certificate Holder on the policy.
- c. Workers' Compensation insurance whether or not required by Maine Statute, with statutory coverage and including employer's liability insurance.

Worker's Compensation Insurance	Statutory
Employer's Liability Insurance	\$100,000 each accident
	\$500,000 disease – policy unit
	\$100,000 disease – each empl.

- The CONTRACTOR hereby expressly agrees that he/she will defend, indemnify and hold the OWNER harmless from any and all claims made or asserted by the CONTRACTOR'S agents, servants or employees arising out of the CONTRACTOR'S activities under this CONTRACT. For this purpose, the CONTRACTOR hereby expressly waives any and all immunity he/she may have under Maine's Workers Compensation Act in regard to such claims made or asserted by the CONTRACTOR'S agents, servants, or employees.
- d. The Contractor will provide All-Risks Builder's Risk Insurance in an amount equal to 100% of the insurable value of the work, Completed Value Form including materials delivered and labor performed. [Manufacturers of Passenger Boarding Bridge Equipment may provide Builder's Risk or Commercial Property Insurance](#). This policy will be written in the name of the Owner, the Contractor, Sub-Contractors, and Sub-subcontractors as their interests may appear. Such policy will also be endorsed so that loss, if any, shall be adjusted with and made payable to the Owner as Trustee for the insured's as their interests may appear; such insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained as the present premises. The All-Risks insurance includes full flood and earthquake coverage. Materials stored off-site and materials in transit will be covered up to \$100,000 per occurrence. ***Builder's Risk Insurance is only required for construction of structures or buildings including work on existing structures and/or buildings.***
 - e. Any and all deductibles on the above described insurance policies shall be assumed by and be for the account of, and at the sole risk of contractor.
 - f. Insurance companies utilized must be admitted to do business in Maine or be on the Insurance Commissioner's list of approved non-admitted companies and shall have a rating of (A) or better in the current edition of Best's Key Rating Guide.
 - g. CONTRACTOR agrees to furnish certificate(s) of the above mentioned insurance to the Owner within fourteen (14) days from the date of this agreement and, with respect to the renewals of the current insurance policies, at least thirty (30) days in advance of each renewal date. Such certificates shall, with respect to comprehensive general liability and auto liability insurance, name the Owner, Architect/Engineer firms designated by Owner as an additional insured (except workers' compensation) and, with respect to all policies shall state that in the event of cancellation [material change or significant modification which will affect the Owner's interest](#), written notice shall be given to the Owner at least thirty (30) days in advance of such cancellation or change.
 - h. The purchase of the insurance required or the furnishing of the aforesaid certificate shall not be a satisfaction of CONTRACTOR'S liability hereunder or in any way modify the CONTRACTOR'S indemnification responsibilities to the Owner or Architect/Engineers.
 - i. It shall be the responsibility of CONTRACTOR to ensure that all subcontractors comply with the same insurance requirements that he is required to meet.

SPECIAL HAZARDS

The Contractor's and Subcontractor's Public Liability, Property Damage, Vehicle Liability, and Vehicle Property Damage insurance coverages shall provide adequate protection against the following special hazards:

- a. Damage or injury to aircraft or persons in aircraft operating on or near the project site,

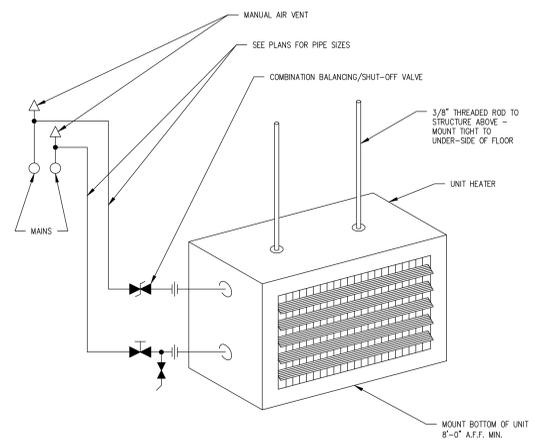
- resulting from any operations under this Contract.
- b. Damage or injury resulting from the use, storage, handling or transportation of explosives in connection with the Contract work.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in the subsection 80-07 titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Section) the sum specified in the contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his or her surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

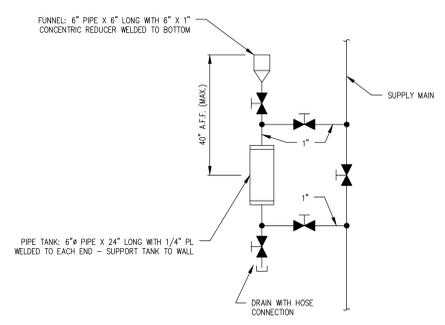
The maximum total time allowed for construction under this contract is **200 calendar days**. The Contractor will be assessed liquidated damages in the amount of \$1,500 for each and every calendar day the work remains incomplete beyond the allowed contract time. **The total dollar value of liquidated damages shall be limited to a maximum of 10-percent of the contract value.**

The passenger boarding bridge and associated items have long lead times. As such, the Contractor may complete the Holding Area construction and may request a temporary suspension of work from the Owner. If granted this suspension will stop the accrual of working days until the boarding bridge arrives and is ready for installation. Suspension of work shall not exceed 90 days and the holding area must be accepted usable space for the Owner during the suspension. No work may occur on days that are not counted towards the contract duration and the Contractor will not be compensated in any way for such delay in work.

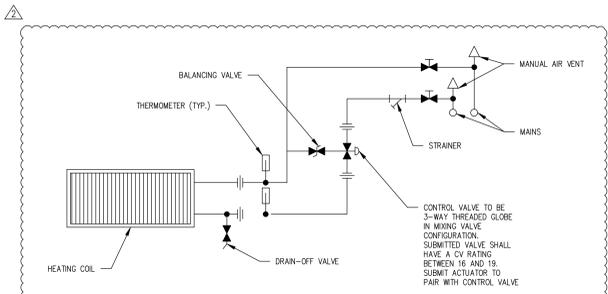
Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the Owner of any of its rights under the contract.



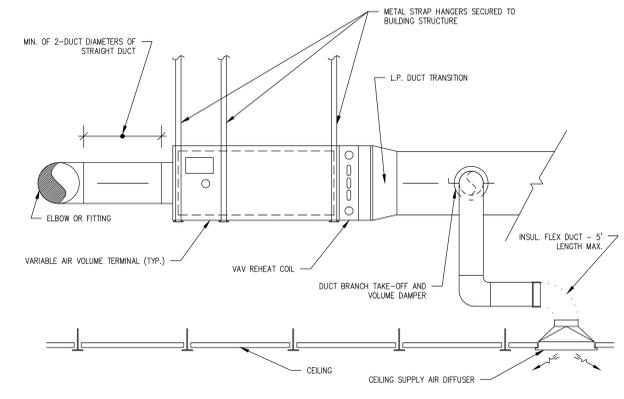
UNIT HEATER PIPING SCHEMATIC
NOT TO SCALE



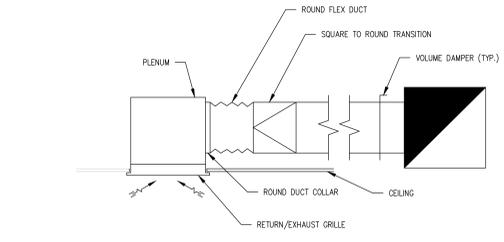
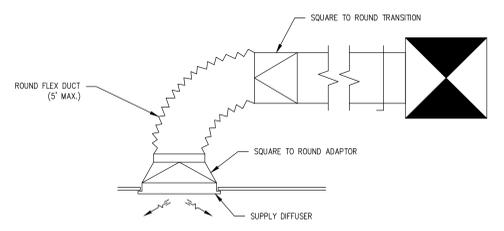
CHEMICAL FEEDER PIPING SCHEMATIC
NOT TO SCALE



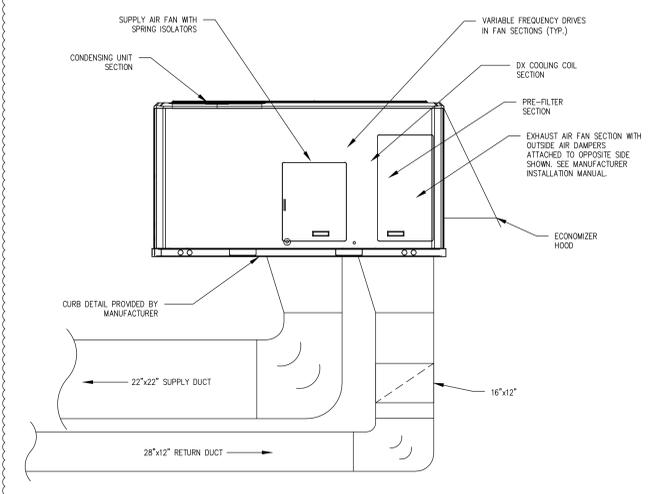
HOT WATER HEATING COIL PIPING SCHEMATIC
NOT TO SCALE



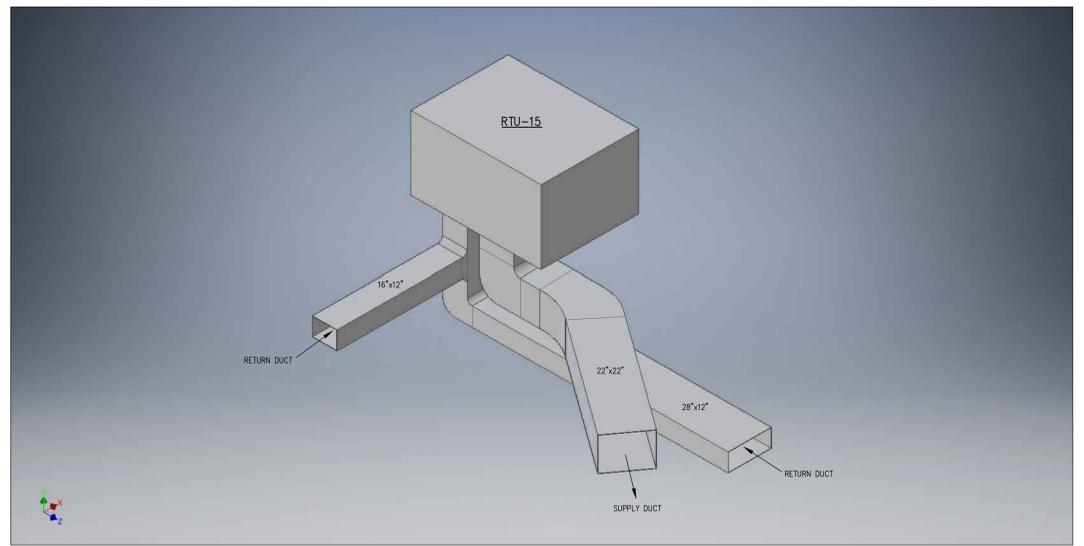
VAV BOX DETAIL
NOT TO SCALE



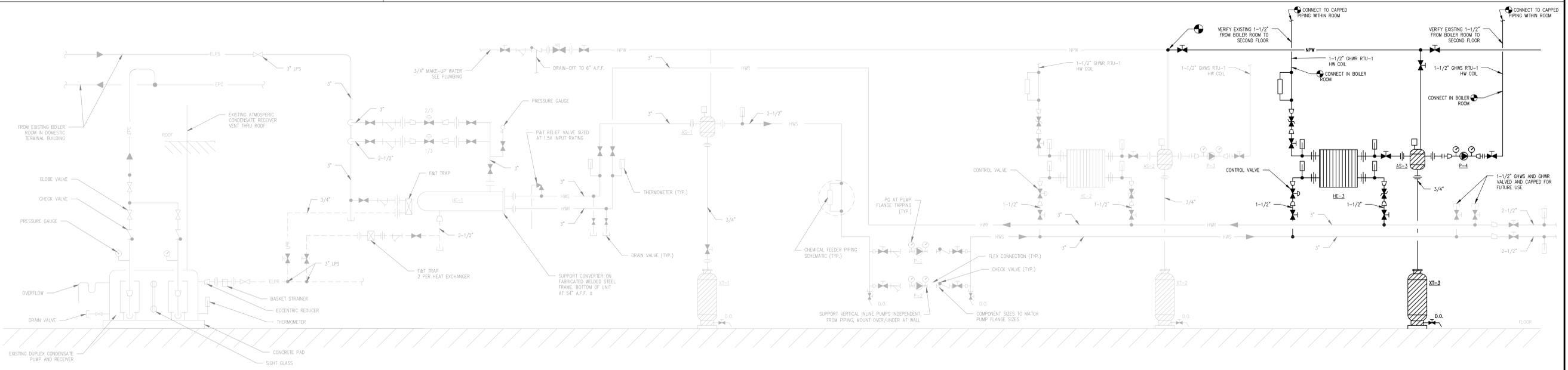
TYPICAL DIFFUSER/GRILLE DETAIL
NOT TO SCALE



RTU-15 DETAIL
NOT TO SCALE



RTU-15 ISO VIEW
NOT TO SCALE



SYSTEM PIPING SCHEMATIC
NOT TO SCALE

Project:
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 GATE 3 PBB & HOLDING AREA
 Client:
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 f. 603.666.7185
 Architect/Project Management:
FENINICK | MACREDE
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 f. 617.350.0051
 Mechanical, Electrical, Plumbing, FP:

Carpenter Associates
 687 Stillwater Ave
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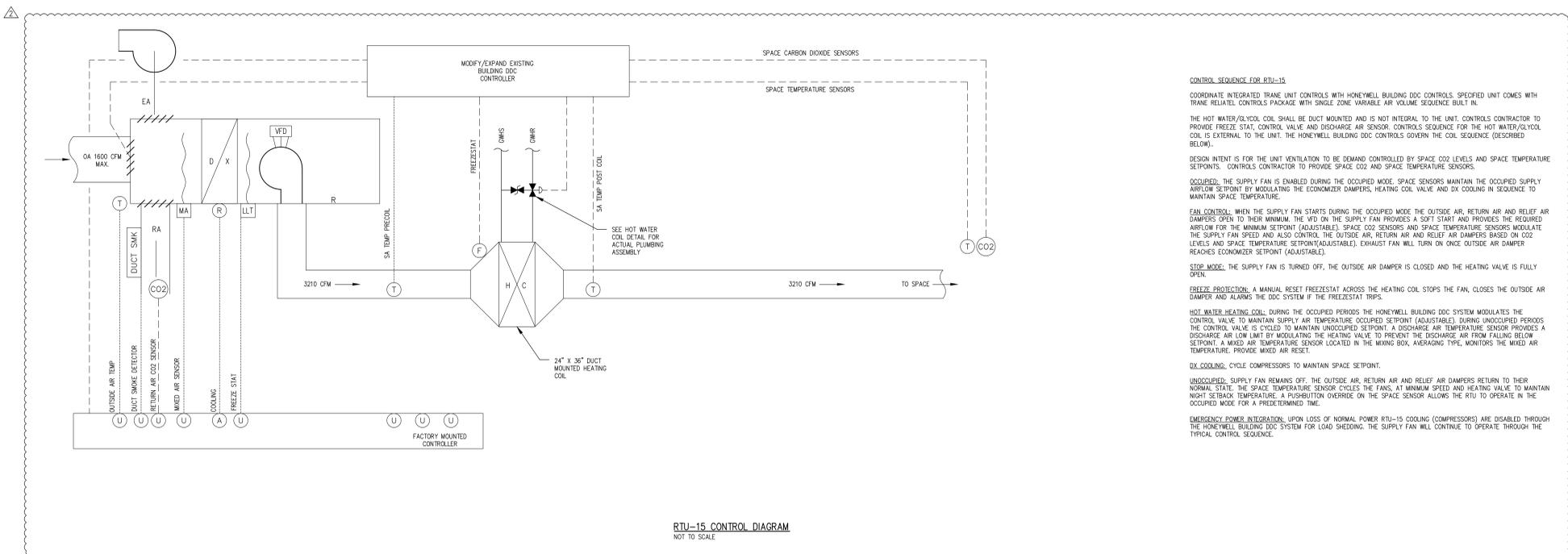
100% BID DOCUMENTS

No.	Date	Revision
1	04-18-2016	ADDENDUM 1
2	04-28-2016	ADDENDUM 3

Job No.: 16011
 Drawn By: JE
 Checked By: RB
 Date: 04-05-2016
 Scale: AS NOTED
 Drawing Title:

MECHANICAL DETAILS

Drawing No. **M-007**



CONTROL SEQUENCE FOR RTU-15

COORDINATE INTEGRATED TRANE UNIT CONTROLS WITH HONEYWELL BUILDING DDC CONTROLS. SPECIFIED UNIT COMES WITH TRANE RELIATEL CONTROLS PACKAGE WITH SINGLE ZONE VARIABLE AIR VOLUME SEQUENCE BUILT IN.

THE HOT WATER/GLYCOL COIL SHALL BE DUCT MOUNTED AND IS NOT INTEGRAL TO THE UNIT. CONTROLS CONTRACTOR TO PROVIDE FREEZE STAT, CONTROL VALVE AND DISCHARGE AIR SENSOR. CONTROLS SEQUENCE FOR THE HOT WATER/GLYCOL COIL IS EXTERNAL TO THE UNIT. THE HONEYWELL BUILDING DDC CONTROLS GOVERN THE COIL SEQUENCE (DESCRIBED BELOW).

DESIGN INTENT IS FOR THE UNIT VENTILATION TO BE DEMAND CONTROLLED BY SPACE CO2 LEVELS AND SPACE TEMPERATURE SETPOINTS. CONTROLS CONTRACTOR TO PROVIDE SPACE CO2 AND SPACE TEMPERATURE SENSORS.

OCCUPIED: THE SUPPLY FAN IS ENABLED DURING THE OCCUPIED MODE. SPACE SENSORS MAINTAIN THE OCCUPIED SUPPLY AIRFLOW SETPOINT BY MODULATING THE ECONOMIZER DAMPERS, HEATING COIL VALVE AND DX COOLING IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE.

FAN CONTROL: WHEN THE SUPPLY FAN STARTS DURING THE OCCUPIED MODE THE OUTSIDE AIR, RETURN AIR AND RELIEF AIR DAMPERS OPEN TO THEIR MINIMUM. THE VFD ON THE SUPPLY FAN PROVIDES A SOFT START AND PROVIDES THE REQUIRED AIRFLOW FOR THE MINIMUM SETPOINT (ADJUSTABLE). SPACE CO2 SENSORS AND SPACE TEMPERATURE SENSORS MODULATE THE SUPPLY FAN SPEED AND ALSO CONTROL THE OUTSIDE AIR, RETURN AIR AND RELIEF AIR DAMPERS BASED ON CO2 LEVELS AND SPACE TEMPERATURE SETPOINT (ADJUSTABLE). EXHAUST FAN WILL TURN ON ONCE OUTSIDE AIR DAMPER REACHES ECONOMIZER SETPOINT (ADJUSTABLE).

STOP MODE: THE SUPPLY FAN IS TURNED OFF, THE OUTSIDE AIR DAMPER IS CLOSED AND THE HEATING VALVE IS FULLY OPEN.

FREEZE PROTECTION: A MANUAL RESET FREEZESTAT ACROSS THE HEATING COIL STOPS THE FAN, CLOSES THE OUTSIDE AIR DAMPER AND ALARMS THE DDC SYSTEM IF THE FREEZESTAT TRIPS.

HOT WATER HEATING COIL: DURING THE OCCUPIED PERIODS THE HONEYWELL BUILDING DDC SYSTEM MODULATES THE CONTROL VALVE TO MAINTAIN SUPPLY AIR TEMPERATURE OCCUPIED SETPOINT (ADJUSTABLE). DURING UNOCCUPIED PERIODS THE CONTROL VALVE IS CYCLED TO MAINTAIN UNOCCUPIED SETPOINT. A DISCHARGE AIR TEMPERATURE SENSOR PROVIDES A DISCHARGE AIR LOW LIMIT BY MODULATING THE HEATING VALVE TO PREVENT THE DISCHARGE AIR FROM FALLING BELOW SETPOINT. A MIXED AIR TEMPERATURE SENSOR LOCATED IN THE MIXING BOX, AVERAGING TYPE, MONITORS THE MIXED AIR TEMPERATURE. PROVIDE MIXED AIR RESET.

DX COOLING: CYCLE COMPRESSORS TO MAINTAIN SPACE SETPOINT.

UNOCCUPIED: SUPPLY FAN REMAINS OFF. THE OUTSIDE AIR, RETURN AIR AND RELIEF AIR DAMPERS RETURN TO THEIR NORMAL STATE. THE SPACE TEMPERATURE SENSOR CYCLES THE FANS, AT MINIMUM SPEED AND HEATING VALVE TO MAINTAIN NIGHT SETBACK TEMPERATURE. A PUSHBUTTON OVERRIDE ON THE SPACE SENSOR ALLOWS THE RTU TO OPERATE IN THE OCCUPIED MODE FOR A PREDETERMINED TIME.

EMERGENCY POWER INTEGRATION: UPON LOSS OF NORMAL POWER RTU-15 COOLING (COMPRESSORS) ARE DISABLED THROUGH THE HONEYWELL BUILDING DDC SYSTEM FOR LOAD SHEDDING. THE SUPPLY FAN WILL CONTINUE TO OPERATE THROUGH THE TYPICAL CONTROL SEQUENCE.

RTU-15 CONTROL DIAGRAM
NOT TO SCALE

Project:

BANGOR INTERNATIONAL AIRPORT
GATE 3 PBB & HOLDING AREA
 Client:
BANGOR INTERNATIONAL AIRPORT
 287 Godfrey Boulevard
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 t. 207.992.4600
 f. 207.945.3607

Prime Consultant, Civil & Structural Engineer:

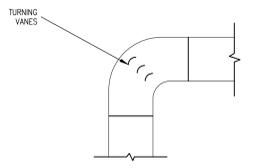
JACOBS
 Two Executive Park Drive, Suite 205
 Bedford, NH 03110
 t. 603.666.7181
 f. 603.666.7185

Architect/Project Management:

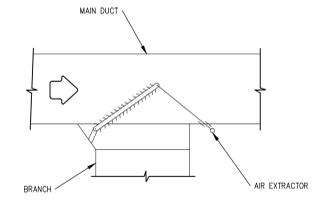
FENNICK | McCREDE
 70 Franklin Street
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Mechanical, Electrical, Plumbing, FP:

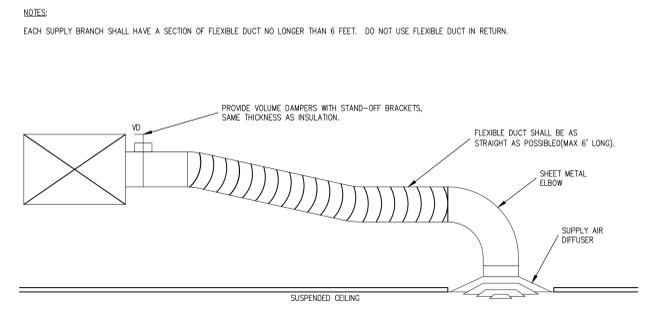
Carpenter Associates
 687 Stillwater Ave
 Old Town, ME 04468
 t. 207.827.8001



90° ELBOW
NOT TO SCALE

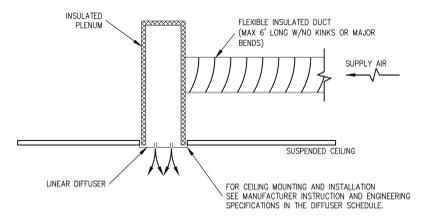


BRANCH TAKE OFF
NOT TO SCALE

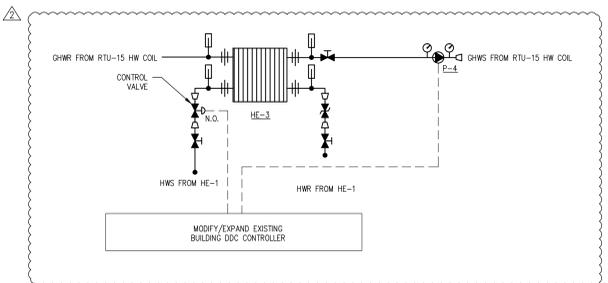


TYPICAL AIR TERMINAL INSTALLATION
NOT TO SCALE

NOTES:
 EACH SUPPLY BRANCH SHALL HAVE A SECTION OF FLEXIBLE DUCT NO LONGER THAN 6 FEET. DO NOT USE FLEXIBLE DUCT IN RETURN.



LINEAR SLOT DIFFUSER DETAIL
NOT TO SCALE



HOT WATER/GLYCOL HEAT EXCHANGER CONTROL
DIAGRAM
NOT TO SCALE

CONTROL SEQUENCE FOR HE-3

PLATE HEAT EXCHANGER HE-3 GLYCOL LOOP SIDE HYDRONIC PUMP P-4 IS ENERGIZED TO OPERATE CONTINUOUSLY WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 65°F (ADJUSTABLE).

THE PLATE HEAT EXCHANGER HOT WATER CONVERTER SIDE CONTROL VALVE MODULATES TO MAINTAIN THE GLYCOL LOOP SUPPLY TEMPERATURE SETPOINT. THE CONVERTER HOT WATER TEMPERATURE SETPOINT VARIES INVERSELY PROPORTIONAL TO THE OUTSIDE AIR TEMPERATURE. THEREFORE, THE GLYCOL LOOP SUPPLY TEMPERATURE ALSO VARIES.

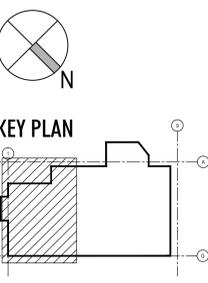
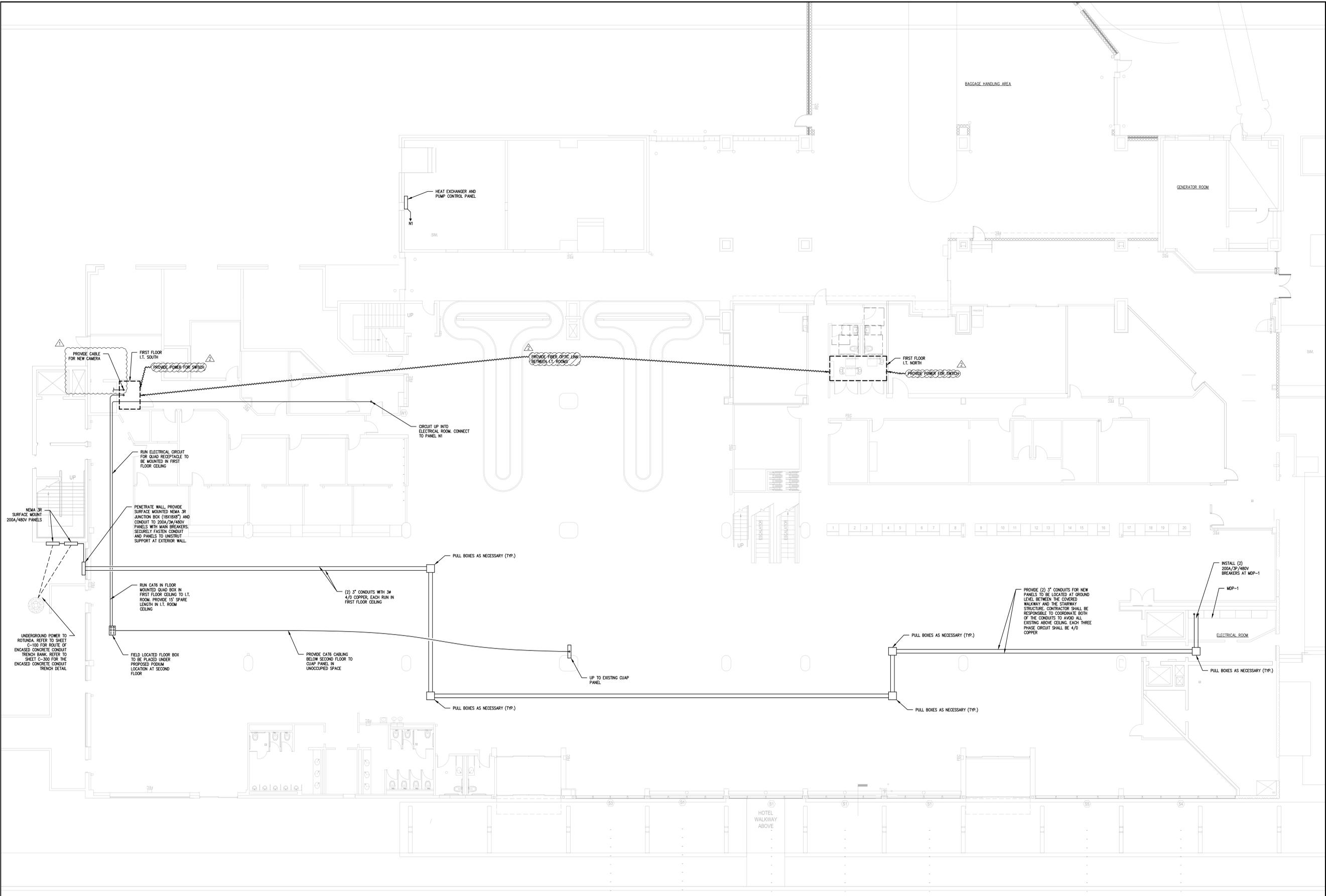
100%
 BID DOCUMENTS

No.	Date	Revision
2	04-28-2016	ADDENDUM 3

Job No.: 16011
 Drawn By: JE
 Checked By: RB
 Date: 04-05-2016
 Scale: AS NOTED
 Drawing Title:

MECHANICAL CONTROLS

Drawing No.
M-008



100% BID DOCUMENTS

No.	Date	Revision
1	04-18-2016	ADDENDUM 1
2	04-28-2016	ADDENDUM 3

Job No.: 16011
 Drawn By: JE
 Checked By: RB
 Date: 04-05-2016
 Scale: 1/8" = 1'-0"
 Drawing Title:

ELECTRICAL PLAN FIRST FLOOR

ELECTRICAL DATA NOTES

- ALL WORK MUST MEET NEC.
- CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS ABOVE CEILING AND VERIFY EXACT ROUTE WITH ENGINEER PRIOR TO BEGINNING WORK.

ADDITIONAL NOTES

- THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK TO INTEGRATE THE NEW DEVICES INTO THE EXISTING SYSTEM. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND INCLUDE ALL ADDITIONAL MOUNTING BRACKETS, PLATES, CABLING, ETC., RECOMMENDED BY THE MANUFACTURER. ALL SYSTEM CABLING, WIRE, AND CONDUIT ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL NECESSARY CABLE, WIRE, CONDUIT, ETC. TO PROVIDE AN ACCEPTABLE FUNCTIONING SYSTEM.
- THE CONTRACTOR SHALL BE AWARE OF ALL CONDITIONS OF THE PROJECT AND IS RESPONSIBLE FOR VERIFYING QUANTITIES AND LOCATIONS OF ALL WORK TO BE PERFORMED. FAILURE TO DO SO SHALL NOT RELIEVE THE CONTRACTOR OF ITS OBLIGATION TO FINISH ALL LABOR AND MATERIALS TO PERFORM THE WORK.

FIRST FLOOR PLAN
 NOT TO SCALE