

ADDENDUM NO. 1

DATE: November 16, 2022

FROM: WSP
300 Wyandotte, Suite 200
Kansas City, MO 64105
Phone 816-702-4244
Email: sam.stallbaumer@wsp.com

TO: Prospective Bidders and Suppliers (All current plan holders)
Eric M. Johnson, President and Director of Airports, MTAA
Andrea McKinnie, Federal Aviation Administration

RE: **Addendum No. 1**
Metropolitan Topeka Airport Authority
New Passenger Boarding Bridge
Topeka Regional Airport
AIP Project No. 3-20-0113-044

This addendum forms an integral part of the Contract Documents and modifies the original Contract Documents dated November 7, 2022 as noted below. Each bidder must acknowledge the receipt of this addendum in the space provided on the BID FORM. **Failure to do so may subject the bidder to be disqualified from bidding.**

This addendum is to include an add alternate 1.

The base bid will be for just the passenger boarding bridge.

The add alt 1 is for the Pre-Conditioned Air Unit (PCA).

PROJECT MANUAL

1. **Table of Contents:** Remove existing sheets TOC-1 of 2 and TOC-2 of 2 replace with new TOC-1 of 2 and TOC-2 of 2. Added additional specifications.
2. **Certification Page:** Relace Sheet CP-1 of 1 with attached CP-1 of 1. Added additional specifications.
3. **Notice to Bidders:** Replace sheets NTB-1 of 4 to NTB-4 of 4 with “Notice to Bidders-Addendum No 1”.
4. **Proposal Form:** Replace sheets PF-1 of 8 to PF-8 of 8 with “Proposal Form-Addendum No 1”.
5. **Specifications:**
 - a. 118502: Add Specification Direct Expansion Point of Use Preconditioned Air Unit
 - b. 118504: Updated specification for PCA configuration if Add Alt 1 is selected.

PLANS

1. **SHEET AP-2.1 (1 Sheet):** New sheet to show PCA configuration if Add Alt 1 is selected.
2. **SHEET PBB-2.1 (1 Sheet):** New sheet to show PCA configuration if Add Alt 1 is selected.
3. **SHEETS PBB-4.1 to 4.4 (4 Sheets):** New sheets to show PCA configuration if Add Alt 1 is selected.

4. **SHEET PBB-5.1:** New sheet to show PCA configuration if Add Alt 1 is selected.
5. **SHEET E101:** New sheet to show PCA configuration if Add Alt 1 is selected.

As a reminder, sealed bids will be received until 2:00 PM (CST) on Tuesday, December 7th by the Metropolitan Topeka Airport Authority, Topeka, Kansas, at the office of the Authority, 6510 SE Forbes Avenue, Suite 1, Topeka, KS 66619 (Topeka Regional Airport), at which time and place bids will be publicly opened and read aloud. Bids received after said time will be returned unopened.

Bidders are reminded to acknowledge receipt of this addendum on their bid proposal form.

ISSUED BY: _____



Sam Stallbaumer, PE

WSP USA, Inc.

END OF ADDENDUM NO. 1

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14 Pages

150/5370-2G Operational Safety on Airports During Construction

95 Pages

APPENDICES

20222041.00 MTAA FOE Passenger Boarding Bridge Geotech Report

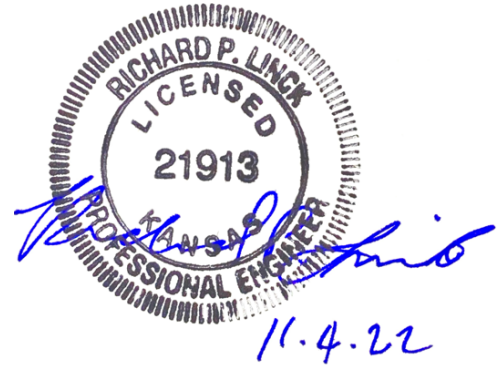
33 Pages

CERTIFICATION PAGE

I am responsible for the following specifications and drawings:

Specifications:

- 03 10 00 Concrete Forming and Accessories
- 03 20 00 Concrete Reinforcing
- 03 30 00 Cast-In-Place Concrete
- 31 63 29 Drilled Concrete Piers and Shafts

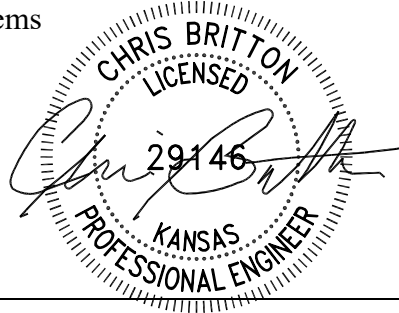


(SEAL)

I am responsible for the following specifications and drawings:

Specifications:

- 11 85 02 Direct Expansion Point of Use Preconditioned Air Unit
- 11 85 04 Passenger Boarding Bridge
- 26 05 19 Low-Voltage Electrical Power Conductors and Cables
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- 26 05 33.13 Conduit for Electrical Systems
- 26 05 33.16 Boxes for Electrical Systems

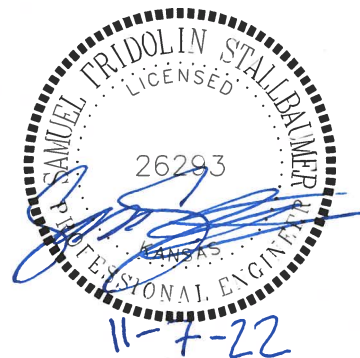


(SEAL)

I am responsible for the following specifications and drawings:

Specifications:

Responsible for Sections: Front End Documents, General Provisions



(SEAL)

Each professional whose signature and personal seal appears above assumes responsibility in these bidding documents only for what is listed above and disclaims any responsibility for all other plans, specifications, estimates, reports, or other documents or instruments not sealed by the signed professional relating to or intended to be used for any part or parts of the project.

NOTICE TO BIDDERS

METROPOLITAN TOPEKA AIRPORT AUTHORITY
NEW PASSENGER BOARDING BRIDGE
TOPEKA REGIONAL AIRPORT
TOPEKA, KANSAS
AIP PROJECT NO. 3-20-0113-044

Sealed bids will be received until **2:00 PM (CST) December 7th, 2022**, and then publicly opened and read at **Metropolitan Topeka Airport Authority Administrative Offices, 6510 SE Forbes Avenue, Suite # 1, Topeka, Kansas 66619** for furnishing all labor, materials and equipment and performing all work necessary for **New Passenger Boarding Bridge, Topeka Regional Airport, Topeka, Kansas, AIP Project No. 3-20-0113-044**.

Copies of the bid documents including project drawings and technical specifications are on file and may be inspected at:

Metropolitan Topeka Airport Authority
6510 SE Forbes Avenue, Suite # 1
Topeka, KS 66619

A “pdf” copy of the project construction drawings and project manual will be provided via e-mail to prospective bidders upon request and at no cost by contacting the project manager at the address provided below or via e-mail. Printing of the project documents from the pdf file are to be borne by the prospective bidder.

Sam Stallbaumer, PE, Project Manager
WSP USA
300 Wyandotte, Suite 200
Kansas City, Missouri 64105
TEL: 816-702-4244
MOB: 210-867-6532
E-Mail: sam.stallbaumer@wsp.com

A pre-bid conference for this project will be held at **Metropolitan Topeka Airport Authority Administrative Offices, 6510 SE Forbes Avenue, Suite # 1, Topeka, Kansas on Monday, November 28th, 2022 at 2:00 PM (CST)**. There will be a Microsoft Teams Link (below) to join virtually. Representatives of the Owner and the Engineer will be present to answer questions. Attendance at the pre-bid conference is **mandatory**.

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 370 029 260 573

Passcode: LC64kR

[Download Teams](#) | [Join on the web](#)

Or call in (audio only)

[+1 213-267-3760,201197207#](#) United States, Los Angeles

Phone Conference ID: 201 197 207#

[Find a local number](#) | [Reset PIN](#)

[Learn More](#) | [Meeting options](#)

CONTRACT WORK ITEMS. This project will involve the following work items and estimated quantities. Prospective bidders are hereby advised that the quantities indicated herein are approximate and are subject to change per the Section 40 of the General Provisions.

Line Number	Description	Estimated Quantity	Unit
1	Passenger Boarding Bridge (Base Bid)	1	LS
2	PCA – Add Alt 1	1	LS

CONTRACT TIME. The anticipated date that project work may commence on or about **March 1, 2023**. The owner has established a contract time of 60 Consecutive Calendar Days. All project work shall be substantially completed within the stated timeframe. This project is subject to liquidated damages as prescribed within the project manual.

BID GUARANTEE. Each proposal must be accompanied by a bid guarantee in the amount of five (5) percent of the total amount of the bid. The bid guarantee may be by certified check or bid bond made payable to Metropolitan Topeka Airport Authority.

BONDING REQUIREMENTS. The successful bidder will be required to furnish separate performance and payment bonds each in the amount equal to 100% of the contract price at the time of contract execution.

AWARD OF CONTRACT. All proposals submitted in accordance with the instructions presented herein will be subject to evaluation. Bids may be held by the Metropolitan Topeka Airport Authority for a period not to exceed **ninety (90) days** from the date of the bid opening for the purpose of evaluating bids prior to award of contract.

Award of contract will be based on the lowest aggregate sum proposal submitted from those bidders that are confirmed as being responsive and responsible. The right is reserved, as the Metropolitan Topeka Airport Authority may require, to reject any and all bids and to waive any informality in the bids received.

Prospective Bidders are hereby advised that award of contract is contingent upon the owner receiving Federal funding assistance under the Airport Improvement Program.

PROJECT SCHEDULE AND LIQUIDATED DAMAGES. The CONTRACTOR agrees to commence construction on or about March 1, 2023, and to have the project substantially completed within 60 Consecutive Calendar Days from the start of construction. A limited Notice-To-Proceed will be issued for the procurement of equipment.

The bidder acknowledges and accepts that for each and every Calendar Day the project remains incomplete beyond the contract time of performance, the substantial completion date, or not open to traffic as stipulated in the preceding paragraphs of this section, the CONTRACTOR shall pay the non-penal amount of \$3,600.00 per calendar day as a liquidated damage to the OWNER.

FEDERAL PROVISIONS. This project is subject to the following partial listing of Federal provisions, statutes and regulations:

Equal Employment Opportunity - Executive Order 11246 and 41 CFR Part 60: The Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth within the supplementary provisions. The successful Bidder shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin.

Goals for Minority and Female Participation – Executive Order 11246 and 41 CFR Part 60:

1. The Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth within the supplementary provisions.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables:

Goals for minority participation for each trade:	9.0%
Goals for female participation in each trade:	6.9%

These goals are applicable to all of the contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its Federally involved and non-federally involved construction.

Certification of Non-Segregated Facilities – 41 CFR Part 60: A certification of Non-Segregated Facilities must be submitted prior to the award of a federally-assisted construction contract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.

Contractors receiving federally assisted construction contract awards exceeding \$10,000, which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause. The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Disadvantaged Business Enterprise – 49 CFR Part 26: The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contracts. In accordance with 49 CFR Part 26.45, the sponsor has established a contract goal of nine percent (9.0%) participation for small business concerns owned and controlled by certified socially and economically disadvantaged enterprise (DBE). The bidder shall make and document good faith efforts, as defined in Appendix A of 49 CFR Part 26, to meet this established goal.

Davis-Bacon Act, as amended – 29 CFR Part 5: The Contractor is required to comply with wage and labor provisions and to pay minimum wages in accordance with the current schedule of wage rates established by the United States Department of Labor.

Debarment, Suspension, Ineligibility and Voluntary Exclusion – 49 CFR Part 29: The bidder certifies, by submission of a proposal or acceptance of a contract, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Individuals or companies listed in the General Services Administration's "Excluded Parties Listing System" will not be considered for award of contract.

Foreign Trade Restriction – 49 CFR Part 30

The Bidder and Bidder's subcontractors, by submission of an offer and/or execution of a contract, is required to certify that it:

- a. Is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);

- b. Has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;
- c. Has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

Buy American Certificate – Aviation Safety and Capacity Act of 1990:

This contract is subject to the “Buy American Preferences” of the Aviation Safety and Capacity Act of 1990. Per Title 49 U.S.C. Section 50101, all steel and manufactured products installed under an AIP assisted project must be produced in the United States unless the Federal Aviation Administration has granted a formal waiver. As a condition of bid responsiveness, Bidders must submit the appropriate Buy American certification with their proposal.

ADDITIONAL PROVISIONS. A complete listing of the provisions applicable to this project can be found in the Supplemental Provisions.

MODIFICATION OF DOCUMENTS. Modification to the project documents may only be made by written addendum by the Owner or Owner’s authorized Representative.

The proposal must be made on the forms provided within the bound project manual. Bidders must supply all required information prior to the time of bid opening.

SUBMITTAL OF PROPOSALS. Additional information and instruction for submittal of a proposal are provided within the Instructions-to-Bidders. Envelopes containing bids must be sealed and addressed to:

Hand Delivery of Proposals: Metropolitan Topeka Airport Authority
6510 SE Forbes Avenue, Suite # 1
Topeka, KS 66619
TEL: 785-862-2362

Mail Delivery of Proposals: Metropolitan Topeka Airport Authority
P.O. Box 19053
Topeka, KS 66619

The upper left-hand corner of the sealed envelope must identify the following information:

CONTRACT PROPOSAL

Bid of {Insert Name of Bidder}

New Passenger Boarding Bridge

AIP Project No.: 3-20-0113-044

To be opened at: 2:00 PM (CST), December 7th, 2022

END OF NOTICE TO BIDDERS

PROPOSAL FORM
METROPOLITAN TOPEKA AIRPORT AUTHORITY
NEW PASSENGER BOARDING BRIDGE
TOPEKA REGIONAL AIRPORT
TOPEKA, KANSAS
AIP PROJECT NO. 3-20-0113-044

BIDDERS NAME: _____

TO: Metropolitan Topeka Airport Authority
6510 SE Forbes Avenue, Suite # 1
Topeka, Kansas 66619

AIP Project No.: 3-20-0113-044

Description: New Passenger Boarding Bridge, Topeka Regional Airport, Topeka, Kansas.

The undersigned Bidder, in compliance with the request for bids for construction of the above mentioned Project, hereby proposes and agrees, if this Bid is accepted, to enter into an agreement with the Owner in the form included in the contract Documents to furnish all labor, permits, material, machinery, tools, supplies and equipment to faithfully perform all work as specified or indicated in the Bid Documents in accordance with the project manual, project drawings and issued Addenda within the specified time of performance for the following prices:

Line Number	Description	Estimated Quantity	Unit	Unit Price	Extension
1	Passenger Boarding Bridge (Base Bid)	1	LS		
2	PCA – Add Alt 1	1	LS		

TOTAL BASE BID (Numeral Format) \$ _____

TOTAL BASE BID (Word Format) _____

TOTAL BASE BID PLUS ADD ALT 1 (Numeral Format) \$ _____

TOTAL BASE BID PLUS ADD ALT 1 (Word Format) _____

ACKNOWLEDGEMENTS BY BIDDER

- a. By submittal of a proposal, the BIDDER acknowledges and accepts that the quantities established by the OWNER are an approximate estimate of the quantities required to fully complete the Project and

that the estimated quantities are principally intended to serve as a basis for evaluation of bids. The BIDDER further acknowledges and accepts that payment under this contract will be made only for actual quantities and that quantities will vary in accordance with the General Provisions subsection entitled "Alteration of Work and Quantities".

- b. The BIDDER acknowledges and accepts that the Bid Documents are comprised of the documents identified within the Instructions to Bidders, including without limitation those dealing with the disposition of Bid guarantee. The BIDDER further acknowledges that each of the individual documents that comprise the Bid Documents are complementary to one another and together establishes the complete terms, conditions and obligations of the successful BIDDER.
- c. As evidence of good faith in submitting this proposal, the undersigned encloses a bid guaranty in the form of a certified check, cashier's check or bid bond in the amount of 5% of the bid price. The BIDDER acknowledges and accepts that refusal or failure to accept award and execute a contract within the terms and conditions established herein will result in forfeiture of the bid guaranty to the owner as a liquidated damage.
- d. The BIDDER acknowledges and accepts the OWNER'S right to reject any or all bids and to waive any minor informality in any Bid or solicitation procedure.
- e. The BIDDER acknowledges and accepts the OWNER'S right to hold all Proposals for purposes of review and evaluation and not issue a notice-of-award for a period not to exceed **ninety (90) days** from the stated date for receipt of bids.
- f. The undersigned agrees that upon written notice of award of contract, he or she will execute the contract within **thirty (30) days** of the notice-of-award and furthermore, provide executed payment and performance bonds within **fifteen (15) days** from the date of contract execution. The undersigned accepts that failure to execute the contract and provide the required bonds within the stated timeframe shall result in forfeiture of the bid guaranty to the owner as a liquidated damage.
- g. By submittal of this proposal, the undersigned acknowledges and agrees to commence work within ten (10) calendar days of the date specified in the written "Notice-to-Proceed" as issued by the OWNER. The anticipated date that project work may commence is on or about **March 1, 2023**. The undersigned further agrees to complete the Project within 45 Calendar Days from the Notice-to-Proceed.
- h. The bidder acknowledges and accepts that for each and every Calendar Day the project remains incomplete beyond the contract time of performance, the substantial completion date, or not open to traffic as stipulated in the preceding paragraphs of this section, the CONTRACTOR shall pay the non-penal amount of \$3,600.00 per calendar day as a liquidated damage to the OWNER.
- i. The BIDDER acknowledges that the OWNER has established a contract Disadvantaged Business Enterprise goal of **nine (9) percent** for this project. The BIDDER acknowledges and accepts the requirement to apply and document good faith efforts, as defined in Appendix A, 49 CFR Part 26, for subcontracting a portion of the prime contract to certified Disadvantaged Business Enterprises (DBE), as defined in 49 CFR Part 26 for purposes of meeting the OWNER'S established goal. The BIDDER, in complying with this requirement, proposes participation by Disadvantaged Business Enterprises as stated on the attached forms, "Utilization Statement" and "Letter of Intent".
- j. The BIDDER, by submission of a proposal, acknowledges that award of this contract is subject to the provisions of the Davis-Bacon Act. The BIDDER accepts the requirement to pay prevailing wages for each classification and type of worker as established in the attached wage rate determination as issued by the United States Department of Labor. The BIDDER further acknowledges and accepts their requirement to incorporate the provision to pay the established prevailing wages in every subcontract agreement entered into by the Bidder under this project.

Compliance Reports (41 CFR Part 60-1.7): Within 30 days after award of this contract, the Contractor/Subcontractor shall file a compliance report (Standard Form 100) if s/he has not submitted a complete compliance report within 12 months preceding the date of award. This report is required if the Contractor/Subcontractor meets all of the following conditions:

1. Contractors/Subcontractors are not exempt based on 41 CFR 60-1.5.
2. Has 50 or more employees.
3. Is a prime contractor or first tier subcontractor.
4. There is a contract, subcontract, or purchase order amounting to \$50,000 or more

k. The undersigned acknowledges receipt of the following addenda:

Addendum Number ____ dated	Received _____
Addendum Number ____ dated	Received _____
Addendum Number ____ dated	Received _____

REPRESENTATIONS BY BIDDER

By submittal of a proposal (bid), the BIDDER represents the following:

- a. The BIDDER has read and thoroughly examined the bid documents including all authorized addenda.
- b. The BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement these referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as Bidder considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by Bidder for such purposes.
- c. The BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by Bidder in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.
- d. The BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- e. The BIDDER has given the Engineer written notice of all conflicts, errors, or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder.
- f. The BIDDER has a complete understanding of the terms and conditions required for the satisfactory performance of project work.
- g. The BIDDER has fully informed themselves of the project site, the project site conditions and the surrounding area.

- h. The BIDDER has familiarized themselves of the requirements of working on an operating airport and understands the conditions that may in any manner affect cost, progress, or performance of the work
- i. The BIDDER has correlated their observations with that of the project documents.
- j. The BIDDER has found no errors, conflicts, ambiguities, or omissions in the project documents, except as previously submitted in writing to the owner that would affect cost, progress or performance of the work.
- k. The BIDDER is familiar with all applicable Federal, State, and local laws, rules and regulations pertaining to execution of the contract and the project work that may in any manner affect cost, progress or performance of the work.
- l. The BIDDER has complied with all requirements of these instructions and the associated project documents.
- m. This BID is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other bidder or over Owner.

CERTIFICATIONS BY BIDDER

- a. The undersigned hereby declares and certifies that the only parties interested in this proposal are named herein and that this proposal is made without collusion with any other person, firm or corporation. The undersigned further certifies that no member, officer, or agent of OWNER'S has direct or indirect financial interest in this proposal.
- b. **Certification of Non-Segregated Facilities:** (41 CFR Part 60-1.8) The BIDDER, as a potential federally assisted construction contractor, certifies that it does not maintain or provide, for its employees, any segregated facilities at any of its establishments and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The BIDDER certifies that it will not maintain or provide, for its employees, segregated facilities at any of its establishments and that it will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Bidder agrees that a breach of this certification is a violation of the Equal Opportunity Clause, which is to be incorporated in the contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms, and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason. The Bidder agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause and that it will retain such certifications in its files.

c. **Trade Restriction Certification:** (49 CFR Part 30)

The Bidder, by submission of an offer certifies that it:

1. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR).
2. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list.
3. has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

d. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion:** (49 CFR Part 29) The Bidder certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the Bidder or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

e. **Buy American Certification:** (Title 49 U.S.C. Chapter 501) As a condition of bid responsiveness, the bidder must certify its compliance with the Buy American preferences established under Title 49 U.S.C. Section 50101. Bidders must complete the Buy American certification that is attached to this proposal form.

ATTACHMENTS TO THIS BID

The following documents are attached to and made a part of this Bid:

1. Bid Guaranty in the form of _____;
2. Completed DBE forms "Utilization Statement" and "Letter of Intent".
3. Evidence of good faith efforts required by 49 CFR Part 26, Appendix A. If proposed DBE goal is met, submittal of evidence of good faith efforts is not required.
4. Evidence of BIDDER'S qualifications per the requirements of the Instructions-to-Bidders.
5. Buy American Certification.

SIGNATURE OF BIDDER

IF AN INDIVIDUAL:

Name: _____

By: _____
(Signature of Individual)

Doing Business as: _____

Business Address: _____

Telephone Number: _____

IF A PARTNERSHIP:

Partnership Name: _____

By: _____
(Authorized Signature)
(Attach Evidence of Authority to sign as a Partnership)

Name and Title: _____

Business Address: _____

Telephone Number: _____

IF A CORPORATION:

Corporation Name: _____

By: _____
(Authorized Signature)
(Attach Evidence of Authority to sign)

Name and Title: _____

Business Address: _____

Telephone Number: _____ (CORPORATE SEAL)

ATTEST:

By: _____
(Authorized Signature)

Name and Title: _____

IF A JOINT VENTURE: *(Attach copy of Joint Venture Agreement)*

Joint Venture Name: _____

By: _____

(Authorized Signature)
(Attach Evidence of Authority to sign)

Name and Title: _____

Business Address: _____

Telephone Number: _____

Joint Venture Name: _____

By: _____

(Authorized Signature)
(Attach Evidence of Authority to sign)

Name and Title: _____

Business Address: _____

Telephone Number: _____

Project Number: AIP 3-20-0113-044

Contractor's Name: _____

List of Subcontractors

The Bidder is required to furnish the following information in accordance with the provisions of paragraph Subcontractors, Etc., in the **Instructions to Bidders** for ALL Subcontractors. Do not list alternate subcontractors for the same work. The Contractor shall list only one subcontractor for each such portion of Work as is defined by the Contractor in his bid. Contractor shall not substitute any person as subcontractor in the place of a subcontractor listed below, except as provided in paragraph Subcontractors, Etc.

The Bidder understands that if he fails to specify a subcontractor for any portion of the Work to be performed under the contract or specifies more than one subcontractor for the same portion of the Work, he shall be deemed to have agreed that he is fully qualified to perform that portion himself and that he shall not be permitted to sublet or subcontract that portion of the Work, except as provided in paragraph Subcontractors, Etc.

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

Subcontractor: _____
Amount: _____ (\$ _____)
(words)

SECTION 11 85 02
DIRECT EXPANSION POINT OF USE PRECONDITIONED AIR UNIT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Direct Expansion (DX), Point-of-Use (POU) Preconditioned Air Units (PCA)
- B. Work Includes: Designing, manufacturing, testing, furnishing, installing and commissioning Direct Expansion, Point-of-Use Preconditioned Air Units rated as indicated herein, with single output and dual output units, as indicated, to provide preconditioned air for both heating and cooling commercial aircraft.
- C. Mechanical Contractor (MC) shall purchase all equipment, materials, etc. defined in this section. MC shall turn over all electrical devices to the Electrical Contractor (EC) for the EC to install, including, but not limited to:
 - 1. PCA Pushbutton Station/Remote Control Station.
 - 2. PCA Control Cable
 - 3. PBB Interlock Cable
 - 4. Temperature Control Cable
 - 5. NOTE - all wire, conduits, cables, brackets etc., except for those items specifically listed in this specification shall be provided (furnished and installed) by the Electrical Contractor. EC shall closely review the Mechanical Drawings which reflect much of these work/items.

1.02 RELATED SECTIONS

- A. Drawings, General Provisions of the Contract, including General and Special Conditions, as well as General mechanical and electrical materials and methods of installation apply to work of this section.

1.03 DEFINITIONS

- A. The terms "Direct Expansion (Dx), Point-of-Use (POU), Preconditioned Air Unit", "PCA Unit", "Unit", and "PCA" as used within this specification, shall be construed to mean the components, sub-components and sub-systems that constitute a complete, operable, and maintainable Direct Expansion, Point-of-Use Preconditioned Air Unit, including all ancillary equipment, such as air hoses, hose couplings, hose storage devices, etc.
- B. PCA Unit Categories
 - 1. Class I: PCA unit shall be single output units capable of serving the following aircraft: ERJ, CRJ, MD 80/90, B-717, B-737/All, B-757/2/3, A319, A320, and A321.

1.04 GENERAL REQUIREMENTS

- A. The PCA unit and all components thereof shall be constructed in accordance with all codes and standards and local laws and regulations applicable to the design and construction of this type of equipment, which are generally accepted and used as good practice throughout the industry, including without limitation, NFPA, Underwriter's Laboratories, OSHA, SAE Publications, American National Standards, Military Standards, etc. The design of all parts and subassemblies shall be in accordance with good commercial practice and shall be the responsibility of the manufacturer to assure safe, efficient, and practical design in keeping with requirements peculiar to this type system.
- B. The Manufacturer shall be a qualified source, who has been regularly engaged in the engineering, manufacturing, and installation of commercial aviation PCA equipment and components for a minimum of five (5) years and with a minimum of five hundred (500) units installed.
- C. Qualified manufacturers will have completed no less than ten (10) jobs of similar size and scope within the last five (5) years.
- D. Manufacturers are required to satisfy all requirements of this specification. Should the Manufacturer desire to deviate from any portion, either because the specification is in error, violation of any law or regulation, or is in need of modification to permit a more satisfactory functional and economical design, they must submit a written request for such deviation. The

DIRECT EXPANSION POINT OF
USE PRECONDITIONED AIR
UNIT

Manufacturer shall not contract, purchase or cause to be delivered, equipment which does not meet all requirements of this document as specified, without obtaining prior written approval.

- E. The Manufacturer shall be responsible for verifying installation locations and methods and shall notify the Representative of any conflicts or code violations prior to manufacture of the PCA units. Modifications to eliminate conflicts or code violations will be coordinated with and approved by the Representative. Modifications shall be made at no additional cost to the Owner.
- F. The Manufacturer shall furnish and install all necessary equipment and incidentals to provide a complete operable and maintainable unit.
- G. Should alternate mounting configurations or physical attributes, other than those specified herein, or indicated on the project drawings, be proposed, manufacturers shall submit alternates for approval prior to bid date. Alternate mounting, configurations, or attributes shall be provided at no additional cost to the Owner.
- H. EMI/RFI: Unit shall be designed so as not to affect aircraft radio/navigation equipment. It shall be applicable throughout the entire aircraft radio frequency range. Provisions shall be designed into the unit to protect it from voltage fluctuations which might result from the operation of aircraft radio frequency equipment.
- I. Buy American Certification and Waiver
 - 1. All equipment shall meet the Buy American requirements as listed the front end specifications herein.
 - 2. Buy American Certification shall be submitted with the Contractor's bid.
 - 3. If a waiver is needed to the Buy American requirements, the Contractor shall submit the required Waiver with their bid.
 - 4. The Buy American Waiver will be submitted to the FAA for approval prior to the issuance of the FAA VALE grant.
 - 5. Failure to obtain a Buy American Waiver from the FAA will not alleviate the Contractor from meeting the Buy American requirements referenced herein.

1.05 REFERENCES

- A. The latest approved version or edition, by the authority having jurisdiction, of the following codes, references and standards shall apply. If the authority having jurisdiction has not approved or adopted a particular code, reference, or standard, the latest published edition shall be applicable.
 - 1. FM P7825 - Approval Guide; Factory Mutual Research Corporation.
 - 2. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.
 - 3. NFPA 70 - National Electrical Code; National Fire Protection Association.
 - 4. NFPA - "Standard on Construction and Protection of Aircraft Loading Walkways No. 415".
 - 5. SSPC-Paint 15 - Steel Joist Shop Paint; Society for Protective Coatings (Part of Steel Structures Painting Manual, Vol. Two).
 - 6. AFBMA - Anti-Friction Bearing Manufacturers Association.
 - 7. ANSI - American National Standards Institute
 - 8. ARI - Air-Conditioning and Refrigeration Institute.
 - a. ARI Standard 410 - Standard for Forced-Circulation Air-Cooling and Air Heating Coils.
 - b. ARI Standard 850 - Commercial and Industrial Filter Equipment.
 - 9. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers.
 - a. ASHRAE 52 - Method of Testing Air-Cleaning Device Used in General Ventilation for Removing Particulate Matter.
 - b. ASHRAE 15 - Safety Standard for Refrigeration Systems
 - 10. NEBB - National Environmental Balancing Bureau Agency
 - 11. NEC - National Electric Code
 - 12. ATA 101 - Air Transport Association of America - Specification for Ground Equipment Technical Data, 1986.
 - 13. SAE - Society of Automotive Engineers.

14. AISC - American Institute of Steel Construction Code.
 15. ASME - American Society of Mechanical Engineers.
 16. OSHA - Occupational Safety and Health Act.
 17. UL - Underwriters Laboratories.
 18. IEC - International Electrotechnical Commission
 19. MS-33562 - Military Specification, Connection, Aircraft Ground Air Conditioning, 8", latest edition.
 20. FAA - Federal Aviation Administration
- B. In the event of conflict between a reference and another reference or this specification, request clarifications. All responses are final and will be at no additional cost to the Owner.

1.06 SUBMITTALS

- A. Bid-Submittals: The following submittals shall be included with bid.
1. Manufacturer References and Qualifications per 1.04.B, 1.04.C & 1.04.D
 2. Alternates per 1.04.H.
 3. Manufacturer's recommended spare parts list.
 4. UL Certification per 1.07.F.
 5. FAA Buy American Certification or Buy American Waiver per 1.04.I.
- B. Pre-Manufacture Submittals: The following submittals shall be made as necessary to meet the project schedule and shall be submitted and approved prior to manufacturing the Dx POU PCA units.
1. Product data for selected models including specialties, accessories, and the following:
 - a. Direct expansion (Dx) Point-Of-Use (POU) Preconditioned Air (PCA) unit airflow performance curves with system operating conditions indicated; include airflow vs static pressure and airflow vs blower horsepower.
 - b. Manufacturer shall submit performance data of the Dx POU units at the design conditions indicated in this Section. Performance data shall include, but not be limited to, air flow, static pressures, temperatures and humidity levels, at points of significance through the unit and at the aircraft inlet, refrigerant pressures and temperatures at points of significance through the refrigeration circuits, and power requirements of major components as well as entire unit.
 - c. Motor ratings and electrical characteristics including motor and fan accessories.
 - d. Materials, gauges, and finishes, including paint color sample for Owner approval.
 - e. Dampers, including housings, linkages, and operators.
 - f. Air filter manufacturer's technical product data including dimensions, weights, required clearances and access, flow capacity including initial and final pressure drop at rated air flow, efficiency and test method, fire classification, and installation instructions.
 - g. Certification report of airflow test apparatus by an independent third party such as the National Environmental Balancing Bureau (NEBB) or other approved agencies.
 - h. Dx POU unit control sequence of operation including air flow control, capacity control and defrost control.
 - i. Flexible hoses, clamps, rigid ducts, and mounting brackets.
 2. Shop Drawings: Provide schematics and interconnection diagrams, indicate front and side views of enclosures with overall dimensions and weights shown; conduit/cable entrance locations and requirements; and nameplate legends. Differentiate between manufacturer-installed wiring and field-installed connections. Include appurtenances such as hose baskets, ducts, pushbuttons, etcetera.
 3. Installation Details: Provide complete installation details including, without limitation, installation details of all appurtenances. Show installed configuration as well as any pertinent details regarding interface to other equipment and systems, include electrical connection service points.
- C. Pre-Ship Submittals: The following shall be submitted and approved prior to shipping Dx POU units to the project site:
1. Factory Test Reports: Indicate factory tests and results and inspection procedures.

- D. Pre-Substantial Completion Submittals: The following submittals shall be submitted and approved prior to 14 days before substantial completion, unless otherwise noted herein.
 - 1. Operation and Maintenance Manuals.
 - 2. Training Program: At least 60 days prior to substantial completion, a training program summary, course syllabus, instructor qualifications, and copy of the training manual shall be submitted for review and approval.
 - 3. Field Commissioning Report: Submit proposed field commissioning report for approval. This approved form shall be utilized for the final field commissioning as specified in Section 3.
- E. Pre-Final Completion Submittals: The following submittals shall be submitted and approved prior to 14 days before final completion.
 - 1. As-Built Drawings. Provide field edited redlined project drawings showing deviations from design documents.
 - 2. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and have been registered with the manufacturer.
 - 3. Field Commissioning Report: A completed field commissioning report for each installed unit as specified herein. Utilize approved form.
 - 4. Training Rosters. Provide training roster with trainee names, dates, and types of training, as well as durations.
 - 5. Original software and documentation registered in the Owner's name.
 - 6. Hard copy and electronic version (compact disk or flash card) copies of all programs and settings loaded into equipment provided hereunder.

1.07 QUALITY CONTROL

- A. ARI Compliance: Air filter equipment shall comply with ARI 850.
- B. ASHRAE Compliance: Air filters shall comply with ASHRAE Standard 52 for method of testing and for recording and calculating air flow rates.
- C. NFPA Compliance: Comply with applicable portions of NFPA 70 and NFPA 415 for components and installed Dx POU Units.
- D. NEMA Compliance: Motors, enclosures and electrical accessories shall comply with NEMA standards and be so rated.
- E. IEC Compliance: Electrical components and accessories shall comply with IEC standards and be so rated.
- F. UL Compliance: Dx POU units shall be UL, or ETL listed and shall be labeled by a nationally recognized testing laboratories at the time of bid. Submit verification with bid submittals.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Lift and support Dx POU units with the manufacturer's designated lifting or supporting points.
- B. Provide Dx POU units which do not require disassembly and reassembly because of movement into the final location and follow manufacturer's written instructions.
- C. Deliver equipment as a factory-assembled Dx POU unit whenever practical for shipping purposes with protective crating and covering.
- D. Store equipment and material in suitable facilities until delivery, installation, and acceptance.
- E. Coordinate the delivery acceptance of this equipment at the job site. Receive, offload, store and protect this equipment until such time as it has been final accepted.
- F. Installing contractor shall properly dispose of all waste including, but not limited to, packaging, crates, etcetera.

1.09 ROYALTIES AND LICENSE FEES

- A. The Dx POU units manufacturer shall pay all royalties and license fees and shall defend all suits or claims for whatever infringements of any prior, pending, or future patent rights and shall save the Owner and Representative harmless from liability, expense, or loss on account thereof, with respect to any processes, devices, methods, articles, inventions, or procedures

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used by the manufacturer.

1.10 WARRANTY

- A. Provide a full parts and labor warranty for the new units and ancillaries. Labor warranty shall be performed by factory trained service technicians. Warranty shall run two (2) years from the Date of Beneficial Use. Date of Beneficial Use is defined as the date the system is turned over by the manufacturer, and accepted by the Owner, for normal operation. All warranty services shall be at the site of the installation. Provider shall be responsible for all travel and sustenance expenses necessary for warranty services.
- B. Shipping and handling charges for warranty parts are the responsibility of the Provider.
- C. Warranty Services shall be commenced with on-site representation, by qualified repair technicians, within 72 hours from the request of the Owner.

1.11 OPERATION AND MAINTENANCE MANUALS

- A. Provide two (2) bound copies and three (3) electronic copies (USB Drives) of the approved, comprehensive Operation and Maintenance Manual for each model PCA unit fourteen (14) days prior to Substantial Completion.
- B. The content of the manuals shall be limited to information and data that specifically apply to products provided and shall include routine normal and special operating instructions and sequences. Also included shall be routine maintenance procedures and guides for troubleshooting, disassembly, and reassembly instructions, and recommended spare parts list including current prices and sources.
- C. Wiring diagrams and schematics shall be incorporated into the manuals to clearly show features such as controls, switches, instruments, points of connection, and indicators by name and location.
- D. Operation and Maintenance Manuals: Include in ATA 101 format a general description, theory of operation and specification, schematics and wiring diagrams, start-up instructions, installation and maintenance procedures, parts list, recommended spare parts list, troubleshooting guides, controls, and accessories information.
 - 1. Include information defining the overall operation of the system, start-up and shut-down and adjustment procedures, overall preventative maintenance charts, flow charts and a listing of major system components, with a guide to finding detailed information on these components in other sections.
 - 2. Include maintenance and operating details of the air handlers, with theory of operation, control diagrams, schematics, troubleshooting charts, complete alignment instructions, preventive maintenance details, parts lists, all in the general format and intent of ATA-101 as adapted for fixed facility equipment.
 - 3. Include one or more sections containing the standard vendors operating and maintenance manuals of all functional assemblies, including compressors, pumps, control valves, coils, etc., with catalog cuts of all devices.
 - 4. One section detailing system controls: operation, theory, control and ladder diagrams, sequence of operation, program parameter adjustments, manual override techniques, parts lists.
 - 5. Cross reference parts list, indicating contractor's part numbers as they appear in the manuals with corresponding original manufacturer's part numbers (if different from contractor).
 - 6. Wiring Diagrams and schematics shall be incorporated to clearly show features such as controls, switches, instruments and indicators by name and location.
 - 7. Information provided under project submittals, shall also be included.
 - 8. Special Tools List: Provide a list of any special tools required to perform any field performable maintenance tasks.
 - 9. Spare Parts List: Provide manufacturer's recommended spare parts list.
 - 10. Include video recordings of O&M training recorded on site.

1.12 TRAINING

- A. Manufacturer shall provide a complete training program for the Owner's operating, engineering, and maintenance personnel. Training shall include both classroom and hands-on instruction and be of sufficient duration to adequately train personnel to perform on site routine, preventative, and remedial maintenance of the equipment, product, or system. Unless noted otherwise, maintenance training shall consist of a minimum of three (3) sessions of four (4) hours classroom instruction and four (4) hours hands-on instruction for ten (12) personnel, and operator's training shall consist of a minimum of four (4) sessions of one (1) hour duration each, hands-on instruction for eight (8) personnel.
 - 1. Some operator's training sessions may necessitate night training, at the discretion of, and without additional cost to, the Owner.
- B. Advanced Maintenance training consisting of 16 hours of classroom instruction to include detailed maintenance of the controls as well as component level troubleshooting and repair.
- C. Operator training shall be completed no later than seven (7) days prior to beneficial use. The manufacturer shall provide maintenance training within 30 days of beneficial use. At least 60 days prior to substantial completion, a training program summary, course syllabus, instructor qualifications, and copy of the training manual shall be submitted for review and approval.
- D. Training shall be conducted at the installation site property at the direction of the Owner.
- E. Provide notice to the Owner a minimum of seven (7) days prior to conducting any training.

1.13 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site, Pittsburgh International Airport. Date and time to be determined upon receipt of Contractor's proposed project schedule and prior to the first installation.

PART 2 - PRODUCTS

2.01 BRANDING

- A. The Owner, or Owner's tenant, reserves the right to provide branding on the exterior sides of the installed equipment and desires that this branding not be diminished by excessively large or aesthetically displeasing branding of individual pieces of equipment. All manufacturers branding, labeling, marking, etcetera, on their products shall encompass no more than two square feet of total surface area. The Owner reserves the right to require any non-approved branding removed from finished products at no additional cost.

2.02 SCHEDULES

- A. Provide quantities and types of equipment as detailed on the project drawings.

2.03 GENERAL DESCRIPTION

- A. The manufacturer shall provide a new, compact, light-weight, low-noise and insulated Dx POU unit that can be mounted underneath the Passenger Boarding Bridge (PBB), such that the operational characteristics of the bridge are unrestricted, and the bridge's structural integrity is uncompromised. It is the Engineer's intent to have the Dx POU units mounted below the "C" tunnel, at the aircraft end of the PBB.
 - 1. The Dx POU unit manufacturer shall ensure the unit and the unit's mounting methods are structurally sound and that they do not affect the structural integrity of the passenger boarding bridge. The Dx unit shall not cause deflections of the passenger boarding bridge tunnel sections or rails. The Dx POU unit shall not affect the dynamic operation of the passenger boarding bridge. All steel, rails, brackets, bolts, reinforcing, etcetera shall be provided and installed with the proper ratings for the finished system.
- B. The Dx POU units shall have a minimum of two (2) distinct assemblies:
 - 1. A control assembly which contains the low voltage logic and control circuits.
 - 2. A blower/coil unit containing a blower, dampers, cooling coils, compressors, condenser coil, condenser fans, filters, complete motor starting equipment, outlet plenum and condensate drain pan to provide the required cooled or heated air to maintain the aircraft cabin temperature specified.

- C. Each Dx POU unit shall be primed and painted to match the color of the passenger boarding bridge on which it is installed.
- D. Each Dx POU unit shall operate properly to serve the full range of aircraft which park at its respective gate position. It shall be the manufacturer's responsibility to review the aircraft parking plans and verify that the units supplied will meet this requirement. Unit sizing indicated in the contract documents shall be considered the minimum sizing of units supplied.
- E. The maximum sound level for the Dx POU units at maximum cooling/heating shall not exceed 85 dBA at a distance of 15' from the unit (external) and 65 dBA inside the bridge (internal).
- F. The Dx POU unit components shall operate satisfactorily under ambient temperature conditions of -20° to 122° F (-29° to 50° C) including static soak up to 48 hours within this range with or without wind of 50 MPH. All components shall be designed or selected for long service life under such conditions
- G. The Dx POU units shall not produce or induce objectionable vibrations into the bridge structure. Vibration levels induced by the units and/or its components shall not be injurious to the units or the bridge structure or be harmful or annoying to passengers and employees. The manufacturer shall provide any and all necessary vibration insulation devices required to meet this requirement.
- H. Where the Dx POU unit components are assembled within a unitized enclosure, provide insulated access doors that are hinged, with a hold-open mechanism. Locate as required for proper access to the following:
 - 1. Blower/dampers.
 - 2. Filters.
 - 3. Coils.
 - 4. Compressors.
 - 5. Motors.
 - 6. Variable Frequency Drives (VFD).
 - 7. Smoke Detectors.
 - 8. Any other item requiring maintenance access at the discretion of the Engineer.
- I. The Dx POU units shall be supplied with any and all necessary ducts, transition hoses and brackets required to route the discharge air from the Dx units to a point above and then to the hose storage device. Such installation method shall ensure that air flow equipment is not restricted or interfered with during any and all PBB operations.
- J. The minimum reliability design requirement for the Dx POU units shall be to operate between preventative maintenance periods of a minimum of 840 operating hours or 12 weeks, whichever comes first.
- K. The Dx POU units shall provide for PBB pre-cooling and pre-heating. The Dx POU units shall be furnished with a dual output damper assembly and connecting 10" diameter flexible duct to form a PBB directed supply air branch. The Dx POU unit control system shall provide pre-cooling or pre-heating upon demand of a manual selector installed in the PBB cab console. PBB pre-cooling/pre-heating status shall be initiated manually and terminated manually or automatically by depressing the aircraft servicing start button.
 - 1. Refer to project drawings for pre-cooling and pre-heating modifications, as intent at this time is for the PBB air supply plenums are to be capped at the PCA unit in order to protect the outlet to be utilized for a planned future PBB project that will utilize the pre-cool/heat function.
- L. The Dx POU unit design shall be based on the use of self-contained refrigeration systems and an electrical heater combined successively by the supply air passage and operationally by a common control system.
 - 1. Primary and secondary systems shall form the basic unit.
 - 2. Primary and/or secondary systems within the basic two-system arrangement may be divided into multiple refrigeration sub-systems for severe capacity requirements caused by extreme design ambient conditions and/or air flow parameters.

2.04 PERFORMANCE REQUIREMENTS

A. COOLING:

1. The Dx POU units shall be designed to automatically maintain a 75°F cabin temperature in all aircraft within its specified class, based on the following design conditions.
 - a. Design ambient temperatures: 90°F/75°F Dry Bulb/Wet Bulb.
 - b. Passenger Load: Full (100%), for the largest aircraft in its classification, including full crew.
 - c. Full solar load (bright sunshine).
 - d. Aircraft electrical load:
 - 1) Class I DX POU Units: 25,000 BTU/h.
 - e. One aircraft door open (typically either L1 or L2).
2. Additional Minimum Design Requirements/Parameters:
 - a. Class I Dx POU units shall be capable of providing a minimum of 240 lb/min of 35°F air at 22" of static pressure at the end of a single 14" diameter 75' long insulated air hose connected to an 8" diameter aircraft connector. Minimum nominal machine rating shall be 45 Tons.
 - b. The Dx POU units shall be capable of operating at an increased air flow rate (up to 15% above the nominal value) with coincident decrease in static pressure. An operation at these conditions on design day will be allowed to raise the supply air temperature by up to 5°F.
3. All temperatures, air flow rates, and static pressures denoted in this section must be simultaneously achieved.

B. HEATING:

1. The Dx POU units shall be designed to automatically maintain a 70°F cabin temperature in all aircraft within its specified class, based on the following design conditions.
 - a. Design ambient temperatures: -10°F Dry Bulb.
 - b. Passenger Load: None (0%), for the largest aircraft in its classification.
 - c. No solar load.
 - d. Aircraft electrical load: 0 BTU/h.
 - e. One aircraft door open (typically either L1 or L2).
2. Additional Minimum Design Requirements/Parameters:
 - a. Class I Dx POU units shall be capable of providing a minimum of 120 lb/min of 140°F air at the end of a single 14" diameter 75' long insulated air hose connected to an 8" diameter aircraft connector.
3. All temperatures, air flow rates, and static pressures denoted in this section must be simultaneously achieved.

2.05 ELECTRICAL REQUIREMENTS

- A. All Dx POU units shall be constructed in accordance with standard electrical manufacturing processes, and shall comply with all applicable Federal, State, and Local laws, codes, and ordinances.
- B. Input Voltage Rating: 480V, 3 phase, 60 hertz.
- C. The Dx POU units shall be provided with a built-in, main circuit breaker of suitable size that provides an electrical disconnecting means for the Dx POU unit and protection from short circuits. This circuit breaker shall be lockable in the OFF position for maintenance purposes.
 1. All primary disconnecting means shall be suitably rated to be capable of withstanding and interrupting fault currents available at the input.
- D. Wiring, Motors, and Electrical Components
 1. All wiring shall be permanently identified. Wrap around adhesive style wire markers will not be permitted. Numbers are to be located one inch from the end of each termination point. If the wires are to be stamped, they must be numbered the full length with indelible ink, with the numbers no more than four inches apart, and the number shall be visible at all terminating points. Wires are to be numbered in a logical sequence. Manufacturer shall indicate all wire numbers on electrical drawings.

2. All circuits shall have suitable overload protection. Each conductor shall be sized to have current carrying capacity as allowed by the National Electrical Code (NEC) equal to or greater than the capacity of the circuit breaker provided in its circuit. Circuit breakers shall be grouped in convenient locations and suitably marked for size and function. Logical grouping of circuits is anticipated. Protection devices shall be sized to protect wiring and motors from damage due to overload and prevent electrical or mechanical damage to associated PCA unit components in the event of failure of one of the components. Each electric motor shall be separately protected by fuses or circuit breakers.
 3. All requisite wiring shall be terminated on terminal blocks and/or suitable connectors. The wiring shall be formed and restrained to give a neat appearance. Common wiring splices shall not be used. Connections shall be made using terminal strips and staked lugs or by patent connectors. Optional and add on components shall be considered in sizing and in the number of conductors provided. Ample spare conductors shall be provided and safely secured and capped so as not to interfere with the normal operation and maintenance of the unit.
 4. Grommets and suitable anti-chafe material shall be used where wires are required to pass through structure or other similar relief or opening which exposes the wire to possible chafing. All wiring shall be in conduit (preferably automotive split loom) or spot-tied and shall be routed away from possible pinch points. Wiring shall be adequately supported to protect it from damage due to ice and snow buildup, bumping, kinking, and flexing.
 5. All meter panels and any components containing printed circuit boards or solid state electronics shall be shock mounted.
 6. Electrical interlocks shall be fail-safe design.
 7. Electrical devices including switches, relays, wiring, and terminals when located in an area exposed to weather, shall be of weatherproof design or protected by weatherproof enclosures.
 8. Weatherproof schematics shall be installed on the interior of the controller door. Schematics shall include all wiring and devices and shall include all wire numbers. Schematic shall be impervious to grease, water, ice, or other elements that they may be exposed to in an aviation maintenance environment on an active apron with the doors open.
 9. All exterior conductors/cables shall be in conduit. Exposed cables will only be allowed where required due to flexibility needs and then will be limited to a maximum of 48".
- E. Ampacity.
1. Each POU PCA Dx unit shall operate satisfactorily, at full load, with the following electrical circuits provided. Each unit's minimum circuit ampacity, calculated in accordance with the NEC, shall not exceed the ampacity of the circuits provided. Circuits to be provided are:
 - a. Class I: FLA 120A, MCA 146A, MOP 150A.

2.06 COMPONENTS AND OPERATION

- A. Compressor(s):
1. Compressor(s) shall be serviceable, hermetically sealed scroll compressors with integral vibration isolators and crankcase heaters which de-energize during compressor operation. Safety controls shall include a low/high refrigerant pressure cutout with manual reset, a compressor motor overload with manual reset, and an adjustable low-ambient lockout.
 2. Vibration isolator/absorber with a braided stainless steel mesh-covered metallic bellows shall be installed in the suction and discharge line to isolate/absorb the compressor vibrations.
 3. A 2-pole compressor motor shall be designed as an integral part of the compressor assembly. It shall drive the compressor scroll or screw. Industrial Grade epoxy shall lock the motor windings in place and resist corrosion of insulation by refrigerant and oil.
 4. Compressors to be fitted with suction and discharge rotolock valves with isolation valves and charging ports to isolate the system refrigerant for maintenance purposes and to simplify compressor replacement.
- B. Casing:

1. Manufacturer's standard casing construction, having corrosion protection coating, and exterior finish. Where the Dx POU unit is provided as a unitized enclosure construction, casings shall have removable panels or access doors for inspection and access to internal parts, a minimum of 1" thick thermal insulation, knockouts for electrical and exterior condensate drain connection, and lifting lugs.
- C. Blower:
1. Provide blower that is factory fabricated and assembled, factory tested, and factory finished, with required capacities and characteristics. The blower shall be centrifugal type and sized for the appropriate constant volume airflow requirements in accordance with the selected size of the Dx POU unit. The blower motor shall be selected such that the fan brake horsepower does not exceed the maximum supplied by the motor over the design operating range of the Dx POU unit.
 2. Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower. Balance and vibration levels shall be in accordance with AMCA 204 for fan application category BV-3 to a balance quality of grade G6.3.
 3. Blower shaft to be turned, ground, and polished steel designed to operate at no more than 70% of the first critical speed at the top of the speed range of the fan's class.
 4. Shaft Bearings: Provide bearings having a median life "Rating Life" (AFBMA L50) of 200,000 calculated in accordance with AFBMA 9 for ball bearings or AFBMA 11 for roller bearings.
 5. Blower: Centrifugal, direct-drive fans; and permanently lubricated motor bearings where bearings are not accessible for greasing.
 6. A 2-pole, drip-proof blower motor shall be directly connected to the blower impeller. Motor shall be of NEMA Design B, Class F insulation, 1.15 S.F.
- D. Condenser Fan:
1. An axial type multi-blade fan shall be utilized for condenser air flow. Fan blades shall be constructed from spark and corrosion proof material. Each Dx POU unit shall utilize a minimum of two (2) identical motor/fan assemblies.
 2. A 4-pole, totally enclosed fan-cooled fan motor shall be directly connected to the fan propeller. Motor shall be NEMA Design B, Class F insulation, 1.15 S.F.
- E. Factory Finish:
1. Exterior Sheet Metal Parts: Prime coating prior to final assembly. Final color to match the PBB.
 2. Interior Surfaces: All air flow surfaces shall be stainless steel or aluminum. Manufacturer's standard finish is acceptable on all other interior surfaces.
- F. Coils:
1. Micro-channel aluminum plate fins and/or copper tube aluminum fins. Fins shall have collars drawn, belled, and firmly bonded to the tubes by means of mechanical or hydraulic-expansion of the tubes. No soldering or tinning shall be used in the bonding process.
 2. Coils shall be constructed and tested in general accordance with ASHRAE 15 and ARI 410.
 3. Coils shall be proof tested to 450 psig and leak tested to 250 psig with air pressure under water, cleaned, dehydrated, and sealed with a holding charge of nitrogen until serviced with refrigerant.
 4. Each evaporator coil section shall have an expansion valve, a solenoid valve, and a distributor.
- G. Airflow Control:
1. Airflow control shall be via a VFD driven blower motor to control the air flow capacity of the blower. The VFD shall automatically adjust the air flow during aircraft cooling to the requirements of the aircraft selected on the remote control station.
- H. Air Flow Ducting:
1. All ducting, plenum transitions, and other air flow components shall be made from either aluminum or stainless steel.

2. Plenum and air flow ductwork shall be properly insulated with polyurethane foam insulation so as to prevent the forming of condensation on ductwork surfaces and as necessary to minimize impacts to unit performance.
- I. Inlet Air Filters:
 1. Inlet air filters shall be factory fabricated by a company regularly engaged and specialized in filter manufacturing. Filters shall be permanent washable mesh type, with a minimum equivalent MERV rating of 8.
 2. The air filters shall meet the following minimum requirements.
 - a. Permanent filters shall be at least 2 inches thick, constructed of woven and crimped aluminum or stainless steel mesh screening.
 - b. The metal enclosing frame shall be constructed of rigid, heavy duty, and at least 20 gauge galvanized steel.
 - c. Face velocity shall be no greater than 500 feet per minute with an initial resistance of 0.3" water gauge, final resistance of 0.5" water gauge, and a MERV rating of 8.
 - d. The filter section shall be furnished with a differential pressure sensor measuring across all filters to activate a "dirty filter" alarm. The PCA unit shall be equipped with a visual indicator for notification of alarm.
 - J. Refrigerant:
 1. Acceptable refrigerants:
 - a. R-407C
 - b. R-410A
 - c. Other refrigerants approved by the EPA as acceptable the "Significant New Alternatives Policy" (SNAP) will be considered and evaluated during the submittal process.
 - K. Refrigerant Filter-Dryer:
 1. A sealed type filter-dryer shall be installed in the liquid line to remove moisture and contamination from the refrigerant. The filter-dryer shall be soldered in place to preclude leakage. Location and installation method shall not inhibit or preclude field replacement of the filter-dryer unit. Filter-dryer shall contain a 100-mesh screen and molded blend of desiccant for acid and water removal.
 - L. Refrigerant Sight Glass:
 1. A combination moisture and liquid indicator shall be designed and installed in the liquid line to monitor the flow and moisture content of the refrigerant. The indicator shall have a large crystal clear glass for viewing refrigerant and shall be protected by a pad and screen and shall change color on the basis of moisture content of the refrigerant.
 - M. Expansion Valve:
 1. An electronic expansion valve shall automatically meter the refrigerant flow to the evaporator coil by sensing the evaporating pressure and temperature of the vapor leaving the evaporator. The valve shall regulate the rate of liquid refrigerant flow into the evaporator coil in exact proportion to the rate of evaporation of the liquid refrigerant by maintaining the pre-adjusted superheat. This shall optimize the evaporator efficiency and prevent the return of the liquid refrigerant to the compressor. The valve shall also contain an external equalizer to compensate for the pressure drop in the evaporator coil.
 - N. Electric Heat:
 1. Staged Electric heat shall be provided on each Dx POU unit. Each Dx POU unit shall consist of a minimum of two (2) stages of electric heat. Each unit shall have a total heat capacity as necessary to meet the performance requirements outlined in the Heating Section of this specification. The electric heater shall be designed such that the power consumption in the Heating mode shall not exceed the maximum power consumption in the Cooling mode. The intent of this paragraph is to maximize the available stages of heat for optimal performance.
 2. Heat strips shall be interlocked to prevent energizing in the absence of adequate air flow across the heat strips.

3. The heat strips shall be locked out of operation if ambient is greater than 65° F. The heat strips shall be deactivated if the plenum temperature exceeds 150° F. Upon plenum temperature dropping below 150° F, the heat strips shall automatically re-activate.
- O. Hour Meter
1. PCA Unit shall be equipped with an electromechanical hour meter easily visible on the exterior of the unit and readable when standing on ground. Hour meter is to track run time of the PCA unit.
 2. Display Units: Hours/Tenths
 3. Time Range: 0 hours to 99999.9 hours, Non-Resettable
 4. Flange Mount with gasket on exterior of PCA unit.
 5. NEMA Rating: 4X
 6. Power: 10 to 80V DC
 7. Ambient Temperature Range: -20°F to 122°F.
- P. Controls:
1. Controllers shall monitor all phases of operation of the PCA Dx Unit. The controller shall be based on a 32 bit microprocessor and utilize flash memory technology to store operation parameter information. Operation parameters of controller shall not be affected by loss of 60 Hz power to controller. PCA manufacturer shall provide with their bid a detailed description of the controller, type of graphics and software, sequence of operation, types and number of control points, and limitations of the control system they intend to provide and install.
 - a. The practice of sharing the passenger boarding bridge controller, either directly, or through remote I/O racks will not be permitted. Each Dx POU PCA unit shall have a dedicated and separate controller.
 - b. Controller shall be of non-proprietary design and readily available from third party vendors.
 2. Control system shall be low voltage (12 & 24 VAC). Control transformer shall be provided and sized to adequately serve all connected loads.
 3. Contactors shall be full voltage non-reversing type and designed to meet international standards including UL and IEC. Contactors shall be AC operated with 120V 50/60 Hz holding coil and functionally assigned for ON-OFF control.
 4. Temperature sensors shall be utilized in the system to maintain the required temperature parameters of the supply air.
 5. Controller shall be capable of interfacing and providing operational data to the Building Management System (BMS) via BACNET IP.
 6. Controls shall include, but not be limited to, the following functions:
 - a. Summary "FAULT" indicator (overloads, compressor circuits, over temp if applicable, filter alarm, VFD).
 - b. Blower Motor Overload Indicator, with shutdown and reset
 - c. Control functions for mode changing, modulating temperature and air flow based on ambient temperatures and aircraft.
 - d. Connections for remote "ON/OFF", remote status displays and "ON/OFF"/summary alarm plus CAT6 RJ45 ports for remote control/monitoring
 - e. Connection for shutdown and display of smoke alarm indication
 - f. Supply Air temperature set point adjust provision.
 - g. Necessary controls (adjustable) to provide auto defrost of the coils
 - h. Manufacturer must include at least 2 fully functional handheld service tools for accessing all adjustable parameters and fault indicators.
 - i. Adjustable duration timer for pre-cool/heat functionality set at 90 minutes as a default value.
- Q. Interlocks
1. Unit shall interlock with the PBB to prevent PBB horizontal operation while PCA unit is operating in aircraft cooling mode.

- a. PBB shall not be interlocked when PCA unit is solely operating in PBB Pre-cool/heat operation.
- R. Remote Control Station:
 - 1. The control station shall be housed in a NEMA 4X stainless steel enclosure and shall operate on 24 volts or less and shall be located on the bridge lift column (aircraft side of the bridge), so as to be accessible from ground level. Coordinate this position with all other installed equipment and ancillaries so as to prevent interferences. The station shall be configured as indicated on the design drawings. Modifications to this configuration must be submitted and approved.
 - 2. The control station shall have a fault-indicator lamp as follows.
 - a. Flash: non-critical fault, Dx POU unit still operational.
 - b. Steady: critical fault, Dx POU unit prevented from operating.
 - 3. The control station shall have a selector switch to choose the aircraft the Dx POU Unit is to serve. This selector switch shall be as shown on the drawings and shall be labeled with the abbreviations of the class of aircraft as follows:
 - a. RJ (Regional Jets)
 - b. NB (Narrow Body Aircraft)
 - c. WB (Wide Body Aircraft)
- S. Cabin Temperature Indicator:
 - 1. Cabin Temperature control shall have a user variable controller installed in lieu of the traditional sensor. The controller should have a metallic knob. The controller face should contain a rotated set of tick marks with the labels of "Cooler" and "Warmer" on the extreme ends. The tick marks and labels should be engraved or etched in the controller faceplate. The design shall operate in a manner that simulates the electrical resistance value of the targeted Cabin temperature setpoint when the knob is in the center of the scale. The temperature controller enclosure box, faceplate and hardware shall be weather resistant stainless steel.
- T. Condensate Pump:
 - 1. The condensate pump shall be lightweight, self-priming, and capable of running dry. Minimum pump rating shall be 3 gpm, 40' head, 1/3 hp or as required by specific PBB configuration. Drain pan shall be stainless steel. Condensate pump shall automatically expel condensate from the Dx POU unit as needed.
- U. PCA Air Hose:
 - 1. Each Dx POU unit shall be provided with single or dual, as specified, length as indicated on drawings, of 14" diameter insulated hose and one 14" to 8" reducer terminating with an aircraft coupling. Complete hose assembly and connectors shall conform to MS-33562. This requirement shall apply to each output of dual hose units.
 - a. Hose lengths specified, or indicated on drawings, are a minimum length only. Provide and install sufficient hose lengths to reach all aircraft capable of being serviced at the gates as indicated on the aircraft parking plans.
 - 2. Air delivery hose shall be of the lightweight insulated type, maximum thermal conductance of 1.28 BTU/hr/ft/°F, pressure rated for 50" water maximum. Hose shall be 14" diameter flat type. Hose is to be supplied in sections of no more than 25' in length, connected with Velcro seals (zippers not allowed), with a 14" to 8" diameter reducing adaptor on the end section.
 - 3. All ducts, hose support sleeves and mounting hardware shall be provided and installed in accordance with the contract drawings and shall be painted to match the color of the newly installed passenger boarding bridge.
- V. Hose Reel (At Gates Indicated on the Project Drawings):
 - 1. PCA Hose shall be stored by a Hose Reel that attaches to a yoke assembly on the side of the wheel bogey of the PBB. The Hose Reel is able to disconnect from the yoke assembly and unreel the PCA hose to the aircraft PCA connection. Each hose reel shall be capable of storing a minimum of 85' of 14" diameter flat PCA air hose.
 - a. Single or dual hose reels shall be provided as indicated on the project drawings.

- b. All hose lengths indicated are minimum lengths only. Provide adequate hose to service all aircraft that park at the gate.
 2. The reel shall be equipped with four (4) swivel casters permitting movement with the bridge.
 3. Hose Reel/Yoke Assembly shall be swivel mounted so as to allow the hose reel to accommodate sloping ramp surfaces, as well as the angular changes of the PBB lift column, while maintaining all swivel casters in contact with the ramp surface. Hose reels and DX POU unit shall be installed such that they do not interfere with the PBB operation for the full range of aircraft served. PCA hoses must be fully accessible when PBB is lowered to its lowest most position as determined by the mix of aircraft served. Hose reel shall be constructed of metal, primed, and painted safety yellow.
- W. Mounting Brackets:
 1. Factory fabricated mounting brackets shall be utilized for installation of the PCA Dx unit. Design of these brackets shall be such so as to prevent any welding or cutting of the bridge components to facilitate installation. Brackets shall be universal in nature so as to allow for installation on industry standard, commercially available passenger boarding bridges.
- X. Safety Provisions:
 1. All corners of the unit's lower rim shall be equipped with corner bumpers.
 2. The entire lower rim, and all vertical corner edges of the Dx POU unit shall be distinguished with an alternating yellow/black adhesive safety tape. Safety tape minimum width shall be 2 inches.
 3. The electric circuitry of the Dx POU units shall be protected against short-circuit currents or grounds by means of circuit breakers.
 4. Each motor shall have separate overload protection.
 5. The Dx POU units shall be protected against overheating when in the Heating mode. Protection shall be automatically resetting.
 6. The refrigeration system shall be protected against operation at abnormal refrigerant pressures by high and low pressure limit switches.
 7. The refrigerant compressor motors shall be protected against short-cycling. A timer shall be installed in the motor control circuit to provide an appropriate delay on re-energizing after each stop.
 8. Smoke Detector:
 - a. Each Dx POU unit shall be equipped with a factory installed and tested smoke detector.
 - b. The smoke detector shall be of the ionization type and shall be mounted at each Dx POU unit discharge plenum. The smoke detector shall interface with the Dx POU unit control circuitry. When sufficient smoke is sensed, the entire Dx POU unit shall shut down. A manual switch shall be utilized to reset the smoke detector.
 - c. A fault of the smoke detector itself shall also cause the entire unit to shut down and alarm.

2.07 CONFIGURATION

- A. The manufacturer shall provide a new, compact, light-weight, low-noise, and insulated Dx POU unit that can be mounted under the Passenger Boarding Bridge (PBB), such that the operational characteristics of the bridge are unrestricted and the bridge's structural integrity is uncompromised. It is the Engineer's intent to have the Dx POU units mounted under the "C" tunnel, at the aircraft end of the PBB.
- B. Manufacturer shall install units as necessary to prevent damage to the units while simultaneously allowing full passenger boarding bridge operational movement so as to service all aircraft as indicated.
- C. In the event the manufacturer's equipment, or project conditions, will not allow for under "C" tunnel mounting, alternative mounting arrangements will be considered. Alternates, which include roof mounting, shall include all items necessary for a complete and safe system, including ductworks, brackets, access ladders and handrails to allow full maintenance of units

in a safe and OSHA compliant manner.

- D. All mounting brackets, hose brackets, handrails, and other exposed metal surfaces shall be primed and painted to match the color of the new passenger boarding bridge.
- E. Maximum Dimensions and Weights: (LxWxH, weight)
 - 1. Class I: (168", 90", 57", 7000 lbs)

2.08 FACTORY TESTING

- A. The manufacturer shall test every Dx POU unit to assure compliance with the specifications. Submit certification test sheets.
- B. Factory performance tests shall be conducted for each size of Dx POU units at design ambient conditions with a test apparatus whose resulting calculated mass flow has been certified by the NEBB or other approved agency.
- C. The Owner shall be notified fourteen (14) days prior to the date of such tests. The Owner reserves the right to witness tests and request additional tests if necessary, to demonstrate compliance with the specifications.
- D. Should factory tests fail to indicate compliance with specifications, all costs associated with re-testing, including costs associated with the Owner's witness services, will be the responsibility of the manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation services shall be provided by an installing contracting company that has a minimum of five (5) years documented experience of successful installations on projects of similar size and scope.
- B. Install in accordance with manufacturer's instructions and project documents.
- C. Equipment installation personnel shall meet all local security and safety requirements.
- D. The Dx POU unit or its associated routing of hoses, air ducts, etc., shall not hinder or restrict the boarding bridge from operating within its full designed operating range.
- E. Arrange installation of Dx POU units to provide adequate clearance for service and maintenance.
- F. The Dx POU units shall be properly aligned, adjusted, and lubricated before final acceptance.
- G. Complete all punchlist items.

3.02 EXAMINATION

- A. Verify/perform the following items or tasks.
 - 1. Air inlets or exhaust louvers are not obstructed
 - 2. Check to be sure that there are no tools or loose objects in the unit.
 - 3. Make a final check of the security of the power connections.
 - 4. Re-install any covers removed during installation.
 - 5. Full passenger boarding bridge and related equipment operational non-interference test.

3.03 INTERFACE WITH OTHER WORK

- A. Installation of unit shall be coordinated with other trades associated with the project.

3.04 CLEANING

- A. Clean unit from all construction dust and debris prior to start-up.
- B. Touch up scratched or marred surfaces to match original finish.
- C. Protect the installed unit from subsequent construction operations.

3.05 STARTING EQUIPMENT AND SYSTEMS

- A. Submit complete approved field commissioning report. Report shall include, but shall not be limited to, smoke test, communications test as applicable, cooling and heating test, aircraft model selector response.

- B. Demonstrate complete functional operation of equipment to the satisfaction of the Owner.
 - 1. Once functional tests are complete, an acceptance test shall be performed on an aircraft and shall be witnessed by the owner's representative. Tests shall comprise of those in the approved test procedure. Complete test reports shall be submitted within 10 working days of completion of the actual tests. Test reports shall contain suitable data reduction and calculation to verify the goals of the test plan and the system capacity.
- C. Include additional commissioning trips to verify operation and performance during the extreme Summer period of July through August, and Winter period of December through January

END OF SECTION

SECTION 11 85 04
PASSENGER BOARDING BRIDGE

PART 1 GENERAL

1.01 SUMMARY

- A. This specification pertains to the apron drive passenger boarding bridges (PBBs) to be furnished and installed as part of this project.
 - 1. This specification is intended to include both two and three tunnel type passenger boarding bridges, of corrugated or truss style construction, and all lengths thereof, as well as any fixed section of tunnel used as a walkway to the apron drive bridge.
 - 2. The aircraft parking requirements for each PBB can be seen in the contract drawings.
- B. Products Supplied But Not Installed Under This Section
 - 1. None
- C. Products Installed But Not Supplied Under This Section
 - 1. None
 - 2. Preconditioned Air Unit
 - 3. Preconditioned Air Hose & Hose Management System
- D. Unless noted otherwise on the drawings, the work shall include everything necessary or incidental to complete the installation including wire raceway (conduit), raceway fittings, outlet boxes, pull boxes, terminal cabinets, 120 volt AC power circuits, and insulated ground cables. Such equipment shall be furnished and installed as Division 26 electrical work. The Contractor shall furnish all necessary information to other contractor(s) to ensure that a proper conduit system will be installed. Provide accurate as-built drawings indicating all installed conduit and junction boxes.
- E. The Contractor shall cooperate with all other contractors engaged in this project and shall coordinate the passenger boarding bridge installation so that all work will proceed in a manner which is in the best interests of the project.
- F. It is the purpose of this specification to require the furnishing of highest quality materials, equipment, and workmanship. The work shall be in accordance with this specification and conform to the designs, layouts, and descriptions on the drawings.

1.02 RELATED SECTIONS

- A. Drawings, General Provisions of the Contract, including General and Special Conditions, as well as General mechanical and electrical materials and methods of installation apply to work of this section.

1.03 REFERENCES

- A. The bridge shall conform to all applicable federal, state, and municipal codes and regulations that apply to the installation site. The design of all parts and subassemblies shall be in accordance with good commercial practices to assure safe, efficient, and practical designs in keeping with standards that have been adopted by the passenger loading bridge industry. Applicable documents include, but are not limited to, the following. The latest approved version or edition, by the authority having jurisdiction, of the following codes, references and standards shall apply. If the authority having jurisdiction has not approved or adopted a particular code, reference, or standard, the latest published edition shall be applicable.
 - 1. American Institute of Steel Construction (AISC)
 - 2. Society of Automotive Engineers (SAE) Standards
 - 3. American Society of Mechanical Engineers (ASME) Standards
 - 4. National Fire Protection Association (NFPA-415)
 - 5. Life Safety Code (NFPA-101)
 - 6. American's with Disabilities Act (ADA)
 - 7. Steel Structures Painting Council (SSPC)
 - 8. National Electrical Code (NEC)
 - 9. National Electrical Manufacturers Association (NEMA) Standards

10. Occupational Safety and Health Administration (OSHA)
11. American Welding Society (AWS) Standards
12. American Society for Testing and Materials (ASTM)
13. American Insurance Association (AIA)
14. Structural Steel ASTM-A36
15. Hollow Structural Sections (HSS) ASTM-500
16. Wide Flange Sections ASTM-A992
17. Steel Pipe ASTM-A53
18. Steel Sheet ASTM-A570
19. T-1 Steel ASTM-A514 and A517
20. Hinge Pins ASTM-A 311 Grade 1018 and Grade 1144
21. Bolts—Standard ASTM-A307
22. Bolts—High Strength SAE-J429 Grade 5 and 8

- B. In the event of conflict between a reference and another reference or this specification, request clarifications. All responses are final, and will be at no additional cost to the Owner.

1.04 DEFINITIONS

- A. The term "Owner", shall include the Owner, or his authorized representative.
- B. The term "Architect" shall refer to SmithgroupJJR/Corgan as defined in Division 1.
- C. The terms, "Seller", "Contractor", "Provider" and "Manufacturer" as referred to herein, are synonymous.
- D. The term "Passenger Boarding Bridge", "Passenger Loading Bridge", "Boarding Bridge" "Loading Bridge", "bridge", "PLB", and "PBB" as used within this specification and throughout the contract documents is understood to mean the components, subcomponents and subsystems that constitute a complete, operable, and maintainable Passenger Boarding Bridge and as referred to herein, are synonymous.

1.05 SUBMITTALS

- A. Each PBB shall have a standalone submittal package.
 1. Fixed walkways, and/or corridors when present, shall be included in the associated PBB submittal under a separate tab/section.
 2. Gates will multiple PBB shall have a submittal for each bridge.
 3. Ancillary equipment (PCA, PWC, 400Hz, etc) for each PBB should be included in each passenger boarding bridge submittal with separate tabs/sections for each.
- B. Drawings, sketches, details, and materials shall be submitted in the English language, with United States Units, including dimensions, volumes, weights, and forces. The use of the metric or SI units is not acceptable.
- C. Delegated Design Submittals:
 1. Short circuit study & calculation
 - a. Upon completion of the installation of the PBB, a study shall be completed with the final "as built" information in coordination with the building electrical contractor for a complete evaluation up to the disconnect(s). Disconnects may include manufacturers panel, or external fused/non-fused disconnects as indicated in the design drawings.
 2. Arc Flash Analysis
 - a. Upon completion of the installation of the PBB, an analysis shall be completed with the final "as built" information in coordination with the building electrical contractor for a complete evaluation up to the disconnect(s). Disconnects may include manufacturers panel, or external fused/non-fused disconnects as indicated in the design drawings.
- D. Bid-Submittals: The following submittals shall be included with bid.
 1. NFPA 415 certificates and manufacturer's compliance statement per 1.12.C.9.
 2. Spare Parts List: Provide manufacturer's recommended spare parts list. Spare parts list shall include Owner applicable pricing. Spare parts pricing shall remain valid for two (2) years from the date of final completion.
 3. Proposed PBB models with manufacturer's standard cut sheets for proposed models.

4. Foundation loads for each passenger boarding bridge model proposed.
 5. UL/ETL Certification per 1.06.C.
- E. Pre-Manufacture Submittals: The following submittals shall be made as necessary to meet the project schedule, and shall be submitted to and approved prior to manufacturing the PBB units.
1. The manufacturer shall submit shop drawings, technical specifications, and descriptive product data for review and approval. An index prepared in chronological order listing drawings, sketches, details, and material submitted shall be provided.
 2. Product data for selected models including specialties, accessories, and the following:
 - a. Critical design items related to the human factors including operation and maintenance shall be addressed with Shop Drawing and shall include, but not be limited to:
 - 1) General:
 - (a) General Arrangement drawings to include dimensions
 - (b) General Erections drawings to include dimensions
 - (c) Plan drawings showing foundation locations and details. Any change to aircraft position(s) must be approved by the Owners Project Manager.
 - 2) Load Sheets for each bridge shall be provided
 - 3) Interior Finishes:
 - (a) Interior scheme of each type
 - (b) Transition details
 - (c) Wall finish attachment
 - (d) Light fixture details and layout
 - (e) Joint details
 - (f) Interior Finishes
 - (g) Floor cover edging details, including, lines of demarcation between floor cover material and hard surfaced floor at wall areas and treatment at doors and thresholds
 - 4) Exterior Configurations:
 - (a) General bridge layout
 - (b) Exterior sketch of each type
 - (c) Graphics
 - (d) Paint finishes
 - (e) Handrails
 - (f) Flashing (terminal to passenger loading bridge)
 - (g) Flashing (terminal to fixed walkway)
 - (h) Flashing (fixed walkway to passenger loading bridge)
 - (i) Flashing (bridge segments)
 - (j) Cab door seal
 - (k) Ramp Service Stairway
 - (l) Illuminated gate signs including fonts and font sizes.
 - (m) Horizontal
 - 5) Cab:
 - (a) Operator's cone of visibility
 - (b) Control panel location and functional layout with labeling.
 - (c) View panels
 - (d) Interface with aircraft
 - (e) Designs necessary for appropriate mating with required aircraft types (including auto-leveling devices)
 - (f) Operator protection while bridge is in motion with weather door open
 - (g) Operator instruction placard
 - (h) Copies of all graphic screen shots in color, including indication of different colors for those items that change colors to indicate changing states of equipment or systems.
 - 6) Electrical:

- (a) Large electrical schematic drawings (11"x17" sheet size minimum).
 - 7) Safety Markings:
 - (a) All safety decals and stencils
 - b. PBB operational envelopes dimensioned.
 - c. Motor ratings and electrical characteristics including motor and fan accessories.
 - d. Materials, gauges and finishes, including paints, wallboards, floor coverings, etcetera.
 - e. Engineering Certification:
 - 1) Manufacturer shall submit Engineering Certification stating that the PBB and all components thereof are constructed in accordance with this specification, as well as all codes and standards and local laws and regulations applicable to the design and construction of passenger boarding bridges, including without limitation, NFPA, Underwriter's Laboratories, and OSHA.
 - f. Shop Drawings: Provide schematics and interconnection diagrams, indicate front and side views of PBB with overall dimensions and weights shown; conduit/cable entrance locations and requirements; and nameplate legends. Differentiate between manufacturer-installed wiring and field-installed connections.
 - g. Installation Details: Provide complete installation details including, without limitation, installation details of all appurtenances. Show installed configuration as well as any pertinent details regarding interface to other equipment and systems, include electrical connection service points.
- F. Pre-Ship Submittals: The following shall be submitted for approval prior to shipping PBB units to the project site:
- 1. Factory Test Reports: Indicate factory tests and results and inspection procedures.
- G. Pre-Substantial Completion Submittals: The following submittals shall be submitted and approved prior to 14 days before substantial completion, unless otherwise noted herein.
- 1. Operation and Maintenance Manuals.
 - a. Provide two (2) bound copies, and three (3) electronic copies (CD) of the approved, comprehensive Operation and Maintenance Manual for each model PBB supplied fourteen (14) days prior to Substantial Completion.
 - b. The manuals shall fully describe each product, system, or subsystem numbered logically and separated into sections and contained in rigid plastic binders with identification inserted in clear plastic pockets on front and spine of each binder. Manuals shall be assembled in accordance with ATA 101.
 - c. The content of the manuals shall be limited to information and data that specifically apply to products provided and shall include, at minimum, a general description, theory of operation, routine normal and special operating instructions and sequences. Also included shall be routine maintenance procedures and guides for troubleshooting, disassembly and reassembly instructions, and recommended spare parts list including current prices and sources.
 - d. Wiring diagrams and schematics shall be incorporated into the manuals to clearly show features such as controls, switches, instruments, and indicators by name and location.
 - e. Interconnection with other systems shall clearly be indicated, including 400Hz equipment, Preconditioned Air equipment, and ancillaries.
 - f. Special Tools List: Provide a list of any special tools required to perform any field performable maintenance tasks.
 - g. Spare Parts List: Provide manufacturer's recommended spare parts list.
 - h. Lubricants list: Provide manufacturer's recommended lubrication product list. Base on a single lubricant manufacturer.
 - 2. Training Program: At least 60 days prior to substantial completion, a training program summary, course syllabus, instructor qualifications, and copy of the training manual shall be submitted for review and approval.
 - 3. Field Commissioning Report: Submit proposed field commissioning report for approval. This approved form shall be utilized for the final field commissioning as specified in Section 3.

- H. Installation Submittals: The following submittals shall be submitted and approved during installation if necessary per these specifications.
 - 1. Welding Certifications per PBB Mechanical Erection and Lifting section of this specification.
- I. Pre-Final Completion Submittals: The following submittals shall be submitted and approved prior to 14 days before final completion.
 - 1. As-Built Drawings. Provide field edited redlined project drawings showing deviations from design documents.
 - 2. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and have been registered with the manufacturer.
 - 3. Field Commissioning Report: A completed field commissioning report as specified herein. Utilize approved form.
 - 4. Training Rosters. Provide training roster with trainee names, dates and types of training, as well as durations.
 - 5. All original software packages and documentation, registered in the Owner's name.
 - 6. Hard copies as well as electronic (compact disk or flash card) copies of all final programs loaded into all machinery under this contract.
 - 7. Training DVD's.

1.06 QUALITY ASSURANCE

- A. The PBB and all components thereof shall be constructed in accordance with all codes and standards and local laws and regulations applicable to the design and construction of this type of equipment, which are generally accepted and used as good practice throughout the industry, including without limitation, NFPA, Underwriter's Laboratories, OSHA, SAE Publications, American National Standards, Military Standards, etc. The design of all parts and subassemblies shall be in accordance with good commercial practice and shall be the responsibility of the manufacturer to assure safe, efficient and practical design in keeping with requirements peculiar to this type system.
 - 1. NFPA Compliance:
 - a. Comply with applicable portions of NFPA 70 and NFPA 415 for components and completed and installed products.
 - 2. NEMA Compliance:
 - a. Motors, enclosures and electrical accessories shall comply with NEMA standards and be so rated.
 - 3. UL Compliance:
 - a. PBB shall be UL, or ETL listed and shall be labeled by a nationally recognized testing laboratory at the time of bid. Submit verification with bid submittals.
- B. The manufacturer shall be a qualified source, who has been regularly engaged in the engineering, manufacturing and installation of commercial aviation PBB equipment and components for a minimum of five (5) years and with a minimum of one hundred (100) units installed.
- C. Qualified manufacturers and installers will have completed no less than five (5) jobs of similar size and scope within the last five (5) years.
- D. The manufacturer shall have proven technical capabilities and adequate manufacturing facilities together with sufficient financial depth and stability to permit prompt and satisfactory execution of the contract.
- E. Workmanship
 - 1. High standards of workmanship and methods shall be employed in the manufacture of the passenger boarding bridge. Particular attention shall be given to metal finishes to assure freedom from blemishes, defects, burrs and sharp edges. Quality of welding, painting, riveting and alignment of parts shall be maintained.
 - 2. All welds shall be of adequate length, area and strength to sustain the design load. Welds shall be reasonably uniform in appearance and cross section, and shall be free of cracks, inclusion, porosity, cavities, and other physical and metallurgical defects. Welds shall not

be ground in order to improve appearance except as required for flush surfaces or non-structural parts. All welding performed in the fabrication, assembly and/or mounting of the passenger boarding bridge shall be accomplished by an appropriately licensed certified welder.

3. Assembly screws, bolts, studs, and other threaded fasteners shall be corrosion-resistant material or plated to prevent corrosion. All fasteners shall be tight and shall retain tension in service.
4. All wires and lines subject to chafing shall be provided with some means of protection. Acceptable anti-chafing devices include grommets, flexible sleeves or jackets, and other approved materials.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Lift and support PBB's with the manufacturer's designated lifting or supporting points.
- B. Deliver equipment as factory-assembled unit, or sub-units whenever practical for shipping purposes with protective covering.
- C. Store equipment and material in suitable facilities until delivery, installation, and final acceptance.
- D. Coordinate the delivery acceptance of this equipment at the job site. Receive, offload, store and protect this equipment until such time as it has been installed and final accepted by the Owner.
- E. Properly dispose of all waste, including, but not limited to, packaging, crates, etcetera.

1.08 PROJECT/SITE CONDITIONS

- A. This is a new construction. It shall be the responsibility of the responding Contractor to verify all conditions and dimensions which pertain to this work.
- B. The Manufacturer shall be responsible for verifying installation locations and methods and shall notify the Engineer of any conflicts or code violations prior to manufacture of the PBB units. Verifications shall include field verifications of terminal building heights, appurtenances and finishes, including terminal doors; electrical, mechanical, special systems, and communications interfaces; as well as PBB and walkway foundation locations, rotations, elevations and bolt details.
 1. Modifications to eliminate conflicts or code violations will be coordinated with and approved by the Engineer. +Modifications shall be made at no additional cost to the Owner.
- C. Should alternate mounting configurations or physical attributes, other than those specified herein, or indicated on the project drawings, be proposed, manufacturers shall submit alternates for approval prior to bid date. Alternate mounting, configurations, or attributes shall be provided at no additional cost to the Owner.

1.09 ROYALTIES AND LICENSE FEES

- A. The PBB manufacturer shall pay all royalties and license fees and shall defend all suits or claims for whatever infringements of any prior, pending, or future patent rights and shall save the Owner and Engineer harmless from liability, expense, or loss on account thereof, with respect to any processes, devices, methods, articles, inventions, or procedures used by the manufacturer.

1.10 WARRANTY

- A. Provide a full parts and labor warranty for the new units and ancillaries. Labor warranty shall be performed by factory trained service technicians. Warranty shall run 24 months from the date of substantial completion . Date of substantial completion is defined as the date the system is turned over by the manufacturer, and accepted by the Owner for normal operation, or the date that the facility/Gate is placed into commercial operation, whichever occurs later. All warranty services shall be at the site of the installation. Provider shall be responsible for all travel and sustenance expenses necessary for warranty services.
 1. Any equipment items or sub-systems requiring repair or replacement during the Owner's 30 day operational test specified in Section 3 of this specification will be provided a new warranty start date of the date that the item or subsystem was repaired or replaced.

- B. Shipping and handling charges for warranty parts are the responsibility of the Provider.
- C. Warranty Services shall be commenced with on site representation, by qualified repair technicians, within 72 hours from the request of the Owner.

1.11 TRAINING

- A. Manufacturer shall provide a complete training program for the Owner's operating, engineering, and maintenance personnel. Training shall include both classroom and hands-on instruction and be of sufficient duration to adequately train personnel to perform on site routine, preventative, and remedial maintenance of the equipment, product or system. Unless noted otherwise, maintenance training shall consist of a minimum of three (3) training sessions of eight (8) hours classroom instruction and eight (8) hours hands-on instruction for eight (8) personnel, and operator's training shall consist of a minimum of six (6) classes at two (2) hours duration each hands-on instruction for eight (8) personnel.
 - 1. Operator's training may require some night hour training classes at the Owner's discretion without additional cost to the Owner.
 - 2. The maintenance training course will fulfill the technical information requirements of the Owner's maintenance instructors, engineers and mechanics. This course, with number of classes as specified shall emphasize the following:
 - a. Orientation providing overview of system/subsystem concept, configuration, and operation.
 - b. Familiarization with and use of electrical schematics, control programs and functional block diagrams.
 - c. Operations theory and interfaces.
 - d. Instruction in basic theoretical and practical understanding of equipment appearance, layout, and functions.
 - e. Safety precautions.
 - f. Use of standard and special tools and test equipment.
 - g. Adjustment, calibration, and use of related test equipment.
 - h. Detailed preventative maintenance activities.
 - i. Troubleshooting, diagnostics, and testing.
 - j. Equipment assembling/disassembling.
 - k. Repair and parts replacement.
 - l. Failure and recovery procedures.
 - m. Cabling and/or interface connectors.
 - n. Operation and Maintenance Manuals, and related reference publications familiarization.
 - o. Procedures, practices, documentation and materials required for system maintenance.
 - p. Towing and Jack Stand operations.
- B. Operator training shall be completed no later than seven (7) days prior to beneficial use. The manufacturer shall provide maintenance training within 30 days of beneficial use. At least 60 days prior to substantial completion, a training program summary, course syllabus, instructor qualifications, and copy of the training manual shall be submitted for review and approval.
- C. Training shall be conducted prior to final acceptance of respective equipment, products, and systems and shall be given at the installation site property at the direction of the Owner.
- D. Provide Owner a minimum of seven (7) days notice prior to conducting any training.

1.12 EXTRA MATERIALS TO BE SUPPLIED

- A. Towbar
 - 1. Manufacturer shall provide the Owner with one (1) Tow bar.
- B. Jackstand
 - 1. Manufacturer shall provide the Owner with one (1) A-Frame.
- C. Laptop
 - 1. Manufacturer shall provide the Owner with one (1) new laptop.

2. Laptop shall be equipped with the necessary software and interconnecting cables for maintenance staff to interface and troubleshoot. Source code is not required.

PART 2: PRODUCTS

2.01 GENERAL

- A. The aircraft passenger boarding bridges covered by this specification shall be designed to extend from the terminal departure lounge doorway to the aircraft boarding door so that passengers can walk between the two, completely protected from inclement weather, aircraft engine blast, and blown dust. The bridge shall provide a simple, convenient, safe, and controlled method for passenger boarding. The complete assembly shall be weatherproof, both when sealed to the aircraft and when parked with the cab weather door closed. Particular attention shall be given to the safety of the passengers.
- B. The apron drive loading bridge must be capable of reaching all passenger doors of specified aircraft parking positions as indicated on the project drawings. The bridge cab shall have sufficient flexibility to enable it to mate with the aircraft passenger loading door when the aircraft is parked at the gate. The bridge shall have sufficient vertical travel to accommodate all aircraft specified on the aircraft parking layout drawings. The bridge shall have additional extended travel beyond the outer most aircraft operational requirement and additional retract travel from the closest aircraft operational requirement or PBB stow box as indicated on the project drawings.
- C. As shown on the drawings and described in these specifications, the Passenger Boarding Bridge installation work will include the following major components:
 1. Fixed Walkway (if specified, or indicated on the project drawings)
 2. Passenger Boarding Bridge
 - a. Rotunda Entry Corridor
 - b. Rotunda
 - c. Telescoping Tunnels (2 or 3 tunnel as specified)
 - d. Dog Legs (Pantographs)
 - e. Vertical Drive System
 - f. Rotating Aircraft Cab with Operator Control Console
 - g. Canopy Closure to Aircraft
 - h. Automatic Leveling System
 - i. Service Door, Landing, Service Stair
 - j. Baggage Slide
 3. Passenger Boarding Bridge Control System(s)
 4. Passenger Boarding Bridge Electrical System(s)
 5. Passenger Boarding Bridge Communication System(s)
 6. Equipment Interfacing with Passenger Boarding Bridge
 - a. Roof Top Mounted HVAC Unit
 - b. 400 Hertz Ground Power Unit (Point of Use)
 - c. Preconditioned Air Unit (Point of Use)
 - d. Potable Water Cabinet

2.02 MANUFACTURERS

- A. Passenger Boarding Bridges & Fixed Walkways
 1. JBT AEROTech – FMC Jetway
 2. Thyssen Airport Systems
 3. Substitutions: None
- B. Ancillary Equipment
 1. Baggage Slides
 2. P&W Quality Machine Inc. Baggage Slide
 3. PAGE
 4. Substitutions: None
- C. Substitutions: None

2.03 FIXED WALKWAY

- A. Where indicated on the aircraft parking layout, fixed walkways are to be installed between the rotunda entry corridor and the terminal building exit. Construction of the fixed walkway shall be substantially identical to that of the bridge tunnels, and shall meet the same applicable specifications.
- B. The fixed walkway shall be designed, furnished, and installed so as not to impose any load on the terminal building.
- C. The contractor must provide all required supports and haunches for final support of existing walkways.
- D. Coordinate base plate with details as indicated on the construction documents. Field verify details prior to manufacture.
- E. Field verify all dimensions prior to manufacture.
- F. The minimum inside height of the fixed walkway shall be 7 feet, 6 inches and the minimum inside width shall be 5 feet, 7 inches.
- G. Walkway design shall meet the same design requirements as the apron drive passenger loading bridges.
- H. Walkways shall be equipped with handrails, both sides, to match "A" tunnel rails.
- I. Exterior and interior construction and finish to match PBB tunnels.
- J. One 120V convenience receptacle, GFCI style, should be installed for every 25' of walkway, with a minimum of one being installed on any walkway over 10'.

2.04 PASSENGER BOARDING BRIDGE

- A. Safety Provisions
 - 1. The bridge shall be designed to achieve the maximum safety of aircraft passengers, crew, operators, and maintenance personnel. The bridge shall conform to all current federal, state, and local Occupational Health and Safety Codes, along with standards developed and adopted by the passenger loading bridge industry.
 - 2. All elements of the bridge shall be designed to be fail-safe in operation.
 - 3. Operating controls and maintenance features shall be designed so that errors in the operation and maintenance of the bridge cannot cause structural damage to any of its elements.
 - 4. All operating mechanisms shall be designed so that the drive mechanism is locked when power fails or is turned off.
 - 5. Electrical-Mechanical lift columns shall be equipped with a fault detector to sense differential motion of the ball screw assemblies. The detector shall disconnect electrical power from the vertical drive motors if a fault is detected.
 - 6. Positive mechanical stops shall be provided to prevent hazardous over-travel where any component might become disengaged from its guiding or restraining component.
 - 7. The operator's position in the cab shall be arranged to permit the operator to operate the loading bridge with the cab weather door closed.
 - 8. Transition ramps shall have floor coverings as indicated in the finishes section with yellow chamfered edges and be equipped with brushed aluminum handrails on both sides.
 - 9. Sheared or sharp metal edges must be deburred or broken and all exposed metal corners are to be rounded. All critical fasteners are to incorporate suitable locking devices.
 - 10. The loading bridge shall conform to the requirements of the National Fire Protection Association (NFPA) "Standards of Construction and Protection of Aircraft Boarding Walkways," NFPA-415, latest edition.
 - a. Submit certificates of compliance for its bridges including any assemblies or appurtenances affected, with NFPA 415, most recent edition, from a Nationally Recognized Testing Laboratory (NRTL) located in the United States.
 - b. Provide written certification that the total PBB, including any design changes, is in compliance with NFPA 415, most recent edition.

11. The innermost or "A" tunnels, as well as the interiors of any fixed walkway section, and all interior ramps, to include brushed aluminum handrails on both sides. 1-1/2" O.D. with returns on ends.
 12. Provide emergency lighting with 90-minute battery back-up complete with self-contained charger and automatic on-off control. Emergency lighting may be incorporated into normal lighting fixtures. Emergency lighting shall meet the minimum lighting level requirements of NFPA 101 - Life Safety Codes.
 13. The PBB shall comply with all applicable Life Safety Codes in effect at the time of manufacture.
- B. Personnel Safety
1. A high resolution color video camera (CCTV) shall be installed beneath the PBB in such a manner as to allow the PBB operator to view at a control console mounted monitor, the wheel bogey and service stair areas during PBB operation.
 - a. Install and adjust as necessary to prevent blocking the operator's view by items such as PCA units, hoses, etcetera.
 - b. See other camera requirements in individual airline specification sections.
 2. The operator's position in the control cab shall be designed so as to permit the operator to position the loading bridge with the outer door open or closed. Suitable enclosures, guard rails, etc. shall be provided to protect the operators from being pitched out the open end of the cab in case of sudden stops or inadvertent movements of the bridge when operated with the outer door open.
 3. Where required, heat shields or guards shall be installed to protect personnel operating the equipment or performing routine periodic maintenance on it against accidental contact with exposed parts which are subject to high operating temperatures.
 4. The loading bridge shall be provided with a caged, OSHA approved roof access ladder accessed from the service stair platform. All items to be galvanized steel.
 5. OSHA approved handrails will be installed atop the outer most tunnel section to provide fall protection to personnel working on drive motors, etc. The other tunnel section(s), as well as any fixed walkway installed, shall be equipped with full length OSHA compliant fall protection. Handrails, ladders, cages, brackets, etcetera shall be galvanized steel.
 6. Additional handrails, ladders, cages etcetera shall be provided as necessary to gain OSHA compliant and protected access to any roof located equipment requiring access. There shall be no need for maintenance personnel to utilize portable ladders or the like.
 7. OSHA and NFPA approved emergency lighting shall be provided as a means of safe exit in the event of a power interruption. They shall provide sufficient illumination throughout the PBB as specified herein.
 8. Suitable OSHA compliant guards shall be provided for all sprockets, gears, chains, fans, belts, and other moving parts located where operating or maintenance personnel may make accidental contact with them. Warning decals shall be added where applicable.
 9. Exposure of operating and maintenance personnel to electric shock hazards shall be minimized by provision of suitable interlocks, grounding means or protective devices.
 10. Guards or enclosures shall be provided for all exposed portions of electrical equipment.
 11. Elevating devices shall be protected from uncontrolled movement or actuation in the event of a power source failure of any type (i.e., electrical, or pneumatic).
 12. Electrically operated lifting devices shall be equipped with brakes to lock the system in the event of power failure or malfunction.
 13. Vertical drive units shall be equipped with a redundant safety locking device and/or safety brake to prevent the bridge from dropping in the event of a vertical drive system failure. The safety locking device shall be designed for a positive mechanical stop of the lifting system.
 14. All pinch and shear points, sharp edges and protruding objects must be eliminated wherever possible and practical. If elimination is not possible, adequate guarding must be achieved to prevent injury and/or damage exposure.
 15. All stairs, ladders, scaffolds, platforms, and handrails shall comply with all applicable OSHA requirements.

16. PBB design shall eliminate wherever possible all tripping hazards. Possible tripping hazards such as transition ramps (nosings), gutters, etc. shall be identified. Transition ramps shall be identified by using a durable, one-inch, yellow (OSHA Alert Yellow) trim band at the beginning of such ramp or hazard. Interior rain gutters shall be indicated with alternating yellow/black safety striping the entire length. Other methods of striping may be acceptable, but shall be submitted for approval prior to installation.
 17. All carpeting shall have edge strips to prevent fraying.
- C. Equipment Safety
1. Sharp edges, projections and hinged devices with hazardous characteristics shall be avoided in the design and construction of the loading bridge. Suitable edge detailing shall be provided where necessary.
 2. When in operate mode, all equipment shall be designed to be fail safe and bridge motion controls (i.e. horizontal and vertical travel, cab rotation) shall require the operator to apply constant pressure to remain engaged (dead-man).
 3. All operating mechanisms, i.e. horizontal and vertical drive, cab rotation, etc. shall be designed so that the drive mechanism is locked when power fails or is shut "off".
 4. Positive mechanical stops shall be provided to prevent dangerous over travel when any component might become disengaged from its guiding or restraining component.
- D. Noise and Vibration
1. The maximum average sound level and loading bridge vibration limits shall comply with the requirements of S.A.E. ARP 1247, current revision.
- E. Technical and Performance Requirements
1. The boarding bridge shall be designed to accommodate all imposed loads collectively. In the worst operating configuration, structural margins of safety as recommended by AISC specifications for the design and erection of steel structures shall be maintained.
 2. In determining the design factor of safety, weld efficiencies as designated by the American Welding Society or applicable design codes shall be used.
 3. Joint efficiencies shall be included in determination of the factor for bolted connections.
 4. All lifting devices shall be designed to AISC standards, (except wire rope) with a minimum factor of safety of 5 based on ultimate strength.
 5. The unit shall be designed with sufficient structural rigidity so that deflections due to load, wind, and motions of working parts do not create interferences, cause malfunctioning of the equipment, or present any safety hazards to personnel, aircraft, or the unit itself.
 6. In the case of standard component or component assemblies used by the end product manufacturer, certification of the application by the component manufacturer will constitute structural acceptability of such components.
 7. Shoulder bolts, bearings, or bushings shall be used when attaching parts that have relative rotary or linear motion.
 8. The wheels used on the equipment shall be of a type and size which will not damage or cause undue wear to the surface over which they will normally operate. The tires must be capable of supporting the design load of the passenger boarding bridge, roof load, snow load, and all ancillary equipment. The tires must be capable, under dead load and/or roof load, including snow loads, of operating satisfactorily without operational degradation.
 9. All mechanisms for actuating, restraining, and guiding the bridge and its components shall be designed so that no noise, sway, or sense of insecurity will be apparent to the passengers. No operating vibration or loads are to be transmitted to the terminal building.
 10. The passenger boarding bridge(s) submitted shall be designed not to exceed 1 in 12 (8.33%) tunnel slope when servicing any aircraft in the fleet mix designated for the gate where the PBB is to be located; however, the PBB shall be capable of achieving a minimum of 12% slope without causing damage to the PBB or ancillary equipment, including PCA or 400 Hz equipment, for maintenance or irregular operation activities.
 11. The bridge floor structure shall be designed to accommodate a dynamic load of 40 pounds per square foot over the total floor area.
 12. The roof shall accommodate snow loads of 25 pounds per square foot over the total roof area, or as otherwise required by code, whichever is greater.

13. The bridge, when in use at any extended length, shall accommodate, while maintaining operability, a wind load of 12.5 pounds per square foot and a wind velocity of 60 M.P.H. from any direction without loss of stability or control.
14. In conditions of sustained wind loads greater than 60 M.P.H., the bridge will be stowed. At wind loads above 60 M.P.H., the bridge, when retracted to the stowed position, shall accommodate a wind load of 25 pounds per square foot and a wind velocity of 90 M.P.H., from any direction.
15. The bridge shall be able to accommodate the added loads of 400 HZ ground power, preconditioned air equipment on the roof, and potable water cabinet on the side of the lift column including appurtenances, including dynamic operational loads presented by the PBB and these additional equipment items. These loads may be applied in total or in part, singularly or simultaneously. The design shall be based on the combination, which imposes the most adverse loading.
16. The bridge when maintained in accordance with the manufacturer's O&M manual by Airport maintenance personnel trained by the manufacturer as indicated herein, shall provide a useful service life of 20 years minimum.

F. Environmental Considerations

1. The bridge shall function satisfactorily and in accordance with these specifications under ambient temperatures from -25 degrees F to 120 degrees F with winds up to 60 miles per hour on wet, iced, or snow laden apron surfaces.
2. The entire bridge is to be weatherproof.
3. Equipment and controls that are exposed to the weather are to be of a weatherproof type or housed in weatherproof boxes.
4. PBB shall be equipped with external tunnel roller ice scrapers to remove ice from the tracks prior to contact with the rollers.
5. Electro-mechanical drive systems shall have suitable protective coverings over motors, chains, sprockets, actuator arms, linear actuator arms, etcetera, to both protect operating personnel and passengers, as well as to protect the systems themselves from exposure to weather elements or traffic abuse.
6. The structure shall be designed to resist the accumulation of debris or water in low points and/or pockets in the structure. Dimpled drain holes or suitable covers will be provided where necessary. Drain holes shall be located so as to drain collection points with the bridge in any normal attitude. Scupper drains from the internal gutters shall carry moisture clear of the structure and shall be sized to eliminate blockage. Welding and drilling operations after application of prime coats shall be prohibited.
7. Where access holes have been created to gain access to components of the PBB, or where pockets otherwise exist, that could trap or accumulate debris, such pocket or opening shall be suitably covered with screw attached covers.
8. All parts shall be resistant to, or protected from corrosion caused by contaminated turbine fuel or moisture blown or splashed from the ground. Provisions shall be made to resist electrolytic corrosion where conditions tend to cause this corrosion. Fasteners shall be of corrosion resistant material or plated to prevent corrosion.
9. All edges of marine grade plywood are to be sealed with an approved APA sealer prior to installation.

G. Service and Access

1. The design shall stress simplicity, ruggedness and ease of maintenance. All systems shall be designed to operate with a minimum of routine maintenance using long life components sealed or self-lubricating mechanisms, etc.
2. Equipment components and systems requiring frequent inspection or maintenance shall be readily accessible. Suitable access doors or removable enclosures shall be approved for this purpose.
3. Access doors, covers, and protective guards shall be designed for quick removal or opening.
4. Access panels shall be hinged, pinned, etc. to prevent loss from the unit. Large panels of over 4 feet, in both height and width, which are normally removed only for heavy maintenance, i.e. major component overhaul or removal, may be designed to be removed

- from the equipment when hinging or pinning is not practical.
5. Hinges shall be located on the forward edge of all vertically hung doors and on the lower edge of all horizontally hinged doors. Where possible, at least 8 inches of clearance above the ground shall exist when any door is open.
 6. All hinge doors shall be provided with devices to secure them either in the open or closed position such that they will not be blown by jet blast or ambient winds.
 7. Stops or bumpers shall be installed so that the doors, when open, do not mark or scratch the paint work.
 8. Major assemblies and components shall be capable of being disconnected and removed from the equipment without the necessity for extensive disassembly of other components. A design goal shall be that any major component should be able to be removed and reinstalled in a period not to exceed eight man-hours. All components/assemblies exceeding 80 lb. for two person-handling or 30 lb. for single person handling, require mechanical assistance and shall be provided with lift eyes, forklift guides, etc.
 9. Fastener heads and nuts shall be provided with adequate clearance for wrenches or drivers.
 10. The design of the unit shall be such that only ordinary common hand tools and test equipment are required in routine maintenance operations and special tool requirements for overhaul/heavy repair work is kept at a minimum.
 11. The equipment compartment shall be designed so as to provide easy access to the controls, relays, valves and other components within the enclosure. Provisions shall be made for ready adjustment, servicing, or replacement of these and other components frequently replaced or serviced.
 12. Maintenance service points and access covers shall be located and positioned in such a manner that a minimum time and effort are required during servicing operations. There shall be no interference to the servicing or draining of lubricants to or from any assembly or component by frame members or other obstructions.
 13. Any special tools or test equipment designed solely to service, overhaul or test performance of the loading bridge shall be identified in writing and submitted as specified.
 14. Pressure lubrication fittings shall be provided at all points where heavy loads, close tolerance, relative rotary or linear motion of parts occurs. Where access to fittings are difficult, a lubrication panel should be utilized.
 15. Components shall be protected from mechanical, electrical, and corrosion damage and malfunctions due to rain, snow, ice, sand, grit, deicing fluids, and other contaminants.
 16. All chains and belt drives shall have provisions for adjustment, and once adjusted, a positive means of retaining this adjustment, as well as OSHA compliant covers or guards.
 17. All hydraulic components, if present, shall be provided with drip pans to prevent the dripping of hydraulic fluid onto the ramp.
- H. Rotunda Entry Corridor
1. The minimum inside height of the entry corridor shall be 7 feet, 7 inches and the minimum inside width shall be 4 feet, 4.5 inches.
 2. A polished aluminum diamond plate threshold plate with a non-slip surface shall bridge the gap between the terminal building and the adjacent fixed walkway or between the terminal building and the rotunda corridor.
 3. Interior and exterior flashing shall be installed between the terminal building and the adjacent fixed walkway or between the terminal building and the rotunda corridor to effect a weather-tight connection. Interior flashing shall be stainless steel or painted metal to match bridge interior color. Exterior flashing shall be NFPA-415 compliant weather resistant fabric.
 4. The design of the rotunda and connecting corridor shall accommodate a terminal door sized 4'-0" x 6'-10" or as otherwise may be existing.
 5. Provide extended corridors where indicated on project documents.
- I. Rotunda
1. The rotunda is to be supported on an independent support column. It shall allow the telescoping tunnels to swing through an arc of 175 degrees (87.5 degrees clockwise and 87.5 degrees counterclockwise).

2. The rotunda support column shall not be anchored or secured to the terminal building, nor shall it transmit any live or dead loads or vibrations to the terminal building.
 3. Coordinate base plate with details as indicated on the construction documents. Field verify prior to manufacture.
 4. Field verify column dimensions prior to manufacture.
 5. The operational and ultimate swing limits shall include a position sensor located in the rotunda ceiling that shall be accessible from the rotunda interior and a physical limit switch mounted at the support column. The physical limit switch located on the support column shall be an ultimate limit, serving as backup to the operational limits defined by the position sensor. Together the sensor and limit switch shall provide three levels of safety for bridge swing (side-to-side) motion: 1) Approach: Bridge speed shall be reduced when within 1 to 2 degrees of the operational limit. 2) Operational Limit: Bridge motion shall be stopped when operation limits are reached. A Yellow warning Text message shall be displayed at the PBB controls informing the operator that an operation swing limit has been activated. Additionally an audible alarm shall sound while the bridge is at the limit and the Joystick is active. Motion in the opposite direction shall remain enabled. 3) Ultimate Limit: Bridge 3-phase power shall be disconnected and a red fault text message displayed at the PBB controls. Should the bridge pass through the operational swing limits, the ultimate swing limit shall trip and stop bridge motion. The ultimate limit switch shall be normally set 2 to 3 degrees past the point where the operational limits are set. Should the ultimate swing limit be reached, maintenance personnel will be required to move the bridge.
 6. The opening between the rotunda and the hinged telescoping tunnels shall have a complete weatherproof seal.
 7. The side coiling curtain barrel assemblies shall be covered to protect them from the weather. These covers shall be hinged to allow easy access to curtain assemblies. Hinges shall be full length stainless steel.
 8. The rotunda floor shall remain level regardless of the movements of the bridge tunnels.
 9. The rotunda shall include positive bird nesting prevention features.
 10. Weather seals shall be provided at curtains to prevent wind blown dust, rain or snow from entering bridge interior.
 11. Curtains, seals and covers shall provide complete protection from the exterior elements. There shall be no visible gaps or daylight apparent through the rotunda.
 - a. A slat-type cab curtain shall be provided in accordance with the following specifications:
 - 1) Allow for the rotation of the cab 87.5-degrees to the left of and 87.5-degrees right of the boarding bridge tunnel center
 - 2) Protective cover installed over cab and rotunda curtains
 12. Threshold plates shall have chamfered edges to reduce tripping hazards.
 13. The rotunda shall be connected to the terminal building or fixed walkway using both interior and exterior flashing. Flexible exterior flashing material shall be installed between the rotunda and the terminal or fixed walkway. Metal flashing shall be used in the interior to cover any gaps between the rotunda and the terminal or fixed walkway.
 14. Slope, over-travel and operational swing limits shall be located on the rotunda assembly. Slope limits shall be adjusted to up to 10 percent (5.71 degrees) for both up and down slopes. This limit shall be adjustable to meet local operating conditions and requirements.
 15. The corridor interface between the rotunda and the terminal building shall have a minimum inside clear width of 4'-4.5" and a minimum clear height of 7'-7" for a minimum of 15 inches. The corridor design shall allow installation of flexible weather seals and floor threshold to the face of the building.
 16. Existing ground connections shall be reconnected after installation or relocation of all PBBs.
 17. Rotunda and support column configurations shall be available to permit rotunda floor heights as low as 3 feet 6 inches (1.07m) above the surface of the supporting foundation.
- J. Telescoping Tunnels (2 or 3 tunnel as specified)

1. The telescoping tunnels shall be rectangular in cross section and hinged for vertical motion at the rotunda.
 - a. The telescoping tunnels shall permit servicing of all commercial jet aircraft as required by the aircraft parking layout such that the slope of the tunnels does not exceed 1 in 12 (8.33%), with the exception of the transition ramps.
 - b. The minimum inside width of the tunnels shall be as follows:
 - 1) Minimum width, wall-to-wall 57.5 inches
 - 2) Minimum interior height 84 inches
 - 3) Minimum inter-tunnel ramp width 53.5 inches
 - 4) Minimum corridor width 52.0 inches
 - c. All bridge/walkway sub-flooring shall be fully sealed, 3/4 inch thick, marine grade plywood or galvanized flat steel panels. Substitutes for marine grade plywood are not acceptable. All flooring shall be securely fastened with fasteners suitable for this purpose. Supplier shall insure that adjoining plywood sheets are supported and fastened to a common member to provide smooth, even joints. Steel panels shall be formed, welded and sealed. Sub-flooring is not required if a smooth metal floor surface is provided. The metal floor needs to be supported such that it prevents the washboard effect.
 - d. The Jet bridge manufacturer will procure the flooring material. The product needs to be glued, (no peel and stick will be accepted) and shall be installed as outlined in the attached Scope of Work. Yellow "nosing" shall be installed on the leading edge of all transition ramps.
 - e. Transition ramps with both fixed and hinged sloping sections shall accommodate the differences in floor elevations where telescoping tunnel sections overlap. Slope of the transition ramps shall not exceed 1:16 (3.6 degrees) relative to the tunnel floors. The fixed transition ramp sections shall comprise sloping floor areas within the tunnels to minimize the slope of the hinged transition ramp sections. Handrails shall be provided on both sides of the tunnels in the ramp areas. The handrails for the A-tunnel transition ramp fixed section shall be attached to the tunnel walls. The B-tunnel handrails shall be attached to the tunnel header.
 - f. High pressure laminated wallboards with blacktrim shall be used.
 - g. Insulation
 - 1) The ceiling shall be fully insulated to have a minimum average R value of 7.5.
 - 2) The tunnel wall shall be insulated to have a minimum average R value of 8.5.
 - h. Flexible seals are to be used between the tunnel sections to provide a weather-tight seal preventing entry of blowing dust, rain, or snow.
 - i. Where the telescoping sections overlap, ramps shall be provided to accommodate the difference in elevation. The ramps shall have yellow chamfered edges and handrails on both sides. Ramps shall have floor coverings as indicated in the finishes section.
 - j. The exterior sides of the boarding bridge shall be constructed of no less than 14 gauge flat steel panels. The Supplier shall detail panel specifications in the proposal. The tunnel sides are to allow for 100% insulation throughout.
 - k. The exterior roof and sides shall be constructed of a minimum of 18 gauge steel panels. All tunnels shall have flat or crowned roofs that are designed to facilitate positive water drainage. Corrugated roofs will not be approved.
 - l. Roof drainage and seals between tunnels shall be designed and constructed to prevent leakage of water runoff onto carpeted areas in the interior of the bridge. Special attention is required in the areas of hinge joints, telescoping tunnel sections, at the top and bottom of rotating portions (rotundas and cabs) and at canopies over aircraft doors.
 - m. All external metal shall be a uniformly smooth surface and free of all mill scale, rust and dirt before painting. A primer coat of epoxy primer shall be applied followed by one finish coat. A total nominal minimum prime and paint thickness of four mils when dry is required.
 - n. Electrical cable conveyance and management:

- 1) The telescoping tunnels shall be equipped with an exterior electrical cable conveyance system. The cable system shall be accessible to maintenance personnel for inspection at all PBB positions and operating conditions. Access to the cable conveyance system shall not impede passenger traffic or bridge operation. The cable conveyance system shall be capable of supporting a combination of cables and hoses.
2. PBB Pre-Cool Plenum:
 - a. Provide a minimum 60"Hx12"Wx12"D dual wall insulated PBB precool plenum in the end of C-Tunnel (or outermost tunnel). Provide and install a brushed aluminum diffuser on the interior of the PBB. Utilize a 10" inlet port, or as necessary to coordinate with PCA equipment which it will be utilized with. Coordinate with the PCA manufacturer. Locate such that plenum is not blocked when the PBB is in the stowed position as shown on the contract documents.
- K. Horizontal & Vertical Drive Systems
 1. The drive column assembly shall provide the force to swing, extend or retract, and raise or lower the bridge. This assembly shall be electro-mechanical.
 2. The motors and mechanisms for vertical, horizontal, and radial motion shall be integral parts of the drive and lift column assembly and operate in a smooth and quiet manner.
 3. The assembly shall be designed to permit simultaneous vertical travel, horizontal travel, and steering to permit expeditious movement to the aircraft.
 4. The vertical lift speed as measured at the cab bumper shall be 2.5 - 3.6 FPM nominal.
 5. The drive system shall permit the unit to be extended/retracted and rotated to any point within its operating envelope and shall permit these movements at variable speeds between 0 and 90 FPM. Maximum speed shall be limited to 85-90 FPM. Control of the drive system shall be such as to provide smooth starts and stops and positive fail safe braking. The brakes shall remain effective with power removed from the unit.
 6. Axles, wheels and tires shall be operated within their respective manufacturer's recommendations.
 7. Wheel/Tire assemblies shall be solid rubber tire tread on steel wheels as manufactured by Trelleborg or approved equal. Drive assembly shall operate satisfactorily as specified in the construction documents on wet, iced, or snow laden ramp surfaces.
 8. Provide a 2" wide reference stripe on each inner column tube indicating upper and lower travel limits.
 9. The assembly shall be electro-mechanical driven and the following requirements shall be met as applicable:
 10. Electro Mechanical Drive
 - a. Horizontal Drive (Electro-Mechanical)
 - 1) The tires used on the horizontal drive wheels shall be solid elastomer, specially designed for PBB applications and rated for the applicable load.
 - 2) The horizontal drive system shall use AC gear motors with integral brakes. The AC motors shall be driven by solid state, variable frequency motor controllers for smooth variable speed proportional control operation. The AC drive system shall provide high efficiency, smooth performance, and good component availability. The individual variable frequency drive controller for each drive motor shall provide adjustable speeds from 0 to 90 feet per minute (27.4m/min), and be factory preset to a maximum 60 feet per minute (18.3m/min). The controller shall be adjustable to provide optimum responsiveness to the horizontal controls. The controller shall provide built-in diagnostics to assist with trouble shooting.
 - 3) A steer angle of 200° shall be possible both in place and in motion. The wheel carriage shall steer 110° to the left and 90° to the right of the centered position. Steering speed shall be adjustable between 16° and 42° per second. The steering rate shall be factory set at a maximum 23° per second. The horizontal drive wheel system shall be equipped with mechanical stops to prevent over steer. A wheel position potentiometer shall monitor rotational alignment with the bridge and provide operational steering limits before the mechanical hard stops are contacted. Wheel bogey position shall be indicated on the touch screen at

the operator's console.

- 4) A dynamic braking system shall allow the PBB to come to smooth controlled stops. Integral spring-applied, electrically-released brakes shall be provided with each drive motor. The brakes lock the PBB in place when electrical power is disconnected, when the operator control stick is in the neutral position or when operating power is turned off at the PBB controls.
 - 5) The horizontal drive motors shall be equipped with manual brake releases to allow the PBB to be towed in the event of power failure. Tow lugs shall be provided at the lower wheel frame. The manual brake release shall automatically reset and re-engage the motor brakes when the PBB drive is engaged.
 - 6) Tire Manufacturer:
 - (a) Low Profile Trelleborg Tires (solid tires)
- b. Vertical Drive (Electro-Mechanical)
- 1) The lift mechanism shall consist of two (2) recirculating ball bearing screw assemblies. Each assembly shall be independent of the other, with individual motors, and be capable of supporting the bridge under full design load and raising and lowering the bridge at an approximate speed of 60 inches per minute +15% measured at the aircraft end of the PBB. The ball nut of this assembly shall be equipped with wiper brushes to remove grit or dirt from screw threads and a self-locking Acme type thread to prevent unit collapse in the event of a ball nut failure.
 - 2) The vertical drive motors shall be fitted with spring-applied brakes that release only when electric power is applied and vertical motion, up or down, is signaled from the operator's console or the auto-leveler system.
 - 3) The brakes shall hold securely at all elevations, without creeping, whether the bridge is in operation or not.
 - 4) The fault detector circuit shall shut down the electrical power to the vertical drive motors and set the brakes independently of the operator. This shall occur if the bridge is in the vertical-operate mode and there is differential motion at the ball screws.
- c. PBB's shall provide for "conventional steering" .
- 1) "Point & Go Steering" shall be selectable through a password protected maintenance screen.
11. HYDRAULIC DESIGN:
- a. General
- 1) The hydraulic fluid shall be fire resistant, have low toxicity, and have biodegradable properties.
 - 2) The hydraulic fluid shall allow satisfactory operation of the drive column under ambient temperatures of -40°F to 140°F with winds up to 60 miles per hour and meet the requirements of MIL-H-5606, latest edition. The hydraulic reservoir (tank) shall have the capability of being electrically heated during severe weather conditions.
 - 3) The system should have shutoff valves installed to facilitate changing of components such as filters, pump, and hoses without draining the system.
 - 4) The hydraulic fluid desired will be specified by the controlling specification. A nameplate stating the type of hydraulic fluid used and the total tank capacity shall be installed adjacent to the reservoir filler neck.
 - 5) The preferred maximum pressure required by an operation is 2000 psi or less.
 - 6) Maximum allowable flow velocity (Ft/Sec) through any hose, tube or pipe shall be determined from the following table:
 - (a) Suction: 04
 - (b) Pressure - Continuous Duty: 15
 - (c) Pressure - Intermittent (up to 50% Duty): 25
 - (d) Pressure - Infrequent (up to 20% Duty): 40
 - 7) In cases where pressure drop due to tube and hose length becomes excessive with the flow specified above, such tubes and hoses shall be made of a larger

- diameter to reduce the pressure drop.
- 8) Hydraulic components shall be protected from flaws in excess of manufacture's published ratings.
 - 9) The hydraulic fluid reservoir shall have a minimum reserve of 25% of displaced hydraulic fluid, making the capacity equal to 1.25 times the total maximum displaced volume of the hydraulic components including that contained in the hydraulic lines, accumulators, and cylinders. The reservoir design is to include the following:
 - (a) Weatherproof breather with 10 micron filtering, having air flow capacity adequate to maintain essentially atmospheric pressure in the reservoir under maximum flow conditions.
 - (b) A magnetic drain plug is to be incorporated in a sump located at the return end of the tank. The tank should be arranged such that the sump and drain are at the lowest point.
 - (c) Full range fluid level indicator with adequate protection from breakage and located in an easily observable area.
 - (d) A strainer type filler neck with attached cap is required.
 - (e) The tank outlet to the pump and the major return port are to be located at opposite ends of the tank and one inch (25.4 mm) above the tank bottom. Any pump case, seal leakage, or other gravity drains are to be returned to the top of the tank with the actual discharge below that level at which oil should be added to the tank to prevent aeration.
 - (f) An access opening to allow full access to interior for cleaning. Access cover is to be gasketed and fastened leak tight.
 - (g) Reservoir to be thoroughly cleaned and protected from contamination during assembly of the unit. Material and construction to conform to commercial quality and adequately protected against corrosion. Coated tanks are unacceptable. Items such as strainers, check valves, relief valves, filters, or any other item requiring periodic inspection or repair shall not be located inside the tank, but outside where they can be serviced easily.
 - 10) The hydraulic system should include a "high" and "low" side hydraulic filter, spin-on design, with a minimum 10 micron filtering capacity. A low pressure filter canister of micron size to be determined by pump manufacturer shall be located between the tank and pump system. Easy accessibility to the clean out port shall be provided.
 - 11) Pumps are to be chosen so that their capacity will meet peak demands within manufacturers' capacity ratings of flow, pressure, and RPM. Where system reliability and/or pump manufacturers' specifications require it, a boost pump and low pressure filter with a differential pressure indication will be provided.
 - 12) The system pump(s) and components are to be protected by a relief valve(s) which have a capacity equal to or greater than pump capacity. Relief valve(s) shall dump directly to tank.
 - 13) The hydraulic fluid temperature during continuous operation shall not exceed 150°F (66°C) on a 115°F (46°C) day and in no case shall exceed the hydraulic system components manufacturers' recommendations.
 - 14) Dynamic pressure surges, spikes, and fluctuations shall be minimized with use of accumulators if necessary. Pre-charge information tags shall be attached adjacent to charge fitting.
 - 15) The material for all hydraulic lines shall be specified. Flexible lines shall be made of hydraulic fluid resistant material. The lines shall be protected and supported from chafing and binding. Hydraulic lines shall be routed so that, where possible, structural members will provide protection. Lines shall be supported so that fittings, tubing and hoses are separated from engine exhaust systems, and are not subject to damage from heat, external loads, and vibration. If necessary, heat barriers or shields shall be installed. Lines shall be protected from kinking and abrasion.

- 16) All hydraulic fittings will be in accordance with SAE J514. If flared, the 37° (0.646 rad) flare with "B" nut and sleeve is to be used. Flared copper seats are not to be applied to fittings for sealing purposes.
- 17) All pipe threads are to be joined with a suitable pipe sealant.
- 18) Hydraulic systems are to incorporate such devices as hydraulic fuses, pilot check valves, holding valves, accumulators where necessary, and interlock systems to eliminate uncontrolled action of mechanisms (i.e., the fall of the bridge, etc.) in the event of energy failure. Manual actuation of systems shall be provided to return systems to a safe condition should energy failure occur.
- 19) Test port locations shall be provided at points in the hydraulic system requiring access for pressure adjustments and troubleshooting. Each port shall be plugged with a 1/4 in. NPT plug.
- 20) The hydraulic tank filler and breather and lines shall be located away from heat sources to prevent oil from splashing onto hot surfaces in the event of overflow, leak or component failure.
- 21) Hydraulic hoses shall conform to the quality of the SAE 100R1 through 100R7, per SAE Standard J517, as applicable.
- 22) All components which are capped when received from suppliers shall have the protective caps left in place until connection is made to each port.
- 23) When charging the hydraulic system with oil, the manufacturer shall take steps to ensure that the oil is free from contamination. The supply container shall be protected from water and dirt contamination during storage. All transfer containers and fittings shall be thoroughly cleaned and dried prior to use to prevent contamination from dirt, water, and other fluids.
- 24) The manufacturer shall operate all segments of the hydraulic system for a period of one hour to thoroughly circulate the hydraulic fluid, remove the hydraulic filter element, examine for contaminants, and replace with a new element. This shall be repeated until the used filter shows no evidence of contaminants. In the case of dead end lines to actuators, provisions for bleeding shall be made and measures shall be taken to ensure that fluid not normally being re-circulated shall be made to do so during the cleansing period to ensure that all fluid, lines, and components are clean.
- 25) Pressure vessels such as air receivers shall comply with all applicable requirements of the ASME Unfired Pressure Vessel Code, Section VIII. Such equipment shall bear an ASME "U" Code Label and certification.
- 26) Manufacturers shall furnish sufficient details of their proposed hydraulic system to allow an engineering evaluation.
- b. Horizontal Drive (For Hydraulically-Driven PBB)
 - 1) A hydraulic drive system shall provide the extend, retract, swing and steer capabilities at variable speeds up to 90 feet per minute. This two-wheeled system shall operate on solid tires. Both wheels shall be independently driven by hydraulic motors.
 - 2) The wheel motors shall be equipped with an automatic brake that locks the undercarriage when the power is "off." In case of a power outage, the brakes shall be manually released so the bridge can be towed. Tow bar and tow bar lugs are to be included on the undercarriage.
 - 3) Switch-controlled wheel stops shall be provided to prevent overturning of the wheel bogey.
- c. Vertical Drive (For Hydraulically-Driven PBB)
 - 1) The lift mechanism shall consist of two (2) extra capacity hydraulic rams. Each assembly shall be independent of the other and capable of supporting the bridge under full design load. An adjustable rate pump and cylinder system shall provide the necessary lift speed measured at the aircraft cab bumper.
 - 2) The lift cylinders shall be equipped with pilot-operated check valves that prevent the bridge from descending in the event of fluid loss or other system failure. The hydraulic system shall be designed so that the bridge can be lowered manually

- in case of a power failure.
 - 3) Mechanical stops in the cylinders shall be provided to prevent over-travel of the vertical lift column. The system shall not be damaged if the bridge is raised or lowered into the cylinder stops.
 - d. PBB's shall provide for "conventional steering" as well as "point & go" steering. The PBB shall default to "point & go" steering, but mode shall be selectable through a password protected maintenance screen.
- L. Rotating Aircraft Cab with Operator Control Console
- 1. The aircraft cab with operator's station shall be designed to rotate a minimum of 125 degrees, a minimum of 92.5 degrees counterclockwise and 32.5 degrees clockwise on bridges with right-side service stairs and a minimum of 92.5 degrees clockwise and 32.5 degrees counterclockwise on bridges with left-side service stairs from the tunnel centerline to facilitate alignment with multiple aircraft parking configurations. The rotation speed shall be between 2 and 2.5 degrees per second. The cab shall be enclosed to provide maximum security and protection from the outside environment throughout the docking and passenger loading operation.
 - a. All cab rotate motors shall be provided with VFD inverter drives suitable rated for the connected load.
 - 1) Provides smooth start/stop functions.
 - 2) Equip enclosure with heaters per environmental section.
 - 2. Cab rotation assemblies shall be provided with sealed bearings or an accessible lubrication points and shall be included in the PBB preventative maintenance program.
 - 3. Control console and operator visibility. The cab shall be equipped with a forward facing control console, with a laminated safety glass window providing full forward view of the aircraft interface. It shall be possible to operate the PBB without opening the cab weather doors. Additional visibility shall be provided for the operator by a wire glass window to the left of the operator, a window to the right, and by windows in the weather doors and a wire glass window in the service door. Wire glass vision panels shall be provided in the cab side-coiling curtains. The front window size shall be 31.5 X 24 inches (800mm x 610mm). The left window size shall be 30.5 X 10.5 inches (775mm x 267mm). The right window shall be 32 X 6 inches (813mm x 152mm).
 - 4. The cab shall have sufficient windows to allow the operator to view the ramp area during operation.
 - 5. Mirrors shall be provided to allow the operator full view of the horizontal
 - a. A round rear view mirror shall be provided on both sides of the cab to allow the operator full view of the horizontal drive wheels (wheel bogie) during operation. Provide additional mirrors as necessary such that operator has full view of wheel bogie and service stairs during bridge operations.
 - 6. The cab side coiling curtain slats shall be equipped with upper and lower safety glass view panels to allow the operator maximum visibility of the aircraft and ramp during operation.
 - 7. A slat-type cab curtain shall be provided in accordance with the following specifications:
 - a. Allow for the rotation of the cab 92-degrees to the left of and 35-degrees right of the boarding bridge tunnel center
 - b. Provide full visibility of the ramp area in the cab curtain through the use of wire reinforced glass windows of uniform size and shape throughout the curtain
 - c. Protective cover installed over cab and rotunda curtains
 - 8. A closed circuit television system shall be provided complete with a monitor housed in or near the control console. The camera shall be focused on the drive bogie and service stair so that the operator has an unobstructed view when servicing all aircraft.
 - 9. The side coiling curtain barrel assemblies shall be covered to protect them from the weather. Covers shall be hinged to allow easy access to curtain assemblies. Hinges shall be full length stainless steel.
 - 10. Weather seals shall be provided at curtains to prevent wind blown dust, rain or snow from entering bridge interior.
 - 11. Curtains, seals and covers shall provide complete protection from the exterior elements. There shall be no visible gaps or daylight apparent through the cab except at windows and

- clear curtain slats.
12. The cab shall have weather proof doors to protect the interior of the bridge when it is not in operation. This door shall be located to the right of the operator's station and have the capability of being locked. This door shall be double inward swinging weather doors. The opening shall have a clear width of 43 inches and a minimum clear height of 7 feet 8.5 inches. The upper portion of each door shall be equipped with a 12 inches wide X 32 inches high (305mm x 812mm) safety glass window to enhance visibility and shall be equipped with 1/2 door height wire reinforced safety glass windows to enhance visibility.
 - a. Door to incorporate suitable stops to hold open when opened and closed when closed.
 - b. Door to be lockable from inside the cab bubble area.
 - c. Doors shall utilize a commercial grade door closer such that a minimum of effort is required to open or close the doors.
 - d. Doors shall be fitted with three non corrosive hinges per door.
 13. The aircraft end of the cab floor shall be equipped with a full width aircraft spacer (bumper) 122 inches wide. The spacer shall be of a material that will retain its flexibility during constant usage regardless of the temperature and must be non-abrasive to prevent scratching or other damage to the aircraft fuselage. The spacer shall provide safe and secure human support when stepped upon. The color of the bumper shall be safety yellow. The bumper shall have a dead load strength of 500 lbs, a cold crack minimum of -40°F, and a flame resistance (max) of 2 second flameout. Appropriate designed and fabricated cut-outs shall be provided to accommodate all design aircraft devices, including without limitation, the door of the A300, MD80 and B737 series aircraft pitot tubes without violating NFPA 415, current edition, requirements. The bumper is to be designed to provide a replacement 18" of bumper material from the left-hand side of the bumper (i.e., with respect to the operator's perspective) with a 1" thick bumper material. This provides proper interface with the MD-80 aircraft. The PBB spacer material shall comply with NFPA 415, current edition, requirements.
 - a. Submit bumper details for approval.
 14. Adjustable cab floor: The aircraft end of the cab shall be equipped with a cab floor that adjusts to level for various aircraft floor heights and bridge slope angles. The floor shall be individually actuated and independently adjustable to adapt to aircraft doorsills. The adjustable cab floor shall level automatically and shall be equipped with a manual override control switch. The floor shall be capable of providing a level surface adjacent to the aircraft doorsill for PBB slopes from -10% to +10%. The automatic leveling system shall correct the floor to a slope not to exceed +2% (+1.2°) from level. The maximum slope of the cab floor shall be limited to plus or minus 6.5 degrees (11.4%).
 15. The floor shall be double hinged and shall provide a smooth transition between the level floor and the tunnel section. This transition floor shall provide a smooth platform sloped approximately in the direction of passenger traffic flow. There shall be no raised surfaces that may introduce a tripping hazard to the passengers. Adjacent surfaces shall be the same level regardless of the position of the cab floor or the passenger loading bridge. The cab floor walking surfaces shall be ribbed rubber
 16. Operator's station shall be equipped with an operators platform for the operator to stand on while rotating the cab. This prevents the operator from having to walk while also attempting to operate the bridge.
 17. Control console doors/lid shall be interlocked to drop main power in the event they are opened. These limit switch interlocks shall be defeatable by maintenance staff.
 18. Control console doors/lid shall have hold open devices.
- M. Console Controls and Indicators
1. Controls
 - a. The operator's control console shall be designed to allow accurate operation by personnel possessing no special skills and trained by the manufacturer or manufacturer-certified trainers, in accordance with the manufacturer's operation manual.

- b. A placard outlining the bridge operating instructions shall be displayed in a prominent location in the cab of each bridge so as to be easily visible to the Operator while operating the bridge.
 - c. All motor controls shall be motion oriented. For example, in raise and lower functions, the "raise" push-button will be located above the "lower" push-button, etc.
 - d. The operator's console shall be Owners standard and meet the following specifications:
 - 1) Faceplate cover shall be made of a heat and scratch resistant material
 - 2) All labels shall be integrated into the cover material
 - 3) Non-removable type button faces shall be used
 - 4) Labeling shall be simplified and consistently placed above or below the switches - above if the control is a warning light or push button, below if the control is an on/off switch
 - 5) Labels are to be placed on all sides on multi-directional joystick or set buttons
 - 6) A four quad joystick providing forward, reverse and left and right steering is to be provided
 - 7) An intuitive display for jetbridge cab height
 - 8) The alarm speaker is to be mounted inside the console so the agents are unable to disable the speaker
 - e. Smoke detectors in the PCA and Cab (or any other ancillary equipment with a smoke detector, ex. PCA) shall be wired to provide a single point back to the building fire alarm system. This alarm shall trigger a local alarm per airport standards.
 - f. Power and control circuit switches or combined power/control circuit switch shall be key operated using a three position (i.e. OPERATE, OFF, AUTO) locking switch device, with a remove core as follows.
 - 1) Power-On Circuit and Control Circuit lock or combination shall be Best #1W6E2, US260
 - 2) Operator's Console panel lock shall be Best # 7L6R14, US26D
 - 3) One set of CORE keys are to be furnished by the supplier to the Owner prior to installation of Owners cores.
 - 4) The operator must be able to remove the key from the switch when the switch is in either the OFF or AUTO position.
 - g. The maintenance console shall be equipped to accept a Best Lock removable core.
 - h. Control requirements shall include a Human Machine Interface (HMI) touchscreen.
 - 1) All control and display schemes shall be submitted for approval. See submittals section.
2. Indicators.
- a. The following indicators shall be labeled to indicate function and shall be located on the control panel.
 - 1) 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. See airline specific requirements.
 - 2) A wheel position indicator shall show the orientation of the wheels along with the true tunnel centerline, regardless of the cab's rotational position.
 - 3) An amber light to indicate that the auto level function is energized and operating.
 - 4) An auto level malfunction shall be indicated with a red light and shall be accompanied by an audible warning.
 - 5) A swing limit reached shall be indicated with a red light and shall be accompanied by an audible warning.
 - 6) An amber light shall indicate when the aircraft canopy closure is in the down position (aircraft closure must be retracted before the bridge can be moved). Green shall indicate up, red shall indicate canopy down and the key selector switch to ON.
 - 7) A red light shall indicate a lift column malfunction has occurred.
 - 8) A light shall indicate if the adjustable cab floor is in the automatic or manual mode.

- 9) A red light shall indicate when the 400 Hz aircraft cable is deployed.
- 10) An green light shall indicate when the 400 Hz SSFC or PCA units are operating, red shall indicate faults, amber shall indicate standby.
- 11) Any operator correctable condition that prevents the PBB from operating with the Key switch in the ON position should be displayed in an approved manner.
- 12) Any condition that causes an audible alarm shall be displayed.
- 13) Video control monitor.
- 14) Display requirements shall be met with a Human Machine Interface (HMI).
 - (a) All control and display schemes shall be submitted for approval. See submittals section.

N. Canopy Closure to Aircraft

1. The outermost end of the cab is to be equipped with an accordion-type bellows closure. Both sides of the closure shall be independently adjustable to provide a weather-tight seal against the most critical aircraft contours. When fitted against the aircraft fuselage, the closure shall enclose both the open aircraft door and doorway. Pressure sensitive limit switches shall be incorporated into each side of the closure actuator mechanisms, as necessary, to prevent excessive pressure on the skin of the aircraft. The aircraft contact point of the closure shall be a soft material to prevent scratching or damage of any kind. The closure is to be non-abrasive, highly tear resistant, and weather resistant as well as able to remain elastic and flexible in extreme cold and hot climates and meet the requirements of NFPA-415, latest edition.
2. To maximize UV protection and increase service life, the assembly shall be two ply, the outer ply will be a rugged, polyester fabric while the inner ply will be a NFPA 415 compliant material.
3. The material for the outer ply shall meet the following minimum requirements: FIBER-Polyester, DENIER-1000, COUNT-18 x18, TEAR (LBS/IN)-242/213, TENSILE (LBS/IN)-439/441.
4. The material for the inner ply shall meet the following minimum requirements: FIBER-Fiberglass-Satin Weave, DENIER-, COUNT-, TEAR (LBS/IN)-50/45, TENSILE (LBS/IN)-300/275.
5. A minimum two (2) inch thick cushion pad shall be provided at the point of contact between the canopy and the aircraft fuselage to prevent damage to the aircraft skin and cabin or cockpit windows. Canopy supports in the leading edge of the canopy shall be padded to prevent contact with the aircraft. This padding shall be firmly attached in such a manner to prevent its slipping, turning, twisting, or distortion from normal usage. It shall be possible to replace the padding in sections without removal of the entire canopy.
6. The horizontal width of the canopy opening at the aircraft interface shall be at least 10 feet (3.05m).
7. The closure must be capable of mating with all aircraft from BAE-146/RJ-85 through B757, B767, B777, B747 and Airbus aircraft compatible. This shall be a minimum requirement. Additionally, the manufacturer shall review the aircraft parking planning drawings and shall ensure that all canopies shall mate properly to all indicated aircraft, irrespective of gate position.
 - a. The canopy fabric must conform to the following specifications:
 - 1) Color – See Finishes
 - 2) Base Material - Polyester
 - 3) Minimum Fabric Weight - 5.0 oz./SY
 - 4) Vinyl Coated - Minimum Finished Coated
 - 5) Material Weight - 24.0 oz./SY
 - 6) Tongue Tear Strength - 190/190 lbs
 - 7) Trapezoid Tear Strength - 50/60 lbs
 - 8) Grab Tensile Strength - 375/350 lbs/in
 - 9) Strip Tensile Strength - 300/275 lbs/in
 - 10) Adhesion (min.) - 10 lbs/in
 - 11) Hydrostatic Resistance - 500 psi

- 12) Cold Crack Minimum - -40°F
 - 13) Flame Resistance (max) - 2 second flameout
 - 14) Lining - 2 inch foam
 - 15) NFPA-415 Certification - Yes
8. The canopy will be designed to provide a removable 18" long canopy pad from the lower left-hand side of the canopy (i.e., with respect to the operator's perspective). This provides proper interface with the MD-80 aircraft.
 9. A metal canopy hood is to be installed to protect the canopy in the retracted position. At no time shall the hood come in contact with the aircraft.
 10. Supplier is required to submit a sample of fabric and associated specifications with proposal.
 11. The closure when in its retracted position shall be protected by a hood or other device to prevent water and/or debris from laying in the folds of the closure material when the bridge is not in use.
 12. Any exposed arms, struts, etcetera should be covered.
- O. Automatic Leveling System
1. PBB's shall be equipped with an automatic leveling device which permits the bridge to automatically respond to changes, including small changes, in aircraft door sill height thus maintaining a constant relationship between the floor of the aircraft and the floor of the PBB. It shall not exert stress on the fuselage skin. The leveling device actuating mechanism or rotary sensor which contacts the aircraft shall be located on the right side of the cab in full view of the operator. If the actuating mechanism or sensor is located in the cab interior or other area normally exposed to passenger traffic, it shall be located in a remote area not typically occupied by the passengers, and it shall be adequately protected and shrouded to preclude passenger interference. "DANGER - DO NOT TOUCH" shall be printed in 1/2" red letters on the device or shroud to advise passengers to stay clear. It shall function reliably on each specified aircraft regardless of door location, fuselage contour, and aircraft door sill height. The auto-leveler shall be engaged when the PBB is in the "AUTO" mode.
 2. In the event of an auto leveler failure, an alarm shall sound and an "Auto Leveler" Warning light shall flash, at the console to alert the operator. The console alarm shall be a different alarm with a distinct sound so as to distinguish it from other PBB alarms. The audible alarm shall be of sufficient volume to be heard throughout the interior of the PBB.
 3. The system shall stop vertical travel and sound an audible alarm in the event the system does not neutralize within a pre-set adjustable distance (1 inch to 4 inches). The audible warning device will be installed at the console and at the rotunda, or walkway, whichever is closest to the terminal door. Provisions to allow an external audible device shall be made in case there are requirements to have the device at the gate counter.
 4. Since the aircraft and PBB are exposed to various wind conditions and jet blast during the servicing period, the auto-leveler actuating mechanism shall be capable of activating within the full range of its horizontal and lateral clearance.
 5. The control circuitry shall include an adjustable timer which shall limit the auto-leveler's continuous response in either direction. The timer shall be adjustable from 1.6 to 16 seconds, and shall be preset to 2 seconds, and have a minimum rotation of one revolution and allow a range of adjustment of at least six inches up or down from a neutral position. The circuitry shall include both audible and visual alarms at the operator's console, and a bell or horn in the general ramp area, which shall produce a distinctively different sound from the other alarms on the unit, when the timer interrupts the response to the system. When the timer circuit de-activates the auto-leveler, the vertical lift system shall automatically be de-energized and locked in position, a vertical brake system shall automatically engage, and the audible and visual alarms at both the operator's console and ramp area shall be activated.
 6. The auto-leveler actuating mechanism and sensor shall be durable and operate reliably even in the most adverse weather and ramp environment. It shall also be protected against accidental damage.

7. A remote audible alarm shall be located at the rotunda or fixed walkway, at the building interface to alert in the event of an auto leveler fault. This will be in addition to the console located audible alarm.
- P. Service Door, Landing, Service Stair
1. A ramp service door, landing, and service stair shall be provided at the aircraft end of the bridge for apron access by authorized personnel. The door, landing, and stair shall be positioned on the right-hand side of the cab bubble unless otherwise indicated.
 2. The service door shall be a minimum of 2'-3" wide by 6'-7" high, half wire-glass hollow core, steel door, with a 45-minute fire rating. The door shall open outward on the landing and be equipped with a heavy duty door closure. The door shall include a #4 finish, 16 gauge stainless steel cover plate with horizontal brush marks along with weather stripping on the jambs and header and a vertically adjustable bottom weatherstrip. The door shall include a weatherproof, heavy-duty, exterior mounted, door closer.
 3. The door shall be equipped with an electronic keypad keyless lockset conforming to FAR 107.14 security requirements. Security system shall match airfield standard.
 - a. The door shall be equipped with electronic access conforming to FAR 107.14 security requirements.
 - 1) Service door options:
 - (a) 30 inch (762mm) high stainless steel kick plate shall cover the lower inside and/or outside portions of the door.
 - b. Door shall incorporate hold open devices to hold door open in high wind conditions and due to forces associated with a sloping bridge.
 - c. Maglock style doors shall be equipped with exterior pull handle and interior pushplate as necessary.
 - d. Equip door exterior with gutter or drip diverter for overhead condensation.
 - e. Equip with weatherproof exterior adjustable heavy duty door closer
 - f. Confirm all details with the tenants prior to manufacturing.
 4. The service stair shall be equipped with self-adjusting risers and open mesh steel treads made from galvanized steel channel sections with open serrated grating (similar to Grip Strut™) providing high-traction, high-drainage walking surfaces. All steps shall have an equal rise. The treat width shall be 28 inches (711mm) and the maximum tread depth shall be 9.5 inches (241mm). The length of the stair stringers shall be selected depending on the operational height range of the PBB. The service stair shall be protected on both sides by handrails compliant with OSHA standards. The entire service stair assembly shall be constructed from hot-dip galvanized steel. The service stair shall be accessible to ramp service personnel at all operational heights and positions of the PBB.
 5. Service stair and landing illumination. An exterior rated 60 watt incandescent light fixture shall be provided on the exterior of the PBB above the service stair and landing to illuminate the service access. The light shall be controlled by a light switch provided on the interior wall of the PBB adjacent to the service stair access door.
 6. Service landing illumination control options:
 7. A photo cell shall operate the service access light automatically during darkness, with an interior light switch that shall override the photo cell to shut off the light.
- Q. Baggage Slide
1. New baggage slides are indicated on the drawings. Where indicated on the drawings, provide and install new baggage slides.

2.05 CONTROLS

- A. The bridge shall be designed with safety as the first priority; at a minimum, the following control features, interlocks, and warning devices shall be included in the bridge:
1. With the PBB in the "Off" mode, all controls shall be inoperative.
 2. Spring-loaded wheel brake(s) shall be automatically set whenever controls for horizontal travel are not actuated by the operator. The drive system shall have provisions to manually release the brakes to permit towing of the unit in the event of a power failure.
 3. The vertical lift column safety stops are to be automatically engaged whenever controls for vertical travel are not actuated by the operator.

4. With the PBB in the "Auto-Level" mode, all manual motion controls shall be inoperative. In this mode, vertical travel shall be regulated by the automatic leveling system.
 5. With the PBB in the "Operate" mode, the Auto-Leveler shall be retracted and become inoperative.
 6. The control circuits shall be designed and wired so that it is impossible to select opposite motions simultaneously, e.g., extend and retract or raise and lower travel.
 7. Two limit switches, one to slow the bridge to half speed and one to halt forward or reverse travel of the bridge when the tunnel extension or retraction limits have been reached.
 8. Limit switches shall prevent movement of the bridge beyond specified Rotunda operating parameters as specified in these Specifications.
 9. A 6-inch diameter alarm bell located under the aircraft cab shall sound continuously whenever the bridge is in drive mode of operation.
 10. An amber colored rotating beacon located under the aircraft cab shall illuminate when the selector switch on the operators' console is in the "Operate" position.
 11. Adjustable slope limit switches shall be added to prevent movement of the bridge in a way that can damage the loading bridge or any auxiliary equipment that is mounted on the bridge.
 12. Vertical travel limit switches shall be provided to prevent travel of the vertical lift columns into the mechanical stops.
 13. Horizontal travel limit switches shall be provided to prevent travel of the tunnels into the mechanical stops.
 14. Cab rotation limit switches shall prevent over rotation (left or right) of the cab into mechanical stops.
 15. Preconditioned air and 400 Hz operating interlocks shall prevent horizontal bridge motion while these units are operating or the 400 Hz aircraft cable is not in the stowed position. Suitable warning indicators shall be provided for each of these conditions.
 16. Drive forward and cab rotate controls shall be locked out when canopy is down on the aircraft.
 17. Forward or reverse "drive" controls are locked out by their respective extend or retract switches.
 18. The bridge shall be fitted with slope vertical limiting switches which shall lock out appropriate vertical and drive functions if operated beyond 10.0% (or as required by airline specifications) slope limits.
 19. Adjustable switches shall be provided to limit the swing or rotation of the bridge to prevent contact with the terminal building or other fixed obstruction. This system will stop drive motions in the direction of contact and the system shall incorporate suitable warning lights and buzzers on/or inside the operator's panel.
- B. The operator shall be able to pre-position the bridge to the approximate height of the aircraft serviced while raising or lowering the bridge in the manual mode. A vertical height indicator shall be provided.
- C. The control station or operator compartment shall be located at the aircraft end of the PBB. It provides the operator with a control console, service utilities, and control interlocks required for PBB operation. The control station shall be positioned on the left side of the cab and oriented to position the operator facing forward in full view of the aircraft during bridge operations. It provides the optimum PBB maneuvering visibility without obstructing passenger traffic flow. An operator of average height shall have an unobstructed view of the boarding bridge cab spacer to position it at the aircraft fuselage during bridge operations.
1. Control console: The control console shall be located at the control station in the operator compartment and shall be protected from the outside environment. The control console shall include a Graphical User Interface (GUI) touchscreen, joystick and pushbutton controls; and a cabinet containing the main programmable controller for the PBB plus terminal blocks, relays and related electrical components necessary for full, safe control of the PBB.
 2. Programmable Logic Controller (PLC): PBB functions and information systems shall be controlled using a Beckhoff Programmable Logic Controller (PLC). The PLC system used shall comply with IEC 61131

3. Graphical User Interface (GUI): The control console shall include a Graphical User Interface (GUI) on a 10.4 inch (264mm) touchscreen graphical display that provides the operator with a means to login, control interfaces, bridge set up displays, maintenance and diagnostic information, wheel position information, fault/limit/status and warning messages and fault history as described in the following sections.
 4. Networking with gate equipment: The PLC shall be designed to allow Modbus TCP/IP networking of the boarding bridges and appropriately equipped ancillary equipment, such as pre-conditioned air (PCA) units and ground power units (GPU), to a common remote monitoring station using Ethernet protocols and appropriate hardware.
 5. Controls: All bridge major motion controls shall be momentary contact type pushbuttons or joystick located on the control console. All major motions shall only occur while a control is maintained in the active position ("deadman" functionality). All of the motion controls shall be designed to be relative to the function of the PBB being controlled. For example, "raise" push button shall be located above the "lower" push button.
 - a. Horizontal drive control: Bridge movement in the horizontal (forward/reverse propulsion and left/right steering) shall be controlled by a four-quadrant variable control stick (Joystick). Forward/reverse propulsion shall be controlled by fore/aft motion of the control stick and steering shall be controlled by right/left motion of the control stick. A wheel position indicator on the GUI shall display the direction of drive. Speed shall be proportionally controlled: as the control stick is moved progressively from the neutral position, wheel speed increases proportionally with the position of the control stick. The control stick shall have a momentary "dead man" type trigger that when depressed shall enable PBB horizontal motion after a 3-second delay. During the 3-second delay the travel warning bell at the horizontal drive shall sound and an amber indication shall be displayed at the console to inform the operator to wait to drive. After the 3-second delay period is complete and the trigger remains depressed a green indicator on the console shall indicate that drive is enabled.
 - b. Vertical drive control: Push button switches shall be provided that raise and lower the PBB.
 - c. Cab rotation control: Push button switches shall be provided that for cab rotation, left or right, shall be available at the control console.
 - d. Emergency stop: The control console shall be equipped with an illuminated red mushroom type push button switch for discontinuing all bridge movement in an emergency. Two additional illuminated emergency stop switches accessible to ground personnel shall be installed, one at the lower end of the left vertical drive column and one at the lower end of the service stairs.
 - e. Closed-circuit TV (CCTV) monitor: A 5 inch (125mm) diagonal color monitor shall be mounted in the control console that continuously displays a camera image of the PBB horizontal drive wheels area. The CCTV camera shall be mounted at a location that provides a clear view of the wheels area.
- D. Slow and Stop Proximity Sensors
1. The manufacturer shall equip each PBB with a proximity switch system, or comparable, to prevent the bridge bumper from hitting the aircraft, causing damage. At 2' to 10' (adjustable) from the aircraft, slow-down circuitry shall be initiated, slowing forward movement to half speed. As the bridge continues to approach the aircraft, stop proximity sensors shall activate, no part of the bumper will be permitted to come within 0" to 2" (adjustable) of the aircraft. Appropriate forward motion and cab rotation in the direction of the aircraft will be locked out to prevent the bridge from contacting the aircraft. Movement away from the aircraft will be unrestricted.

2.06 OPERATION AND CONTROL LOGIC

- A. Operator log on and security: An Operator, Maintenance or Administration Password shall be required to access PBB operations or maintenance activities. An operator shall be required to log on at the GUI using a valid password to operate the PBB, to include enabling or disabling the automatic leveling mode. Passwords shall be used to control access to bridge functions, set up, maintenance and diagnostic screens and password maintenance. The PBB shall have three levels of passwords:

1. Level I – Operator Passwords. Up to forty-two (42) operator passwords shall allow access to all aircraft docking functions.
 2. Level II – Maintenance Passwords. One (1) maintenance password shall allow access to all operator and maintenance/setup functions.
 3. Level III – Administrative Password. One (1) administrative password shall allow access to all Level I and II functions plus allow the administrative user to view and edit passwords.
 4. Operator log on options:
 - a. A three position, master key switch shall be used to select “OFF”, “OPERATE” or “AUTO” (automatic leveling) modes. The key may be removed only in the “OFF” or “AUTO” positions.
 - b. A three position, master switch with no key shall be used to select “OFF”, “OPERATE” or “AUTO” (automatic leveling) modes.
 - c. Both a keyed (or non-keyed) master selector switch plus operator log on shall be required to operate the PBB.
 - d. A card swipe system shall be used for operator log on. The customer must specify in detail the card swipe system to be used and its required input power and control interface.
 - e. Both a keyed (or non-keyed) master selector switch plus a card swipe shall be required to operate the PBB.
- B. Log Off: To log off, the Operator shall touch the Logoff touch button on the GUI. This will return the GUI to the opening log on/password screen.
- C. PBB Operation Modes: The controls shall provide auto level, operate and logged off modes that shall be selected using touch buttons on the touchscreen.
1. Auto Level: Selecting the “Auto Level Mode” touch button shall initiate the auto level sequence. The auto level arm extends toward the aircraft, and the system shall perform an automatic check (test nod) of the auto level system to verify that the aircraft sensor has made contact with the aircraft and that the auto level control system is functional. Upon completion of the verification process, a message shall be displayed indicating that the PBB is in “Auto Level Mode”. When in auto level mode, the PBB shall allow only vertical travel; canopy, cab rotation and horizontal travel become inactive. In auto level mode, the PBB shall engage the auto level system and automatically follow the vertical movement of the parked aircraft. To exit auto level mode and return to manual mode, the operator must touch the auto level mode touch button and enter a valid password.
 2. Operate: Logging on using a valid password, or exit auto level mode using a valid password enables all bridge movements – extend/retract, vertical, floor movement, and cab rotation – provided there are no faults or activated limits. In operate mode, all bridge movement shall be initiated by the operator. The appropriate pushbuttons shall be lighted to indicate those functions available, and a message on the GUI panel shall be displayed indicating the PBB is in Operate Mode.
 3. Logged Off: The operator must touch the “Logoff” touch button to exit the Main Screen and return to the Log on Screen. All PBB functions except lighting shall be disabled.
- D. Languages: The operator shall be able to select one of the optional preprogrammed languages for display on the GUI. English shall be the standard default language, unless otherwise specified. Up to three (3) additional languages can be programmed into the PLC as options. Once a language has been selected, all messages shall be displayed in the selected language until a different language is selected on the log on screen.
- E. Cab Floor Adjustment: The cab floor of the PBB shall be both automatically and manually adjustable to align the floor level with the aircraft doorsill. Touch buttons on the GUI shall allow control of the cab floor to be toggled between the automatic and manual modes of operation. Text on the touch button shall display which mode is active.
1. Upon selection of cab floor manual mode, two additional touch buttons become active enabling the manual movement of the cab floor up or down. Touching the Up button shall move the right side of the cab floor in the upward direction. Touching the Down button shall lower the right side of the cab floor. When the PBB is “Auto Level Mode”, all cab floor movement shall be disabled and the touch buttons shall NOT be visible. The Cab Floor

mode of operation previously selected when the auto level mode of operation was energized shall be reactivated when the auto level mode is deactivated.

- F. Canopy Closure Control: The bellows-type aircraft closure canopy shall be powered for extend and retract operation. The control console shall contain GUI touch buttons to control extension and retraction of the canopy.
 - 1. The aircraft canopy closure shall be capable of dual activation of both sides of the canopy simultaneously or independent activation of the right or left sides of the canopy in the up or down directions. A GUI touch button shall be provided to select either independent adjustment of the left and right sides of the aircraft closure or simultaneous operation of both sides. Canopy actuation shall be active only when the PBB is in Operate Mode. When the PBB is in Auto Level Mode both canopy touch buttons shall be not visible. Therefore, the canopies must be deployed prior to entering auto level mode. The left and right side canopy actuator motors shall be independently controlled by limit switches that sense both the pressure against the aircraft, and operational range limits to provide positioning of the canopy to the aircraft and prevent over extension or retraction of the canopy closures.
- G. Floodlights Control: A GUI touch button shall be provided to allow control of the apron floodlights that shall be located on the underside of the PBB. These floodlights shall be positioned to illuminate the apron for a distance of approximately 10 m or 30 feet forward of the PBB, and around the wheel carriage area. Touching the Floodlight touch button will toggle the apron flood lighting on and off.
- H. Travel Bell Control: A momentary GUI touch button shall be provided to allow manual activation of the travel warning bell. When touched, the travel bell shall be activated until the button is released. (The travel warning bell sounds automatically while the PBB is moving and also during the three-second motion delay period.)
- I. More Controls” Button: A touch button labelled “More Controls” shall be available on the GUI to allow additional PBB features to be selected and controlled. These features may include selections such as floor heating, window heating, additional lighting and others dependent upon customer-selected options and features.
- J. Maintenance Button: A GUI touch button shall be provided that shall access maintenance functions available at the GUI. The maintenance touch button shall function only when a maintenance or administrative password has been entered during log on. The maintenance button shall provide access to:
 - 1. Calibration
 - 2. Limits Setup
 - 3. Options Selection
 - 4. Diagnostics
 - 5. Save and Restore Data
 - 6. Passwords (Administrative User Only)
 - 7. Warnings History
 - 8. Faults History
- K. Operational Indicators: The following indicators are displayed on the GUI in both auto level and manual modes.
 - 1. Vertical Height: The current vertical height of the PBB measured from ground level shall be measured and indicated. The measurement shall be displayed as a percentage between 0% (minimum height) and 100% (maximum height).
 - 2. Rotational Angle: The rotational angle of the bridge shall be displayed. The display identifies angular counterclockwise (left) rotation in positive (+) degrees, and clockwise (right) rotation in negative (-) degrees from the centerline axis in reference to a programmed zero position.
 - 3. Cab Rotation Angle: The cab rotation angle shall be measured and indicated. The zero data point shall be identified when the aircraft spacer shall be positioned perpendicular to the telescoping tunnel centerline. The display shall indicate counterclockwise (left) rotation in positive (+) degrees and clockwise (right) rotation in negative degrees from the

- centerline axis.
4. Wheel Position Angle: The wheel position angle shall be measured and indicated. Zero degrees shall be identified when the drive wheels shall be positioned parallel to bridge telescoping tunnel centerline axis. The display will indicate counterclockwise (left) rotation in positive (+) degrees and clockwise (right) rotation in negative degrees from the centerline axis.
 5. An amber indicator lamp and a text message on the GUI shall indicate the auto-leveling system is energized and functioning.
 6. A red indicator lamp and a text message on the GUI and an audible warning shall indicate the auto leveler sustained travel timer has activated, indicating an auto level failure alarm.
 7. An amber flashing indicator on the GUI to indicate the aircraft canopy is down. The canopy must be fully retracted before the PBB can be moved forward.
 8. A red indicator and a text message on the GUI and audible alarm indicate vertical drive column faults.
 9. Flashing Travel Beacons: A flashing amber beacon shall be mounted under the cab. The beacon shall indicate that power is on and the bridge may move at any moment. Two additional flashing amber beacons shall be provided, one mounted at the bottom end of each vertical lift column, that shall flash during the 3-second travel delay period and during PBB horizontal motion.
 10. Warning Bell: An audible warning bell shall be mounted under the bridge on the wheel carriage and shall ring (98 decibels at 10 feet (3.0m) when the bridge shall be moving horizontally and also during the 3-second travel delay period.
- L. GUI Message Display. The GUI shall provide status and fault information to the operator. Standard messages shall include the following:
1. Limit Messages: shall be displayed as yellow warning messages.
 2. Horizontal Extend Limit. Forward motion disabled.
 3. Horizontal Retract Limit. Reverse motion disabled.
 4. Vertical Up Limit reached. Drive PBB down.
 5. Vertical Down Limit reached. Drive PBB up.
 6. Cab Left Limit reached. Rotate cab right.
 7. Cab Right Limit reached. Rotate cab left.
 8. Left Swing Limit reached. Rotate PBB right.
 9. Right Swing Limit reached. Rotate PBB left.
 10. ACF Fault. Level floor manually.
 11. Main contactor not energized. Check interlocks and emergency stops.
 12. Limits Disabled. Use caution while driving the PBB with the Limits disabled.
 13. Slope Up Limit reached. Reverse and up motion disabled.
 14. Slope Down Limit reached. Reverse and down motion disabled.
 15. Slowdown Sensor Activated. PBB in Horizontal Slow-down. Speed reduced by ½.
 16. Main Contactor Disabled. To reset Main Contactor you must log OFF then ON.
 17. Fault Messages: shall be displayed as red fault messages.
 - a. Vertical Up Ultimate Limit. Call Maintenance.
 - b. Vertical Down Ultimate Limit. Call Maintenance.
 - c. Horizontal Extend Ultimate Limit. Retract bridge.
 - d. Horizontal Retract Ultimate. Extend bridge.
 - e. Cab Left Ultimate Limit. Rotate right.
 - f. Cab Right Ultimate Limit. Rotate left.
 - g. Inverter Fault. Log Off, Wait XX Seconds, Log back On. Call Maintenance.
 - h. Vertical Column Fault. Call Maintenance.
 - i. Swing Ultimate Limit. Call Maintenance.
 - j. Auto Level Failure. Reset Auto Level System. Call Maintenance.
 - k. Left Vertical Overload activated. Call Maintenance.
 - l. Right Vertical Overload activated. Call Maintenance.
 - m. Cab Position Sensor Failure. Call Maintenance.
 - n. Main Contactor Weld Fault. Press E-Stop and Call Maintenance.

- o. Vertical Up Contactor Weld Fault. Call Maintenance.
 - p. Vertical Down Contactor Weld Fault. Call Maintenance.
 - q. Cab Left Contactor Weld Fault. Call Maintenance.
 - r. Cab Right Contactor Weld Fault. Call Maintenance.
- M. Control Features and Interlocks: The following control interlocks shall be provided.
- 1. Mechanical and logical interlocks shall be provided to prevent damage to control circuits or boarding bridge components by selecting opposite motions simultaneously. For example, depressing an "up" button prevents depressing a "down" button.
 - 2. When the operator selects the auto level mode, or logs off the control system, all basic bridge operational controls shall be inoperative.
 - 3. Basic functional logic of the PBB shall be programmed by the manufacturer. This logic resides in non-volatile memory.
 - 4. The software shall act upon PBB location sensor inputs and operator control inputs to provide valid PBB motions. If a conflict arises between operator inputs and sensor inputs, error routines shall be executed to display messages on the GUI, turn on warning lights, sound an alarm and/or stop the bridge as necessary.
 - 5. PBB motions that if unprotected could endanger personnel or cause damage to the PBB shall be protected by three levels of limits. First level limits shall provide a slowdown of PBB motion. The second level shall provide warning to the operator and motion interruption. Motions selected by the operator that do not conflict with current limits shall be allowed. Other motions shall be disabled. Information suggesting allowable motions shall be displayed for the operator on the GUI where applicable. A third level of limits shall prevent physical travel. The third level limit devices shall interrupt the main line input power to all bridge control circuits except lighting. The PLC shall monitor the limit fault and the error and operator instructions shall be displayed on the GUI. Maintenance personnel shall be required to resolve the fault and reset the PLC to allow further PBB operation.
 - 6. A motion-enabled interlock shall require that an operator must initiate any bridge movement by activating a control panel switch. Otherwise, power cannot be applied to the energizing circuitry. As a result, if the PLC should command the bridge to move by sending an erroneous signal, the bridge will not move until a control console switch has been activated as well. Both the PLC command and the motion enable circuitry shall be activated prior to bridge movement.
 - 7. A non-contact sensor shall slow the bridge horizontal motion as it approaches the aircraft when in operate mode.
 - 8. An interlock shall prevent the PBB from being driven forward when the aircraft closure canopy is deployed.

2.07 ELECTRICAL SYSTEM(S)

- A. A NEMA 4 (IP65) rated stainless steel heavy-duty electrical disconnect panel, mounted on the rotunda support column, shall provide electrical disconnects, overcurrent protection and transformers – if required - to adapt and distribute the specified, customer-provided 3-phase, 5-wire, 480/277 Volt supply power to the motor, lighting, and control circuits with thermal magnetic trip circuit breakers. The disconnect panel shall be equipped with an interior dead front door, accessible only with a tool or a key. A variety of power source options shall be accommodated where needed: for example either a single power feed or separate power feeds into the disconnect panel shall be accommodated.
 - 1. The PBB main circuit breaker shall remove all power from all bridge circuits (exclusive of PCA & 400 Hz systems).
- B. PBB disconnect enclosure shall have SCCR rating of 35kA or greater.
- C. The passenger boarding bridge shall be capable of operating on an emergency power backed up source of 3-phase, 5-wire, 480/277 Volt, 60 Amps service terminating in a panel on the terminal wall adjacent to the rotunda column of the bridge, which shall be provided by others. This power shall remain separate from non-critical load power such as PCA and 400 Hz loads.
- D. All circuit breakers shall be lockable in the "OFF" position.

- E. All primary disconnecting means shall be suitably rated to be capable of withstanding and interrupting fault currents available at the input.
- F. All standard lighting, duplex receptacles, and operator controls shall operate on 120 volt, single phase, 60 Hz power. The transformer and separate circuit breakers for lighting and control power shall be mounted in the power control panel.
 - 1. All circuit breakers shall be lockable in the "OFF" position.
 - 2. All circuits and systems shall be protected by circuit breakers. Fuses will not be allowed.
- G. Disconnect panel shall either be equipped with exterior handles, or shall be guarded such that all circuit breakers can be operated by an operator without having access to energized components.
- H. All electrical components, which are exposed to the weather, shall be of a weatherproof type or housed in weather-tight NEMA 3R enclosures (or better), except for main power disconnect(s), which shall be a NEMA 4 stainless steel enclosure. Where dictated by the environment, electrical enclosures shall be equipped with heaters to control condensation.
- I. All electrical equipment and methods of installation shall conform to the requirements and recommendations of the American Insurance Association (AIA), the National Electrical Manufacturers Association (NEMA), and the National Electrical Code (NEC).
- J. All electrical components utilized shall be recognized by Underwriters Laboratories (UL) or an approved equal testing laboratory.
- K. Wiring and installation shall be in accordance with National Electric Code and applicable local electrical codes.
- L. Both ends of each conductor shall be color coded or identified. Particular attention shall be given to separating circuits of different voltages, emergency lighting, and telephone lines.
- M. Receptacles
 - 1. Receptacles/receptacle circuits shall be protected with ground fault circuit interruption (GFCI) or a residual current circuit breaker (RCCB)
 - 2. Provide at least two (2) 120 volt, 60 Hz, 1-phase, 20 Amp, three conductor, U ground duplex receptacles inside bridge.
 - a. One shall be located in cab section
 - b. One shall be located in the vestibule-end near the terminal door.
 - 3. Provide a weatherproof 120-volt, 60 Hz, 1-phase, 20 Amp, three conductor, U ground duplex receptacle on the drive column of each bridge.
 - a. Exterior outlets shall be equipped with extra heavy duty, metallic, while in use, wet cover assemblies such as Red Dot Model CKMUV or equivalent.
- N. Control console lid, wiring harness should be of sufficient length to allow the panel to be pulled out and turned over, facilitating repairs.
- O. All wiring shall be brought to terminal blocks and/or suitable connectors. The wiring shall be formed and restrained to give a neat appearance. Wire splices shall not be used. Connections shall be made using terminal strips and staked lugs or by patent connectors.
- P. Grommets and suitable anti-chafe material shall be used where wires are required to pass through structure or other similar relief or opening which exposes the wire to possible chafing. All wiring shall be in conduit (preferably automotive split loom) or spot-tied and shall routed away from possible pinch points. Wiring shall be adequately supported to protect it from damage due to ice and snow buildup, bumping, kinking, and flexing.
- Q. Quick disconnect fittings, where required, shall be UL or ETL approved.
- R. Lighting
 - 1. All PBB lighting shall be LED type without ballasts.
 - 2. Interior Lighting
 - a. Interior lighting shall be activated by occupancy sensors when someone enters the cab, rotunda or walkway.

- b. Interior lighting shall include the lighting in the walkways, tunnels, cab/bubble, and rotunda areas.
 - c. The level of illumination shall average 200 lux at the finished floor level with the weather door closed.
 - d. Tunnel lighting shall be provided by recessed LED panel fixtures with diffusers. The fixtures shall be 4 feet long and shall be positioned parallel to the tunnel centerline.
 - e. The lights shall be controlled by two 3-way switches. One shall be located in the control cab and one in the rotunda corridor adjacent to the terminal door.
 - f. Rotunda and bubble area lighting shall be provided in a similar manner, shall meet the same lighting level requirements and shall be controlled from the same tunnel switches.
 - g. Walkway Lighting
 - 1) Shall match the interior lighting design requirements.
 - 2) For walkways greater than 10' in length, the lights shall be controlled with two 3-way switches. One shall be located at the exit end of the walkway, and one shall be adjacent to the terminal door.
 - 3) For walkways less than 10" one light switch adjacent to the terminal door will suffice.
 - 4)
 - h. The operator's console shall be provided additional lighting via recessed LED light fixtures which shall be controlled via a switch on the operator's console. Provide a minimum of 645 lux at the console faceplate.
 - i. PBB electrical control cabinets shall be equipped with interior LED light fixtures as necessary to eliminate the controls for maintenance purposes, control via manual switch interior to cabinet.
 - j. Provide emergency lighting with 90 minutes battery backup complete with self-contained charger and automatic on-off control. Emergency lighting shall be incorporated into the normal lighting fixtures, and shall meet illumination requirements of NFPA-101 life safety codes. Wall mounted battery units are not acceptable.
3. Exterior Lighting
- a. Two exterior LED floodlights shall be provided under the tunnel to illuminate the apron area ahead of the bridge. An additional LED floodlight shall be provided to illuminate the area around the drive column.
 - b. A sealed exterior type LED fixture shall illuminate the cab area forward of the overhead roll-up door. Level of illumination shall be 200 lux at the finished floor level with the weather door closed.
 - c. A weatherproof exterior fixture with a 100 watt LED equivalent lamp shall be installed over the service door to illuminate the service stairs and landing. It shall be controlled by a switch located on the inside wall of the tunnel adjacent to the door.
- S. Electrical interlocks shall be fail-safe design.
- T. Electrical devices including lights, switches, relays, wiring, and terminals when located in an area exposed to weather, shall be of weatherproof design or protected by weatherproof enclosures. All exterior located limits switches, potentiometers, or other electrical devices, shall be protected by suitable covers to prevent the accumulation of snow or ice from preventing switch action or causing false switch action, as well as to protect the devices from physical damage.
- U. Electrical conductors or cables exposed to weather shall be suitably rated and UL approved.
- V. Flexible cables/conduits shall not exceed 24" except where relational motion is required. All cables and conduits shall be adequately supported.
- W. New PBB's shall be equipped with all miscellaneous power, data, control, etcetera cables/connectors as required by airline specifications.

2.08 COMMUNICATION SYSTEM(S)

- A. CAT 6 cables routed through the passenger boarding bridge cable carrier system shall meet the following minimum requirements:

1. Rated for a minimum of 600V
 2. Rated for outdoor use with sunlight resistant jacket when any portion of the cable is not installed in conduit.
 3. Rated for High Flex applications
 4. Comply with ANSI/TIA-568.2-D Standard
- B. Wireless Access Points
1. Refer to design drawings for quantity and type of cables.
- C. Fire Alarm:
1. Provide stranded CAT6 cable for fire alarm interface
 2. The fire alarm cable shall extend across the PBB and must have sufficient length at the rotunda end of the bridge to allow connection to the terminal building communications J box located on the building face near the passenger boarding door as indicated in project drawings. Provide and install terminations at the building face end of cable.
 3. Refer to the design drawings for quantity and type of cables
- D. Security Cameras:
1. Provide stranded CAT6 cable for security cameras.
 2. Refer to the design drawings for quantity and type of cables
- E. ACAMS:
1. Provide connectivity for ACAMS entry and exit at the service door in the cab of the PBB
 2. Separate 4"x4" boxes shall be installed for future card reader installation. One box shall be located inside the cab adjacent to the service door, and the other shall be located on the exterior of the cab adjacent to the service door .
 3. The boxes shall be recessed for a flush mounting design, with covers installed that are designed for their uses (interior and exterior).
 4. One conduit shall be route to each enclosure for future installation of ACAMS cabling back to the rotunda/terminal building. Provide pull strings in each conduit.
 5. Refer to the design drawings for quantity and type of cables .
- F. Telephone:
1. The bridge shall contain appropriate telephone communications equipment. The provisions shall include a flush mounted "J" box containing a 4-pair CAT-6 communication cable near the operator's position.
 2. The communications cable shall extend across the PBB and must have sufficient length at the rotunda end of the bridge to allow connection to the terminal building communications J box located on the building face near the passenger boarding door as indicated in project drawings. Provide and install terminations at the building face end of cable.
 3. Telephone cabling shall be extended to the wheel bogey and shall terminate in a junction box for the potential future installation of wheel bogey telephones.
 4. Telephone will be provided by others.
- G. Remote Monitoring
1. Each passenger boarding bridge shall be capable of being remotely monitored for status, alarms, usage rates, etc.
 2. Remote monitoring of the passenger boarding bridge shall include ancillary equipment including: pre-conditioned air unit, ground power unit, etc.
 3. Remote monitoring shall be provided via a
 4. This specification does not provide specific requirements for any additional software or hardware for the Owner to monitor the passenger boarding bridges equipment with remote monitoring capabilities.
 5. Any additional service fees for remote monitoring software shall be clearly identified and submitted to the Owner or Owners representative for review and consideration.
- H. Owner Equipment Enclosure
1. The manufacturer shall provide a 12"x12"x6" NEMA 12 enclosure inside of the cab of each PBB, mounted above the service stair door.

2. Each enclosure shall be equipped with a duplex receptacle, with power supplied by a separate circuit breaker inside of the cab control cabinet.
3. Each enclosure shall have a 1" conduit pathway provided to it to allow for communications cables to be routed from the dog legs to this enclosure. One CAT6 cable shall be prewired to this enclosure at the factor, coiled for future use by the owner.

2.09 MAINTENANCE AND SET-UP SCREENS

- A. GUI maintenance and Set Up Screens: The PBB shall be designed to provide a quick method for programming the PLC to accept new operational parameters. The Maintenance / Setup Screens shall allow maintenance personnel to complete initial setup or adjustment of the PBB operational parameters directly using the GUI at the PBB control console without the use of additional programming devices or external computer. These screens provide for Preposition and Location Setup, Status Calibration, and initial Bridge Operational Limit Set Up.
- B. Calibrations and Set Up: The following PBB control calibrations and set up operations shall be possible at the GUI touchscreen. A maintenance or admin password shall be required to access these functions:
 1. Calibration:
 - a. Height Calibration
 - b. Cab Angle Calibration
 - c. Rotunda/Bridge Angle Calibration
 - d. Wheel Bogie Angle Calibration
 - e. Extension Calibration (optional)
 2. Analog Limit Setup:
 - a. Vertical Up Limit Set
 - b. Vertical Down Limit Set
 - c. Cab Right Limit Set
 - d. Cab Left Limit Set
 - e. Swing Right Limit Set
 - f. Swing Left Limit Set
 - g. Extend Limit Set (optional)
 - h. Retract Limit Set (optional)
 3. Password Control:
 - a. Change Passwords (Admin password required)
 4. Adjustable Auto Level Timer (1.0 – 10.0 Seconds)
 5. Optional Features:
 - a. Pre-position Setup (optional): Set Pre-positioning Points
 - b. Others as required
- C. Prepositioning (optional): Prepositioning shall be easily programmed by local maintenance personnel without the use of ancillary programming devices. A maintenance person shall be required to log onto the PBB using a maintenance password. From the Maintenance Set-Up Screen located in the Setup Screen menu, the Preposition Setup Mode of Operation shall be selected. The PBB shall then be rotated, moved vertically, extended, and the cab rotated to the desired aircraft service position. Upon reaching the desired aircraft service position, one of the preposition setup buttons, labeled as specific aircraft types, shall be depressed to program the PLC with the required coordinates for that particular prepositioning location. No other programming shall be required.
- D. PBB Calibration: The Status Calibration screen shall be provided to accommodate input of critical data used in establishing operational parameters for a particular gate location during the initial PBB set-up operation. The calibration includes the following data:
 1. Units (feet/meters) selection: A selection shall be provided to allow the linear measurements that shall be displayed on the main screen status display panel to be toggled providing linear measurement readout in either feet or meters.
 2. Height Calibration: This screen provides the ability to establish vertical data points that shall be used as the base for calculation for the vertical height measurements displayed on the screen.

3. Wheel Bogie Calibration: This screen provide the ability to establish a zero or straight forward calibration point and 90° left calibration point used in determining wheel bogie position.
 4. Cab Calibration: This screen provide the ability to establish a zero or straight forward calibration point and 90° left calibration point used in determining Cab position.
 5. Bridge/Swing Calibration: This screen provide the ability to establish a zero calibration point and a second reference point used in determining Bridge/Swing position.
 6. Length Calibration: This screen provides the ability of setting up two length reference points used in determining Bridge Length.
- E. PBB Limits Set-Up.
1. PBB Height: This gives maintenance the ability of setting Vertical Up/ Down Height Limits anywhere within the operation Vertical range of the PBB with just the touch of a couple touch buttons.
 2. Cab Rotation: This gives maintenance the ability of setting Cab Left/Right Limits anywhere within the operational Cab rotation range of the PBB with just the touch of a couple touch buttons.
 3. PBB/Swing Rotation: This gives maintenance the ability of setting PBB Rotation/Swing Left/Right Limits anywhere within the PBB Rotation/Swing operational range of the PBB with just the touch of a couple touch buttons.
 4. PBB Length (Optional): This gives maintenance the ability of setting a PBB Length Extend/Retract Limit anywhere within the Length operational range of the PBB with just the touch of a couple touch buttons.
- F. Password Maintenance. There are three password levels. Operator, Maintenance and Administration.
1. Operator: There are up to forty-two (42) operator passwords available. These passwords give the operator the ability to logon and operate the PBB in Manual and Auto level Mode with full rights to drive the PBB and select Auto level Mode once they are next to an aircraft. The alarm history screen and I/O diagnostic screens shall also be available to operators.
 2. Maintenance: This password gives the Maintenance person the ability of Operating and Configuring the PBB with all Calibration and Limit set-ups and all other configuration screens.
 3. Administration: This password gives the Administrator the ability to Operate, Set-Up and Maintain passwords on the PBB plus access to Alarm History Screen, I/O Diagnostic Screens and all other configuration screens.

2.10 IDENTIFICATIONS, MARKINGS, SIGNAGE & LABELING

- A. All instruments, relays, circuit boards, pumps, motors, controls, etc. and instructions shall be suitably identified with permanent, non-fading placards, or pictographs impervious to the effects of weather, oil, cleaning solvents, aircraft hydraulic fluids, fuel and other effects of normal operation for the life of the equipment without deterioration, fading, or loosening.
- B. Placards shall be in sharp color contrast in large enough letters to be easily read from the operator's position indicating the function, direction and/or identification.
- C. A metal nameplate shall be riveted to the equipment specifying manufacturer's name and/or trademark, manufacturer's part or model number, manufacturer's serial number, date of manufacture, and equipment's rating.
- D. Circuit breakers shall be labeled as to the circuit that they feed.
- E. Three Sided Illuminated Sign
 1. Passenger Boarding Bridge Identification Signs shall be supplied by the manufacturer for each bridge identified in the construction documents.
 2. These three sided illuminated triangular signs are mounted to the top of the jetbridge end cab and are visible from any angle by the pilots as they approach the gate area. The gate number is approximately 2'-5" high with a readable distance of 600 feet or more. The hot dipped galvanized or aluminum-fabricated structure shall be painted to match the color of the passenger boarding bridge, and shall have 1/4" thick acrylic sign faces with surface

sprayed color. The letters will be masked during the spraying process and, when removed, the translucent acrylic will be revealed. Approximate size of the sign faces will be 4'-5&1/2". This sign will require out-door weatherproof detailing.

3. Gate signs shall be activated by a photocell. Power shall be distributed from a circuit breaker located within the electrical control cabinet. Accessible switches that could be inadvertently turned off will not be allowed.
 4. Match airfield standard colors and fonts.
- F. Vinyl Gate No. decals shall be installed on the terminal side of all PBB wheel bogies.
1. Match airfield standard size, colors and fonts.
- G. Other Signage

2.11 FINISHES

- A. The exterior and exterior design shall be aesthetically pleasing and in keeping with contemporary trends. Where necessary to meet this requirement, and when not in conflict and maintainability standards, enclosures should be utilized to cover unsightly appurtenances.
- B. All interior and exterior systems shall be fitted and trimmed as necessary to present a neat and clean finished product
- C. All finishes shall meet NFPA requirements
- D. Interior
 1. All interior surfaces of the structure shall be cleaned in accordance with SSPC-SP3 or sand/grit-blasted in accordance with SSPC-SP6, as appropriate, and shall be coated with a rust inhibiting primer applied to a minimum 4 mil total dry thickness over the average measured blast profile. Exposed interior surfaces shall be coated with an additional 2 mils of polyurethane finish coat.
 2. Interior Wall Treatment
 - a. Shall consist of floor to ceiling (or as noted) high pressure laminate wallboard, with black trim kick plates.
 - b. Paint all exposed interior metal surfaces to match interior wall panels, except brushed aluminum or bright finish work.
 - c. Color: Nevamar Platinum Gray S6023T, Textured
 3. Ceiling:
 - a. 8" metal plank with flat black recessed filler strips or coil coated galvanized steel panels shall be used as ceiling material. A suitable molding shall be provided along the longitudinal corners of the ceiling finish.
 - b. Color: Brushed Aluminum
 4. Flooring:
 - a. Tunnels:
 - 1) The PBB's shall be carpeted with heavy commercial non-skid carpeting, or rubber as indicated. Flooring to be supplied and installed by bridge manufacturer in the factory.
 - 2) Color:
 - 3) Type:
 - b. Transition Ramps:
 - 1) Ribbed rubber 0.1875 inch (4.8mm) thick
 - 2) Color: verify with owner
 - 3) Type: verify with owner
 - c. Cab/Bubble
 - 1) The PBB's shall be carpeted with heavy commercial non-skid carpeting, or rubber as indicated. Flooring to be supplied and installed by bridge manufacturer in the factory.
 - 2) Ribbed rubber 0.1875 inch (4.8mm) thick
 - 3) Color: verify with owner
 - 4) Type: verify with owner
 5. Sub-floors

- a. Shall be constructed of 3/4" fire retardant marine plywood which shall be securely fastened with fasteners suitable for this purpose. Insure adjoining sheets are supported and fastened to a common member to provide smooth even joints. Any remaining unevenness will be removed with filler. The sub-floor fasteners will not protrude through the exterior tunnel siding.
 - b. Cab sub floors shall be aluminum
 - c. Other sub-floors as required by floor covering manufacturers.
 - d. See flooring requirements.
- 6. Cover Plates
 - a. All receptacles and light switch cover plates to be stainless steel, ANSI No. 4 finish.
- E. Exterior
 - 1. All exterior surfaces, including support columns and base plates, shall be sand/grit blasted in accordance with specification SSPC-SP6 to a 1-1/2 mil minimum to 2 mil maximum profile.
 - 2. The exterior shall be coated with a rust inhibiting primer applied to a minimum of 4 mil total dry thickness over the average measured blast profile followed by a finish coat of 5-1/2 mil thickness catalyzed polyurethane enamel. The cured dry film thickness of the total system shall achieve a minimum of 8 mils.
 - a. Color: JBT Standard Arctic White
 - 3. All external metal shall be a uniformly smooth surface and free of all mill scale, rust and dirt before painting. A primer coat of epoxy primer shall be applied followed by one finish coat. A total nominal minimum prime and paint thickness of four mils when dry is required.
 - a. Color: Arctic White
 - 4. Anodized aluminum, galvanized or stainless steel trim items, roll-up doors, and cab curtains shall be supplied in their original unpainted bright finish. Machined surfaces shall not be painted unless they are exposed after assembly.
 - a. Dog Legs (Pantagraphs)
 - b. Service Stair & Platform
 - 5. Canopy
 - a. Color: Light Grey
 - 6. Electrical Enclosures
 - a. Stainless Steel (Manufacturers Disconnect)
 - b. tbd (other enclosures)

2.12 MATERIALS, PARTS AND PROCESSES

- A. Only standard components of highest commercial quality, commercially available and conforming to recommendations of standards established by the Society of Automotive Engineers (SAE) and the American Society of Mechanical Engineers (ASME) will be used.
- B. All material and components assembled or fabricated into the equipment are to be new, unused, of high quality, of current production and free from defects or imperfections which might affect the appearance or serviceability of the finished product.
- C. All parts and materials needed to fabricate, assemble, and finish the equipment shall be furnished by the manufacturer unless otherwise specified.
- D. All bolted, screwed, and threaded fastenings shall incorporate adequate locking devices. Safety wire shall be incorporated in critical applications.
- E. Weldments requiring alignment with assemblies, interchangeability, fit, and flatness shall be fabricated with fixtures capable of maintaining dimensions in the finished part within design tolerance.
- F. Specified sections and weld design and application shall be such that heat distortion of plates and members is minimized in the final weldment.
- G. All intersecting steel planes, e.g. side to top, side to bottom, of exterior steel sections of the passenger boarding bridge shall be 100% welded. Caulk shall not be used to provide weather seals.

- H. Components must be installed per the manufacturer's recommendations. Modification of the component which could affect its performance must be approved in writing from the manufacturer of the component. Any modified component should be identified as such to the Owner for purposes of interchangeability.
- I. All components shall be chosen to be within their manufacturer's published ratings under the most severe conditions of operation. This shall include, but not be limited to the following:
 - 1. Mechanical Components: Speed, torque, force, environment, lubrication means, and expected service life of chains, belts, sheaves, sprockets, shafts, bearings, gears, etc.
 - 2. Electrical Components: Voltage, current, load characteristics, and duty cycle of electrical components.
 - 3. Others: For components proprietary to the manufacturer, design shall conform to established industry practices.
- J. Fastener heads shall not be located on rub or wear surfaces unless recessed below the surface.

2.13 MAINTAINABILITY

- A. The bridge shall be designed to emphasize simplicity, ruggedness, and ease of maintenance. There shall be no special tools required for routine maintenance.
- B. Attention shall be given to the design of each component and assembly to minimize the number of routine maintenance items on the bridge.
- C. Components shall be selected and assemblies shall be designed to facilitate troubleshooting and to minimize repair or replacement time.
- D. Access panels enclosing areas requiring maintenance shall be large enough to permit accomplishment of the task required.
- E. Where practical, components shall be built in subassemblies for ease of replacement and shall be designed to be installed or removed by one person.
- F. Where the weight of a component requires mechanical assistance, the component shall be provided with lifting eyes or other suitable hoisting arrangement.
- G. Drawings, sketches, details, and all materials/equipment shall be submitted and provided in the English language and systems of measure, including, without limitation, dimensions, volumes, weights, threads, forces, fasteners, devices, panels, labels, signs, notices, communications etcetera. The use of metric or SI units is not acceptable.
- H. All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance.
- I. All components and assemblies incorporated into the loading bridge shall be designed and manufactured to dimensional tolerances which will permit future interchangeability and facilitate replacement of parts.
- J. The individual parts and components of each unit shall be of the same original manufacture and part number. Minor component parts need not comply with the above, provided interchangeability and safety are not compromised.

2.14 FACTORY TESTING

- A. The manufacturer shall test one of each model (not size) of every PBB to assure compliance with the specifications. Certification test sheets shall be submitted. The Owner shall be notified fourteen (14) days prior to the date of such tests. The Owner reserves the right to witness tests and request additional tests if necessary to demonstrate compliance with the specifications.
- B. Should factory tests fail to indicate compliance with specifications, all costs associated with re-testing, including costs associated with Owner's witness services, will be the responsibility of the manufacturer.

2.15 PRODUCT SUPPORT

- A. Spare Parts

1. The manufacturer shall maintain an adequate inventory of all proprietary or vendor fabricated or modified parts, especially the long lead time items, for routine maintenance of the unit. All stock shall be maintained, whether or not the unit is in current production, for a minimum of ten (10) years from the date of the last unit manufactured.
- B. Field Support Services
 1. The manufacturer shall provide supervisory and service personnel, certified by the manufacturer, during the installation of the boarding bridge to assure proper installation.
 2. The manufacturer shall provide the Owner with all appropriate Service Bulletins for bridges supplied for a minimum of twenty years from the date of final acceptance.

PART 3 EXECUTION

3.01 GENERAL

- A. This specification shall act as a supplement to the Manufacturer's standard installation procedures only, and in no way shall it be construed so as to limit the installing contractor from providing a complete and operable installation, in accordance with all generally accepted good passenger boarding bridge installation practices, as well as the manufacturer's written installation procedures. Any reference to the installing contractor or contractor herein shall be construed to mean that entity installing this equipment in the field.
- B. Installations shall be performed in strict compliance with the Manufacturer's written Installation Procedures.
 1. Manufacturer shall submit a copy of their Installation Procedures for approval, prior to installation.

3.02 INSTALLATION

- A. Install in accordance with Manufacturer instructions
- B. Any and all damage sustained by the new PBB caused by equipment used for the lifting, transportation, movement, staging, or otherwise, of the new PBB, assemblies, or components shall be the responsibility of the contractor.
- C. PBB Mechanical Erection and Lifting
 1. Use of Heavy Equipment
 - a. The use of crane(s), fork lifts, and/or other heavy equipment throughout the project shall be detailed in advance with and approved by appropriate Aviation Authority offices. Equipment used shall not exceed maximum allowable airfield heights.
 - b. Heavy equipment capacity and operator experience shall be adequate to ensure safe and efficient lifting of the PBB systems, assemblies, and/or components.
 - c. Damage to the terminal building, apron, foundations, and/or PBB shall be the complete responsibility of the installing contractor.
 - d. Paint damage to PBBs and related assemblies shall be minimized, and where occurring, shall be repaired in accordance with the "Exterior Finishes" section of this section.
 - e. Heavy equipment operator's shall be fully trained and certified to operate equipment in their control.
 2. Rigging
 - a. Original Manufacturer designed PBB lifting lugs shall be utilized for rigging and handling of PBB systems, assemblies, and/or components. Where lifting lugs are not present, approved straps, cradles, chains, couplings, cables, and/or fixtures shall be utilized.
 - b. Where applicable, lifting tools shall be of the proper strength rating and shall have current certifications.
 3. Tunnel/Drive System Assembly Installation
 - a. The assembly of PBB vertical and horizontal drive assemblies shall be accomplished using safe and approved practices. All assembly shall be accomplished using new installation bolts/fasteners in accordance with manufacturer's specifications in the originally designed quantities.

- b. Any structural modifications necessary to allow the correct use of fasteners shall be accomplished in a safe and professional manner. All welds, where necessary shall be complete, continuous, and in compliance with AWS standards, and shall be performed by certified welders. Contractor's performing welding operations shall submit copies of the welder's certifications.
- c. PBB structural support integrity shall not be compromised.
- d. The complete tunnel assembly shall be pinned to the fixed rotunda assembly using manufacturer supplied hinge pins.
- e. If hinge pins, hinge pin plates, and/or associated welds show any damage, they are to be replaced.
- f. Ensure that the hinge pins are properly greased and installed without causing any damage or deformation to the pins.

D. Electrical Requirements

1. Miscellaneous Electrical Requirements

- a. All field terminated wiring, interior and exterior, shall be checked for damage and improper or unsafe installation. Damaged wires and cables shall be replaced. All replacement wiring and components shall be UL approved and shall be selected and/or sized in accordance with NEC based upon the intended use.
- b. Wiring shall be color coded in accordance with existing wiring and Manufacturer's specifications and shall be easily traced.
- c. Wiring shall be neatly routed in secured harnesses and shall be labeled.
- d. All electrical enclosures shall be UL approved, and NEMA rated.
- e. The installing contractor shall be responsible for all PBB related electrical inter-connects, component/assembly wiring, and PBB electro-mechanical system functions, unless specifically identified otherwise.
- f. All exterior or otherwise exposed conductors/cables shall be installed within conduit unless required for flexibility to be a flexible cable and then exposed cables shall be limited to 48", unless mechanical requirements dictate otherwise.
- g. All electrical devices/conduits shall be properly secured. Beam clamps will not be allowed.

2. Main Power Electrical Disconnect Assembly

- a. The installing contractor shall be responsible for mounting the PBB Disconnect Power Panels on the rotunda located mounting brackets.
- b. The installing contractor shall be responsible for providing all PBB terminations to the disconnect panel, and shall coordinate his installation with the Project electrical contractor. Electrical contractor shall provide final building utility terminations to the PBB main disconnect panel.
- c. All cables/conductors shall be neatly color coded and marked.
- d. All original manufacturer rating and labels shall remain intact and unmarred.
- e. All enclosures shall be securely fastened to the stand using approved Manufacturer provided fasteners.
- f. All PBB power cables shall be verified to be in new condition. Damaged cables shall be replaced with OEM cables provided by the Manufacturer.
- g. All cables shall be safely routed between PBB junction boxes, utility carrier and the main PBB disconnect. All cables shall be secured to PBBs in accordance with Manufacturer's instructions.
- h. All power cables, wiring, and utilities installed the across the exterior "A" and "B" tunnels shall be installed in the utility carrier.
- i. All power cables, wiring and utilities installed across the exterior of of the outermost tunnel, shall be contained in conduit and shall be installed on the underside of the bridge.
- j. Conduits shall be attached to the PBBs using secure clamps or shall utilize bolted or welded mounting brackets.
- k. All wire/cable terminations shall end neatly in PBB mounted junction boxes.

3. Cable Hoist(s)

- a. The installing contractor shall mount the cable hoist(s) with Manufacturer provided provisions, and shall inspect and verify proper operation.
4. The hoist housing shall be securely mounted. All mounting bolts shall be inspected and replaced where missing or damaged.
5. Any damage to the cable hoist exterior finish shall be re-painted in accordance with the "Exterior Finishes" section of this scope.
6. Up/down limit switches shall be fully functional and shall cutoff control motor operation when the cable is fully deployed or retrieved.
7. The three output cable support hooks (sling) are to be in good working condition and shall remain detachable from the aircraft cable. Hoist up/down control is accomplished from an exterior operator control station mounted on the PBB wheel bogie.

3.03 SETUP

A. PBB Mechanical Setup

1. Limit Switches
 - a. All mechanical stops, limit switch mounting brackets, mechanical limit switch "trip tabs", and associated fasteners shall be inspected, repaired, secured, and/or replaced, as applicable, prior to final operational testing of PBB electrical systems. Limit switch mounting brackets shall be structurally sound and straightened, if necessary, to ensure proper alignment of limit switches. Where adjustable or sliding stops are utilized, slide tracks shall be securely attached to PBB structures and lock bolts, adjustment threads, etc. shall be fully functional.
2. PBB Lubrication
 - a. Ensure that all grease fittings are functional and that grease points have been properly purged of old grease material and foreign material by displacing old material with new material.
 - b. Perform all other OEM recommended lubrication of moveable areas throughout the PBBs. Only OEM approved lubricants shall be utilized. Chains containing old grease and/or foreign debris shall be fully degreased and re-lubricated. All residual grease and oil displaced or drained onto the PBBs shall be thoroughly cleaned. Lubrication shall include, but shall not necessarily be limited to, the following:
 - 1) Rotunda thrust bearing.
 - 2) Wheel bogey thrust bearing.
 - 3) Lift column screws.
 - 4) Cab rotational guide chain.
3. Door Locks and Keys
 - a. Set proper stations code, as defined by stations personnel for service stair door.
 - b. Turn over all keys to stations personnel.

B. PBB Electrical System Setup

1. All wiring and electrical connections shall be safely completed in accordance with national, state, and local electrical code by qualified electricians.
2. Tunnel interconnects and primary electrical system wiring (480Volt) shall be checked and maintained as per the original manufacturer's design.
3. PBB electrical setup procedures shall be accomplished by the Contractor in accordance with Manufacturer's installation instructions and any pertinent service bulletins.
4. Limit Switches
 - a. PBB electrical limit settings shall be set to conform to the structural design limits of the PBBs and in accordance with aircraft parking requirements.
5. Rotunda limit switches (swing limits) shall be adjusted to prevent the PBBs from being capable of swinging into Ground Support Equipment (GSE) staging areas, the terminal building, or adjacent PBBs.
 - a. Rotunda mounted slope limits shall be set to prevent operational PBB slopes from exceeding 10.0 percent.
 - b. Tunnel travel limits ("full extend/retract" and "slow down") shall be set to safely meet each gate's operating requirements.

- c. Oversteer limits for the wheel bogie assembly shall ensure that oversteer conditions cannot be encountered.
 - d. Ensure that the column travel limits and/or height indicator assembly is installed and functional so as to prevent damage to the vertical drive column assembly. Ensure that height indicator functions/limits are calibrated.
 - e. Ensure that the cab rotation limits are functional and that the cab cannot exceed safe rotations
6. Electrical System Inspection
- a. Test the auto-level system for proper operation prior to PBB use. Verify auto-level travel response time and time-out relay function. Ensure that the limit switch is in good working order.
 - b. Ensure proper function of the canopy deployment system. Verify proper unit operation to ensure that excess canopy pressure on the aircraft will not occur. Ensure that canopy deployment speed is consistent on both sides and that no binding occurs.
 - c. Perform a comprehensive operational inspection of all 480-Volt drive systems to ensure proper operation and condition.
 - d. Ensure that all lighting circuits and lights are functioning as designed. Bulbs and ballasts shall be checked and replaced if non-operational. All bulbs should be the same style.
 - e. Ensure interior lighting function properly with occupancy sensors.
 - f. Ensure that all other electrical systems, including all travel alarms, operation bell, indicator lights, and warning beacons or strobes are functioning properly.
 - g. Test smoke detector interlocks to ensure they are functioning as designed.

3.04 INSPECTIONS

- A. Manufacturing Representative
 - 1. Manufacturer's representative shall be on site, as necessary, during the installation of the equipment, as required to ensure the equipment is properly installed in accordance with the Project Specifications.
 - 2. Manufacturer's representative shall be present during preliminary equipment installation inspection.
 - 3. Manufacturer and/or contractor shall diligently pursue the completion of all punch list items.
 - 4. Manufacturer shall notify the Owner when the equipment installation is considered ready for a final inspection.
 - 5. Manufacturer's representative shall be present during final inspection.
 - 6. The manufacturer shall provide a qualified representative on site for at least 30 days after the date the terminal is opened for commercial passenger traffic to assist with operational issues and electromechanical difficulties encountered.
- B. The Owner will not accept the boarding bridge until it has been inspected to verify that the installation, function and quality of the PBB meet The Owner's standards. Any deficiencies and/or violations shall be immediately corrected by the Manufacturer at no additional cost to the Owner and shall be re-inspected.
- C. The term "Beneficial Acceptance" shall be defined as the time that the bridge is installed and available for The Owner use, but prior to the correction of items listed on discrepancy list. In other words, The Owner derives the 'benefits' of using the system prior to "Final Design Acceptance". Warranty and training requirements shall be based on "Beneficial Acceptance".
- D. "Final Design Acceptance" of the unit is contingent upon the Manufacturer satisfactorily correcting all items that the Owner believes to be non-complying with this specification.
- E. After the "Manufacturer" corrects all discrepancies identified during the initial operational demonstration, and after the gate opens for commercial operations, a 30 day test period under normal operating conditions will commence. During this time frame, the bridge must operate trouble free and the "Manufacturer" must demonstrate that the bridge meets the design and performance requirements of this specification. The Owner will have the option of restarting the

30 day test if at any time during the test, additional non-complying specification discrepancies or faults are detected.

- F. Final acceptance of the boarding bridge is contingent upon the Manufacturer satisfactorily correcting all items that the Owner believes to be non-complying with this specification, and the satisfactory completion of the 30 day operational demonstration.
- G. The Manufacturer shall be responsible for providing all necessary test, measuring and recording devices required to demonstrate the boarding bridge's compliance with this specification.

3.05 INTERFACE WITH OTHER WORK

- A. The Contractor shall cooperate and coordinate his work with the 400 Hz, PCA, and related equipment installations including ancillaries.
- B. The Contractor shall coordinate with the 400 Hz, PCA, and related equipment for the provisions for or installation of all necessary infrastructure prior to final factory painting of the passenger boarding bridge. The intent is to eliminate site welding/painting after final factory painting.
- C. Installation of units shall be coordinated with other trades and activities associated with the project and site.
- D. Install phone, provide building face terminations and verify proper operation.

3.06 EXAMINATION

- A. Verify/perform the following items or tasks.
 - 1. Verify all cables and conductors are properly terminated.
 - 2. Check to be sure that there are no tools or loose objects in the unit.
 - 3. Make a final check of the security of the power connections.
 - 4. Re-install any covers removed during installation.
 - 5. Perform full passenger boarding bridge and related equipment operational non-interference test.

3.07 CLEANING

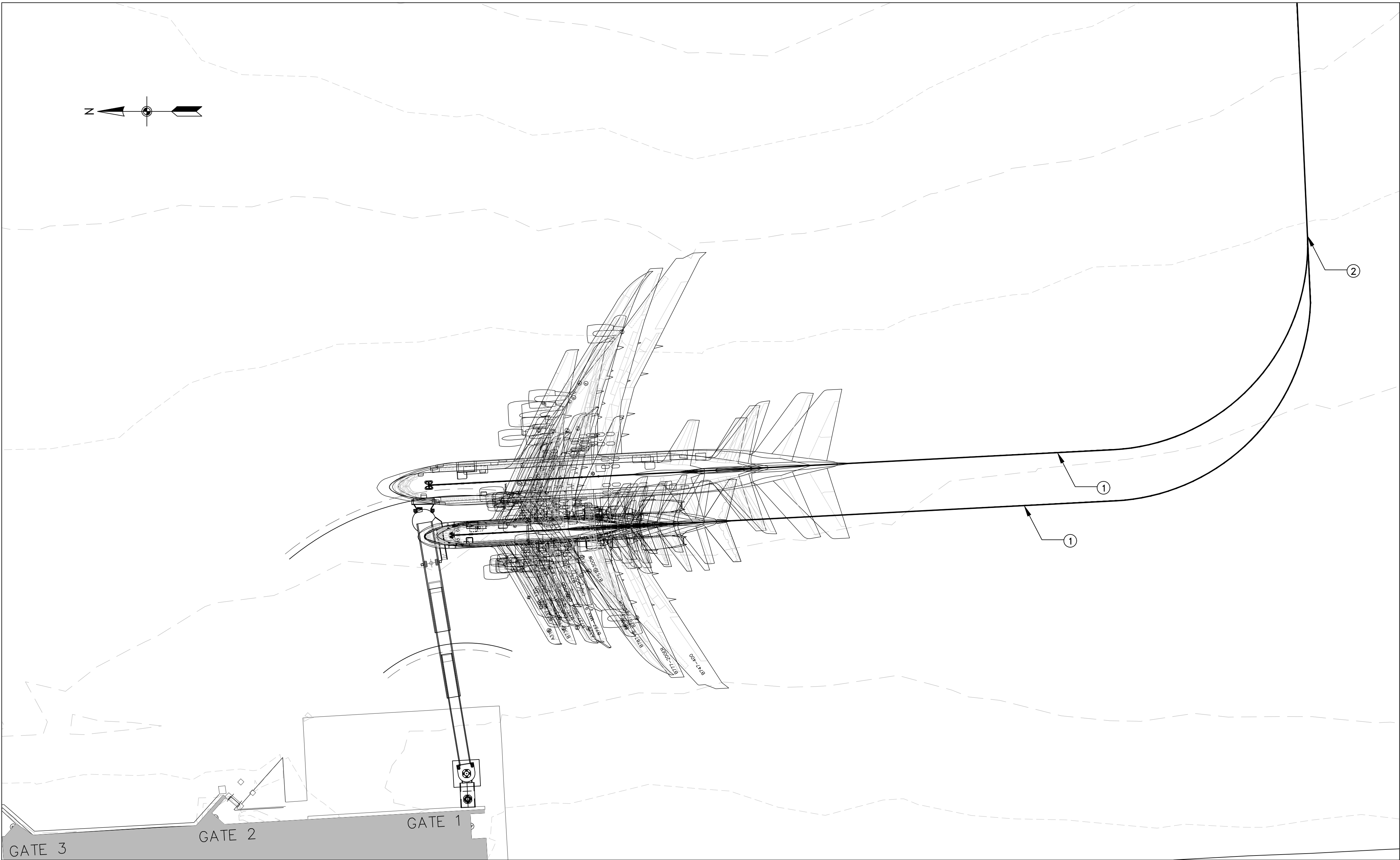
- A. Clean unit from all construction dust and debris prior to start-up.
- B. Touch up scratched or marred surfaces to match original finish.
- C. Protect the installed unit from subsequent construction operations.
- D. Wash exterior of bridge.
- E. Clean all windows, wallboards, windows and interior surfaces.

3.08 STARTING EQUIPMENT AND SYSTEMS

- A. Complete approved field commissioning report, including, but not limited to the following:
 - 1. Verification that the bridge swings to the right and left, and that the swing limits switches function as required.
 - 2. Verification the bridge "raises" and "lowers", and that the vertical limit switches function as required.
 - 3. Verification that the rack limit switches function as required (if present).
 - 4. Verification that the vertical drive brakes function as required (if present).
 - 5. Verification that the bridge "extends" and "retracts", and that the extend and retract limit switches function as required.
 - 6. Verification that the cab rotates, and that the cab rotation limit switches function as required.
 - 7. Verification that wheel alignment matches the gauge.
 - 8. Verification that the canopy extends and retracts as required and that the canopy interlocks function as required.
 - 9. Ensure that the bridge "autoleveler" functions, and it alarms after it times out.
 - 10. Ensure that the "floor leveling" works as required.
 - 11. Verification that the bridge "slow down" and "bumper proximity switches" function as required.

12. Ensure all lights, outlets, fans and other accessories function as required.
 13. Ensure that all alarms, interlocks, emergency lighting and other safety features functions as required.
 14. Ensure that the door locks work.
 15. PBB OEM Lubrication.
 16. All other items listed on the approved Field Commissioning Report.
- B. Demonstrate complete functional operation of equipment to the satisfaction of the Own

END OF SECTION



PASSENGER BOARDING BRIDGE AND SERVICE DATA								
GATE	MODEL	ROTUNDA FLOOR	FIXED CORRIDOR	PCA	400HZ	POTABLE WATER	BAG CONVEYOR	SERVICE STAIRS
1	(N) A3-72/150	8.5' (1)	(N) 16'-6"	(N) YES (2)	NO	NO	NO	(N) YES

(1) ROTUNDA FLOOR HEIGHT INCLUDES FOUNDATION PEDESTAL
(2) PCA SIZED FOR A321. LARGER AIRCRAFT MAY NEED ADDITIONAL UNITS TO MAINTAIN DESIGN COMFORT LEVEL.

PBB AND SERVICE DATA CHART LEGEND:
(E) EXISTING
(N) NEW

AIRCRAFT SERVICE CHART	
GATE NO.	1
MD-83	x
MD-88	x
EMB 170	x
EMB 175	x
EMB 190	x
ERJ 145	x
CRJ-200	x
CRJ-700	x
CRI-900	x
A319	x
A321	x
DC-9	x
737-200	x
737-300	x
737-400	x
737-500	x
737-700	x
737-800	x
737-9MAX	x
747-400	x
757-200	x
757-300W	x
767-300ER	x
777-200ER	x
787-800	x

SERVICE CHART LEGEND:
X = AIRCRAFT SERVICED BY PBB.

SHEET NOTES
① NEW LEAD IN LINE
② LIMIT OF NEW LEAD IN LINE

- GENERAL NOTES:
- DESIGN UTILIZES JBT PBB MODEL AS A BASIS OF DESIGN. PROVIDE AND INSTALL AS INDICATED OR EQUIVALENT. SEE SPECIFICATIONS.
 - COORDINATE ALL ACTIVITIES WITH THE TERMINAL BUILDING CONTRACTOR THROUGH THE OWNER.
 - SCOPE OF WORK SHOWN IS GENERAL IN NATURE AND IS NOT INTENDED TO BE ALL INCLUSIVE. ADDITIONAL DETAILS INDICATED ON APPROPRIATE DRAWING SERIES. PROVIDED ALL WORK ITEMS SHOWN IN CONSTRUCTION DOCUMENTS.
 - PASSENGER BOARDING BRIDGE WHEELS MANEUVER OVER EXISTING MANHOLE LIDS. NO SPECIFIC STUDY WAS PERFORMED TO VERIFY LOAD CAPABILITIES OF THE EXISTING MANHOLE LIDS SHOWN.

GATE 1 SCOPE NOTES:

- DEMO EXISTING STRIPING
- DEMO (E) PBB
- INSTALL (N) PBB FOUNDATION
- INSTALL (N) FIXED WALKWAY
- INSTALL (N) PBB
- INSTALL (N) PCA
- INSTALL (N) BOLLARDS
- INSTALL (N) STRIPING

Issue

By

Date

No.

NEW AIRCRAFT PARKING LAYOUT – GATE 1
PCA ADD ALT.

METROPOLITAN TOPEKA AIRPORT AUTHORITY
NEW PASSENGER BOARDING BRIDGE
AIP NO. 3-20-0713-044
TOPEKA REGIONAL AIRPORT

MTAA

METROPOLITAN TOPEKA AIRPORT AUTHORITY
TOPEKA REGIONAL AIRPORT & BUSINESS CENTER

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Engineer:

Designer:

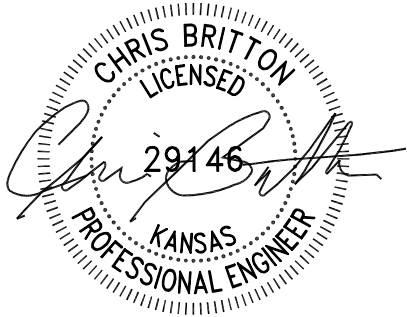
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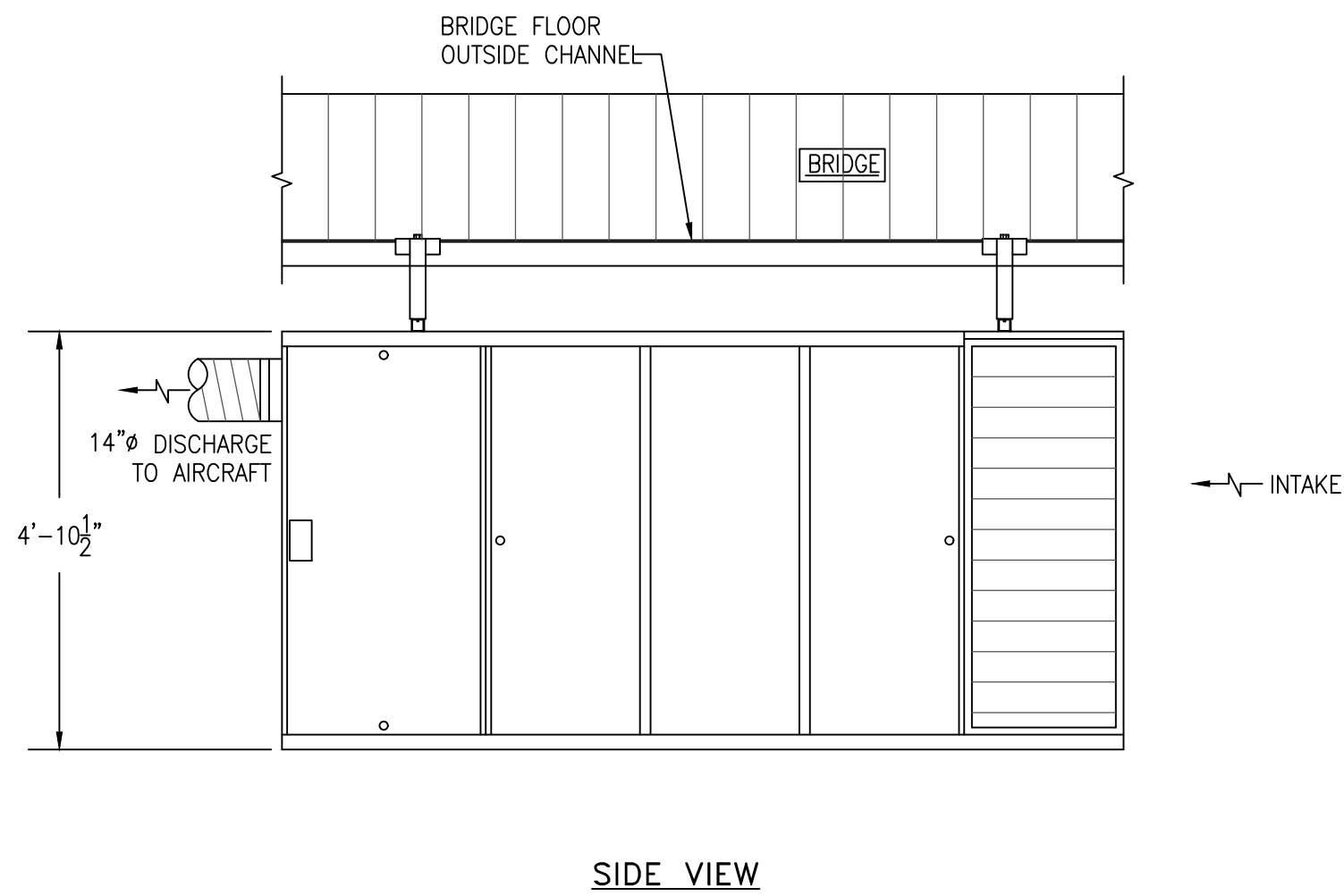
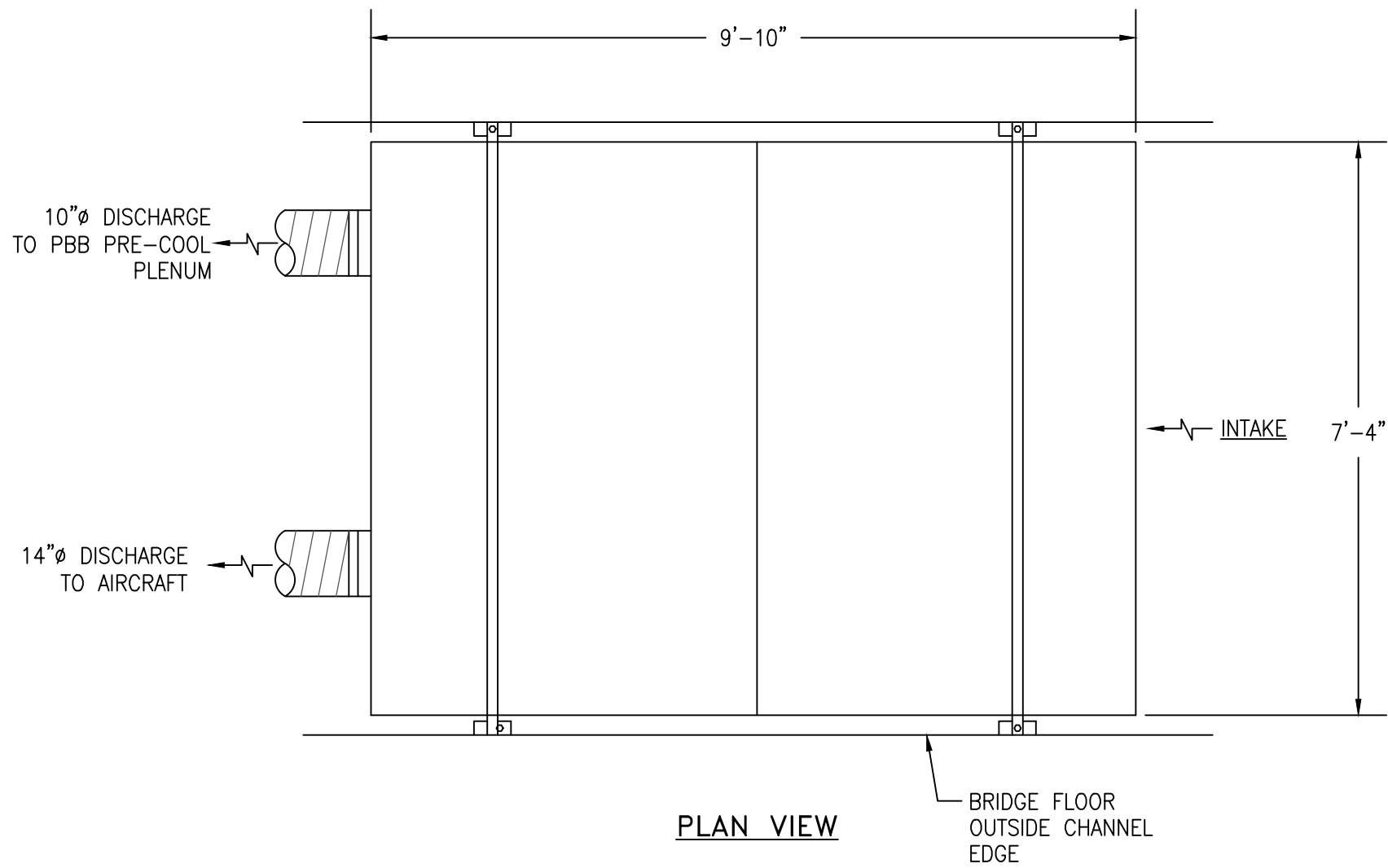
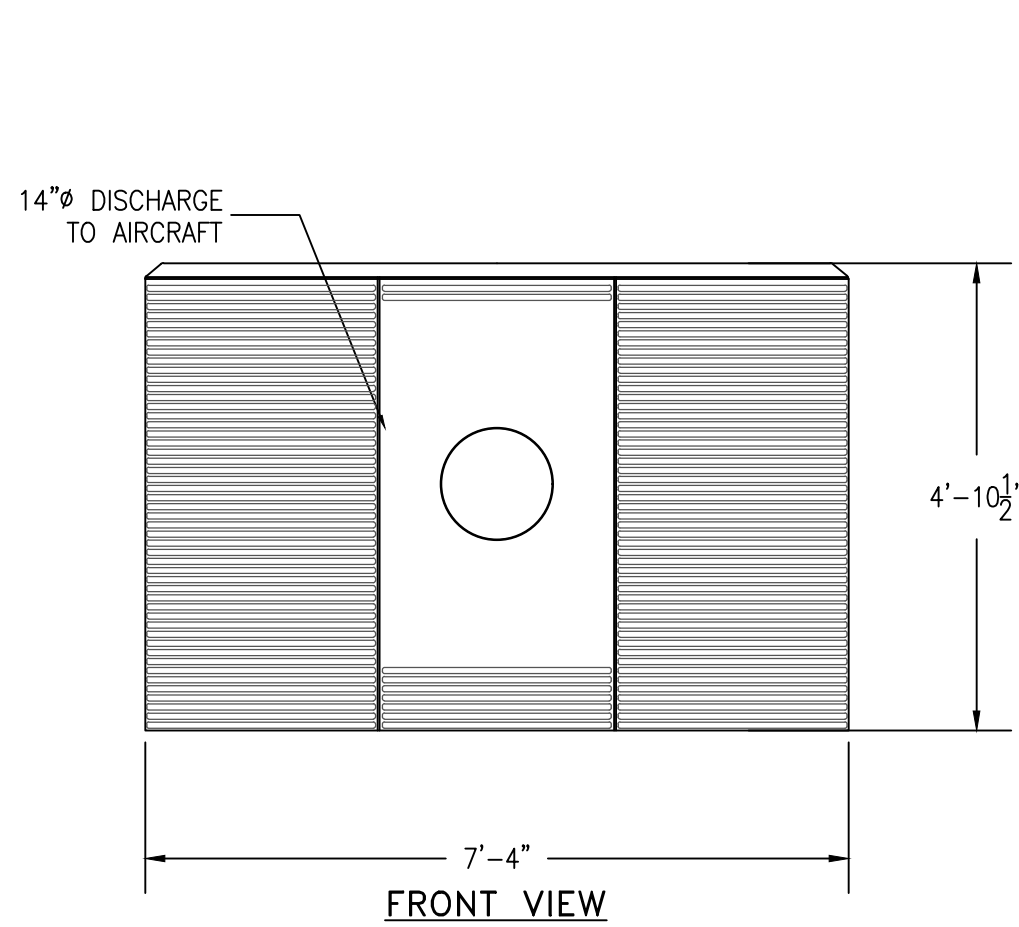
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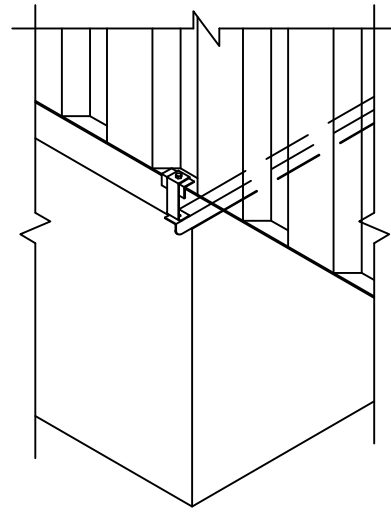
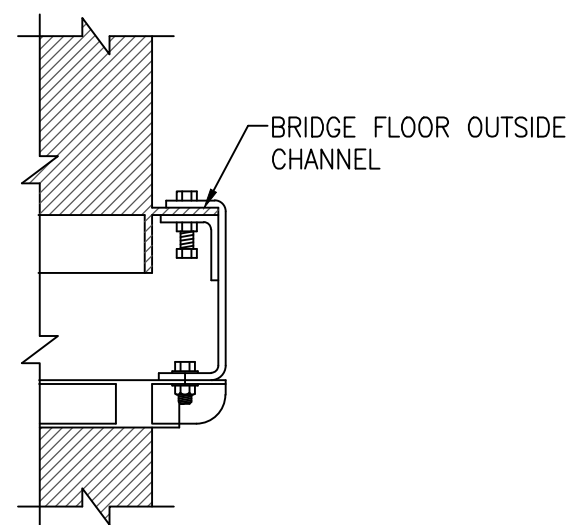
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Sheet AP-2.1





1 60 TON PCA DX UNIT INSTALLATION DETAILS
PBB-4.1 SCALE: 1:16



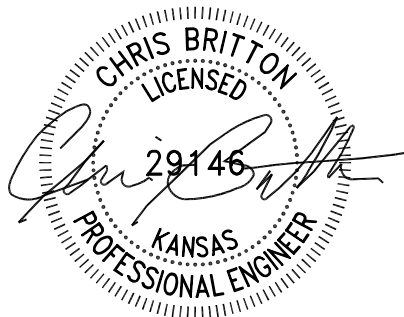
2 PCA DX UNIT MOUNTING BRACKET DETAILS (TYP.)
PBB-4.1 SCALE: N.T.S.

GENERAL NOTES:

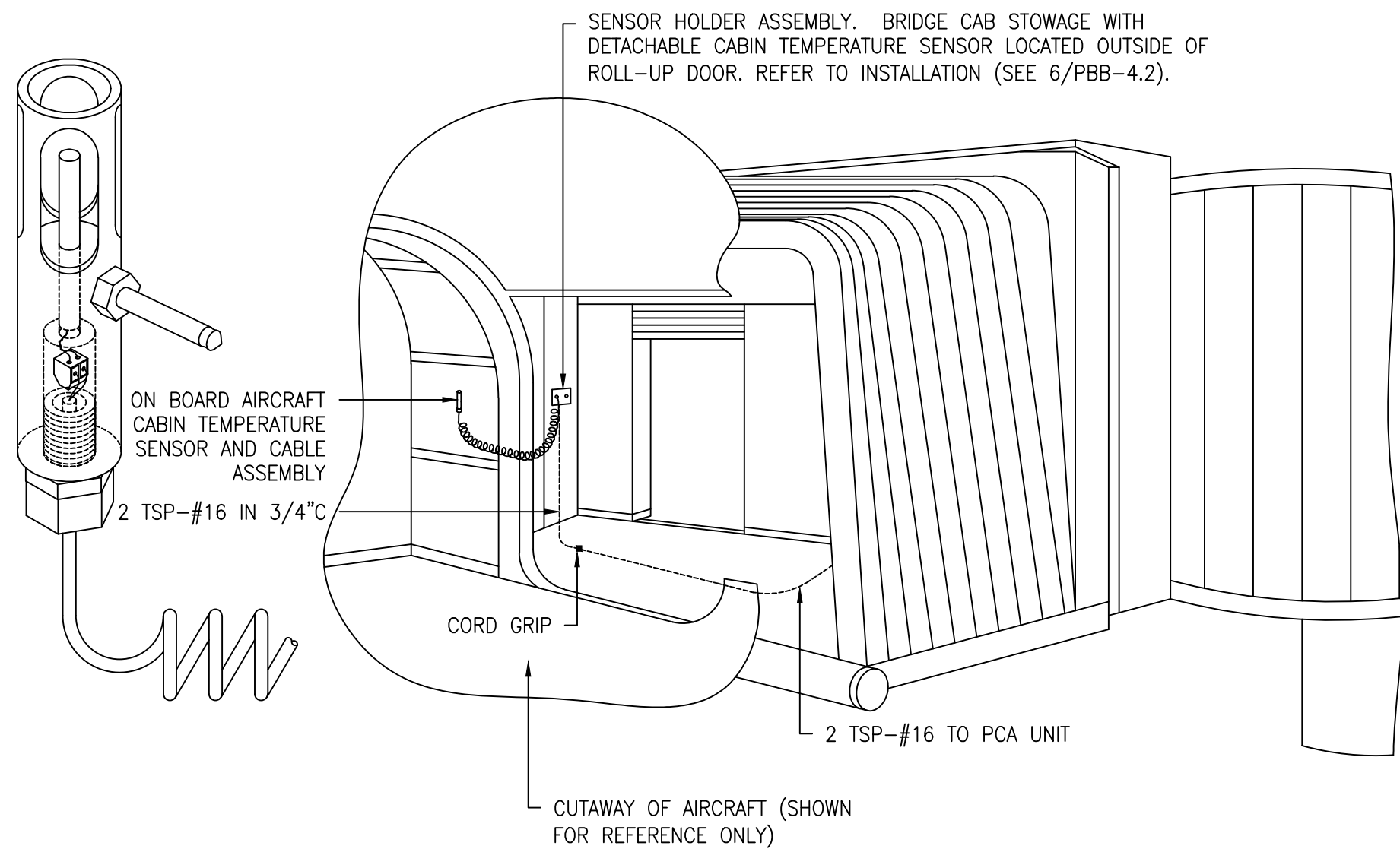
- EQUIPMENT SHOWN IS A DESIGN INTENT ONLY. EQUIPMENT TO BE PROVIDED IN ACCORDANCE WITH THE SPECIFICATIONS AND DESIGN INTENT. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. SUBMIT FOR APPROVAL.
- EQUIPMENT AND BRACKETS SHALL BE FACTORY PAINTED TO MATCH COLOR OF INSTALLED PBB.
- INSTALLATION AND EQUIPMENT DESIGN SHALL NOT INTERFERE WITH ACCESS TO OTHER J-BOXES, DEVICES, ETC., ON THE PASSENGER BOARDING BRIDGE.
- ANY REFERENCE TO TONNAGE IS FOR CONVENIENCE ONLY. ALL PCA UNITS SHALL MEET THE PERFORMANCE REQUIREMENTS IN THE SPECIFICATIONS.
- PCA UNIT SHALL BE INTERLOCKED WITH PBB TO PREVENT PBB HORIZONTAL MOTION ANYTIME THE UNIT IS OPERATING IN AIRCRAFT MODE. PROVIDE & INSTALL (N) AS NECESSARY.
- PROVIDE & INSTALL METERING DEVICES PER THE SPECIFICATIONS.
- SEE DRAWING PBB-5.1 FOR PUSHBUTTON DETAILS.

SHEET NOTES:

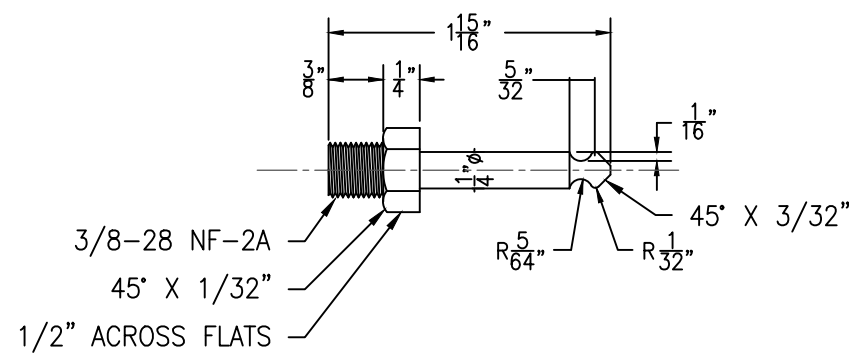
- AT GATES RECEIVING (N) PCA UNITS, PBB PRE-COOL SHALL REQUIRE THE INSTALLATION OF PRE-COOL/HEAT "ON" AND "OFF" PUSH BUTTONS AT THE OPERATOR'S CONSOLE. PRE-COOL/HEAT SHALL BE ACTIVATED BY PRESSING THE PRE-COOL/HEAT "ON" BUTTON AT THE OPERATOR'S CONSOLE. PRE-COOL/HEAT SHALL BE DEACTIVATED BY PRESSING THE PRE-COOL/HEAT "OFF" BUTTON AT THE OPERATOR'S CONSOLE OR BY ACTIVATING AIRCRAFT COOL/HEAT MODE AT THE RAMP LOCATED PUSH BUTTON STATION. PRE-COOL/HEAT SHALL AUTOMATICALLY SHUT DOWN AFTER 1 HOUR OF OPERATION.



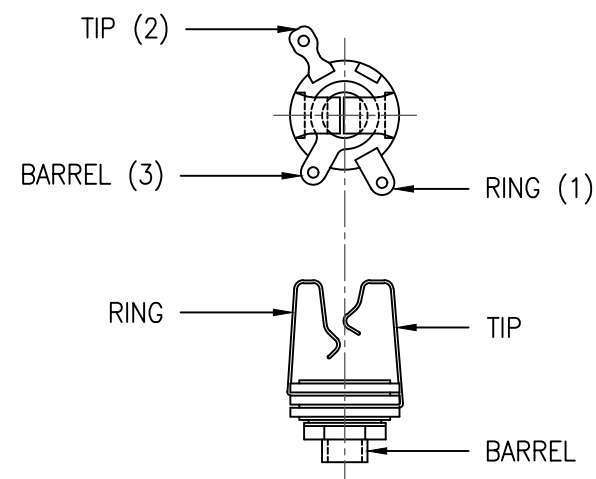
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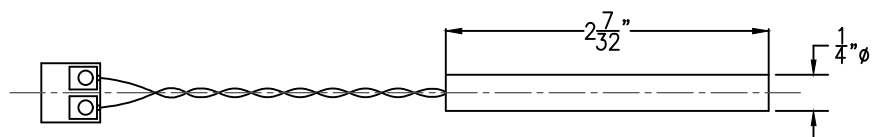
1 CABIN TEMPERATURE ADJUSTMENT LOCATION DETAIL
PBB-4.2 (VIEW FROM AIRCRAFT CAB IN DOOR TOWARD GATE) SCALE: N.T.S.



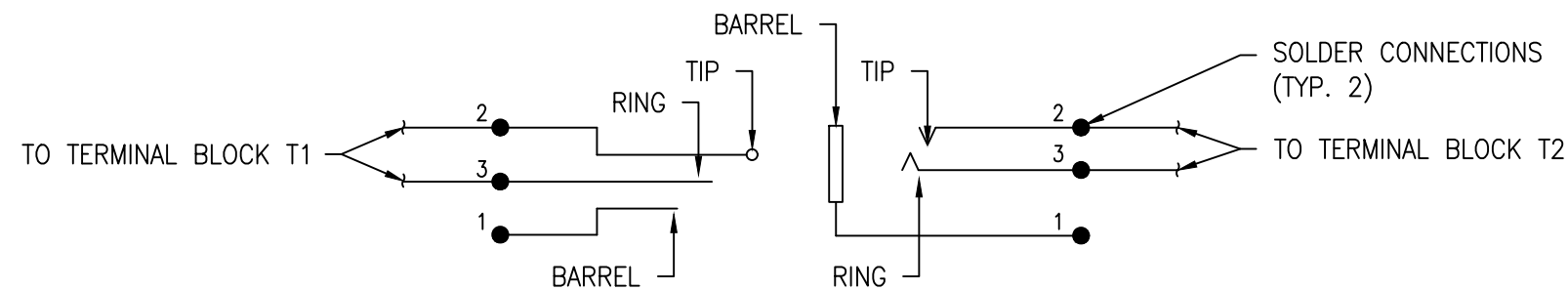
2 PHONE PLUG DETAIL
PBB-4.2 SCALE: N.T.S.



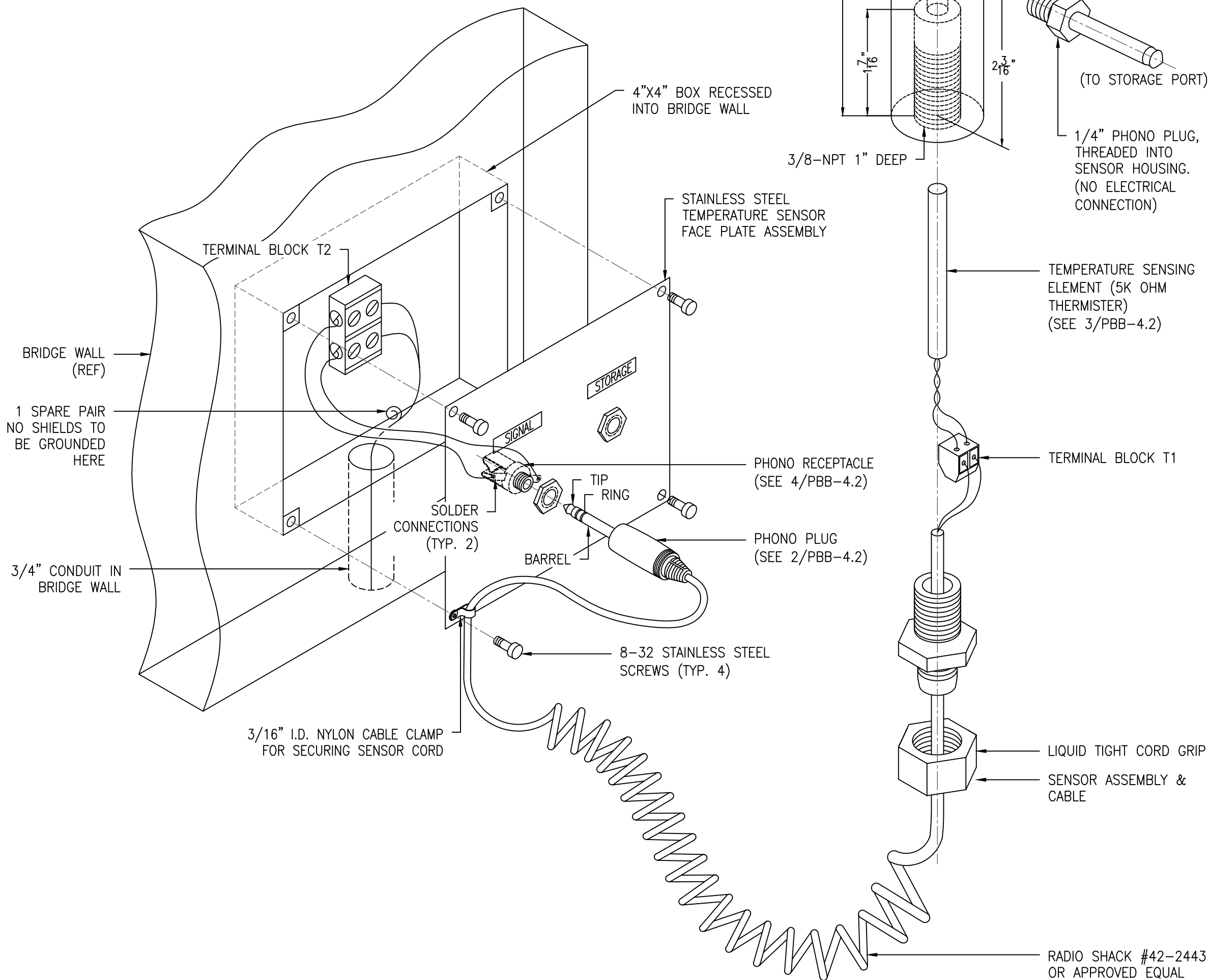
4 PHONO RECEPTACLE DETAIL
PBB-4.2 PART NO. RADIO SHACK 274-312B SCALE: N.T.S.



3 TEMPERATURE SENSING ELEMENTS DETAIL
PBB-4.2 PART NO. MAMAC TE-205-E-7E2 W/OUT HANDI BOX SCALE: N.T.S.



5 PLUG / RECEPTACLE SCHEMATIC
PBB-4.2 SCALE: N.T.S.



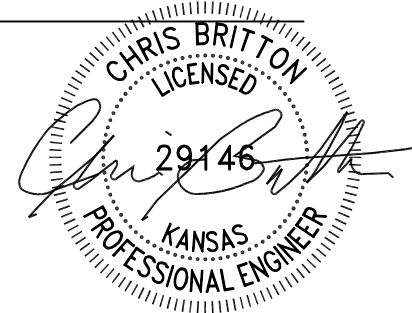
6 SENSOR INSTALL DETAIL
PBB-4.2 SCALE: N.T.S.

GENERAL NOTES:

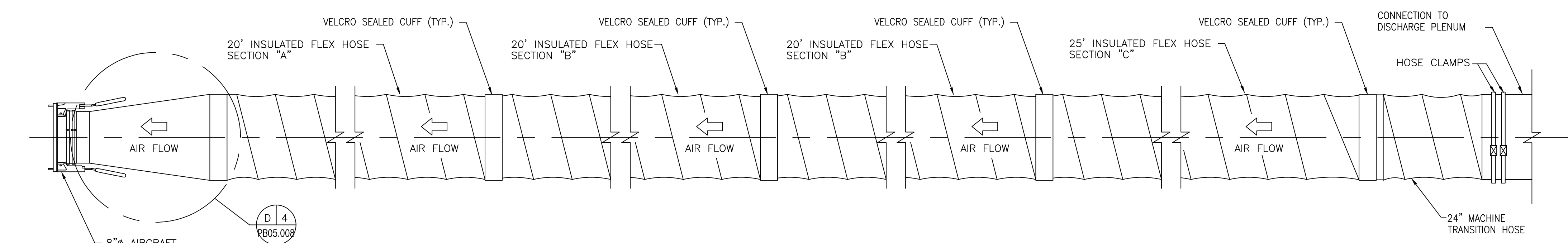
- LAYOUT SHOWN IS A DESIGN INTENT ONLY. PROVIDE, INSTALL AND COMMISSION IN ACCORDANCE WITH THE DESIGN INTENT AND SPECIFICATIONS. SUBMIT EQUIPMENT LAYOUT DRAWINGS FOR APPROVAL.

SHEET NOTES:

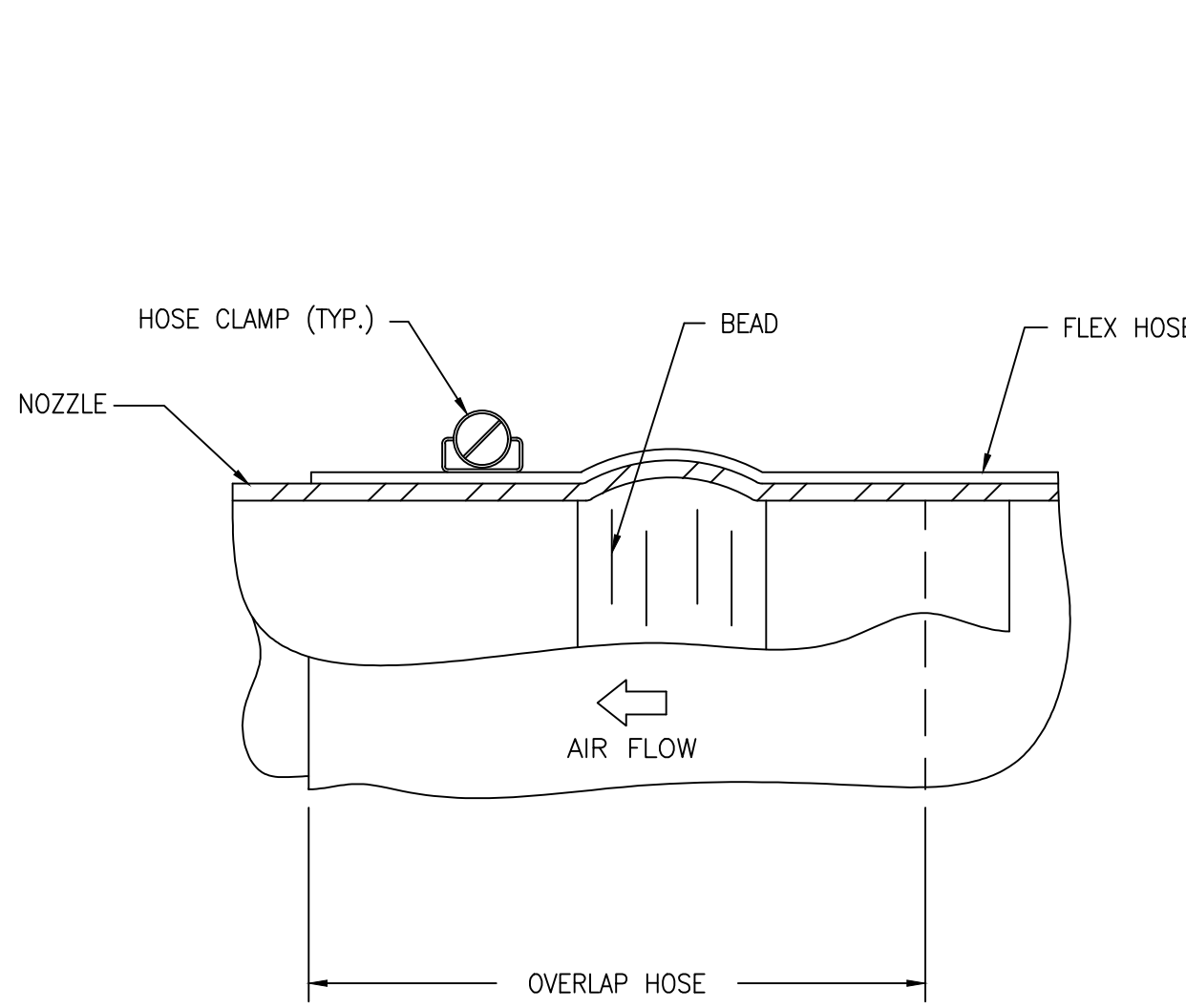
- PROVIDE & INSTALL NEW.



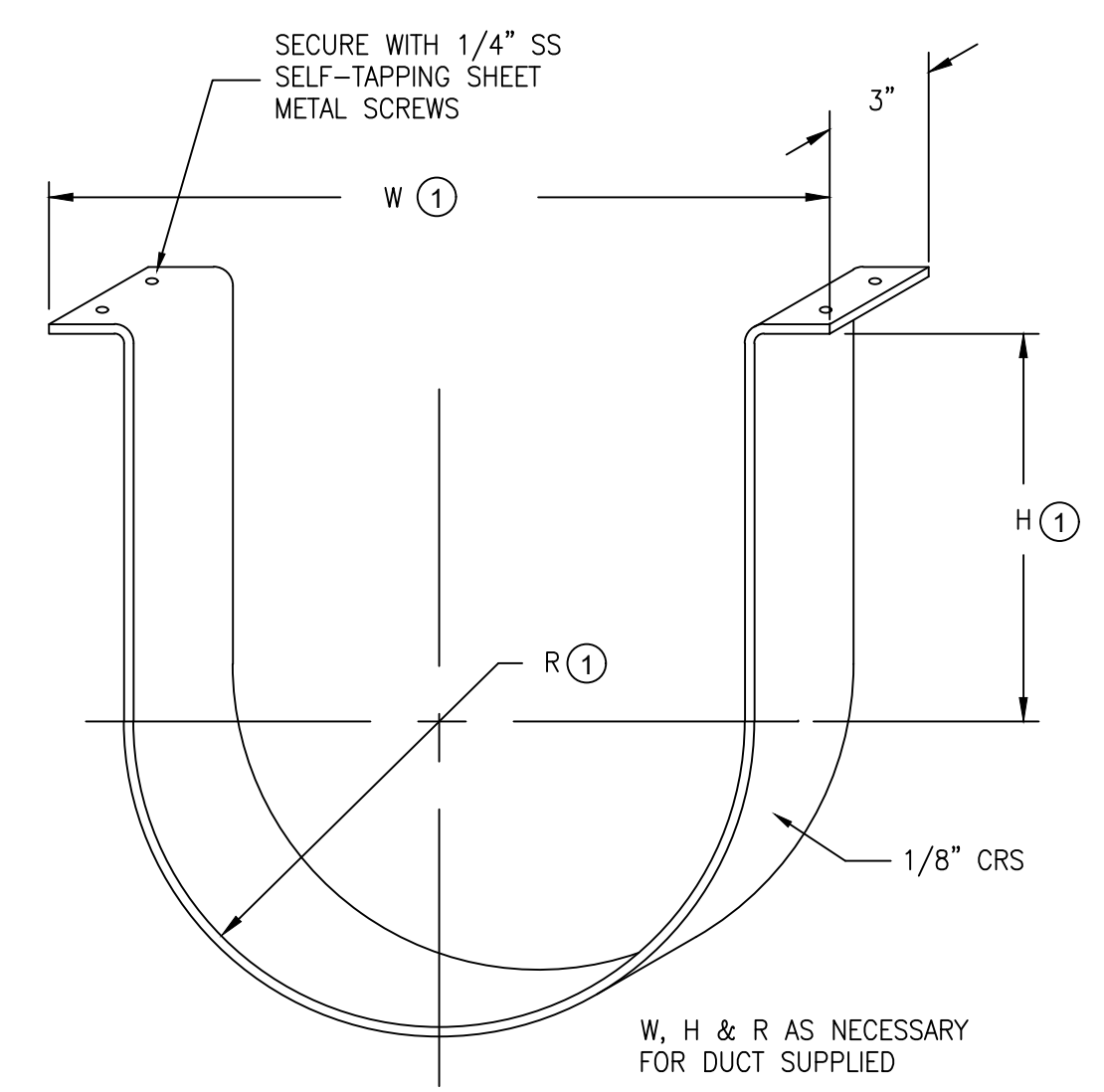
Sheet		PBB-4.2	
		300 WYANDOTTE SUITE 200 KANSAS CITY, MO 64105 TEL: +1 816.702.4300	
Engineer:			
Designer:			
PB Job No.: 30900280G			
Date: 22SEP2022			



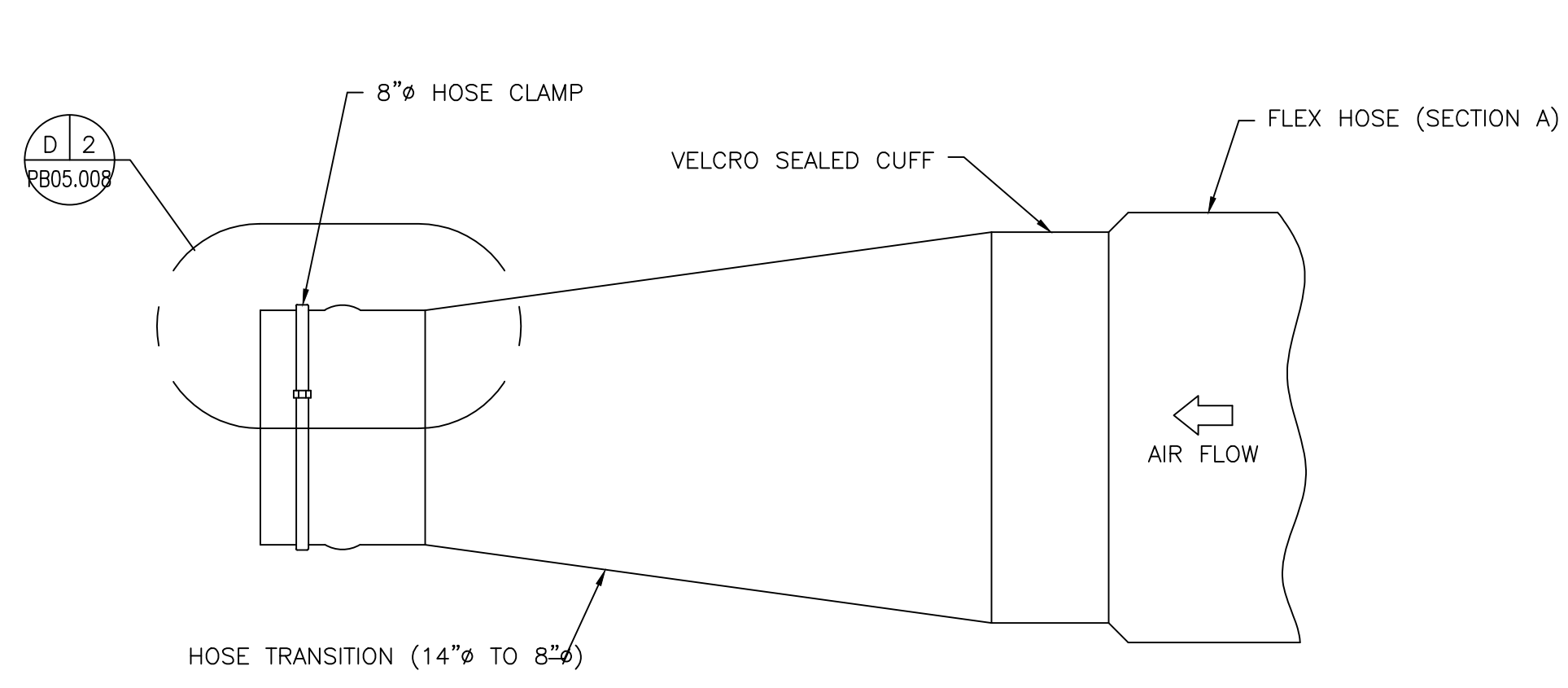
D 1 PCA HOSE CONFIGURATION³
PBB-4.3



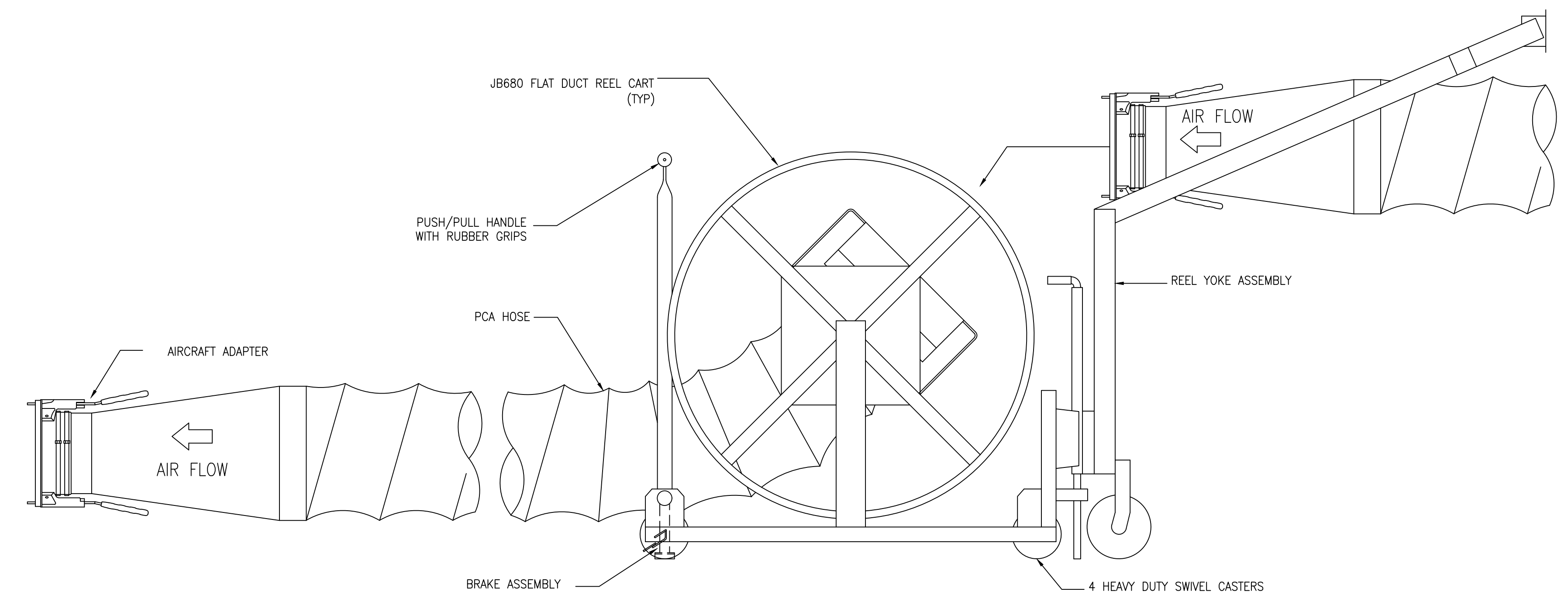
D 2 FLEXIBLE HOSE TERMINATION DETAIL
PBB-4.3



D 3 DUCT SUPPORT DETAIL
PBB-4.3



D 4 14" TO 8" FLEXIBLE HOSE REDUCER DETAIL
PBB-4.3



D 5 PCA HOSE REEL DETAILS^{2,3,4}
PBB-4.3

GENERAL NOTES:

1. ALL EQUIPMENT CORNERS AND EDGES SHALL BE BEVELED AS NECESSARY, TO REMOVE BURS AND SHARP EDGES.
2. LAYOUT SHOWN IS A DESIGN INTENT ONLY. PROVIDE, INSTALL AND COMMISSION IN ACCORDANCE WITH THE DESIGN INTENT AND SPECIFICATIONS. SUBMIT EQUIPMENT LAYOUT DRAWINGS FOR APPROVAL.
3. ALL BRACKETS, DUCTS AND TRANSITIONS SHALL BE PAINTED TO MATCH COLOR OF INSTALLED PBB.
4. INSTALLATION AND EQUIPMENT DESIGN SHALL NOT INTERFERE WITH ACCESS TO OTHER J-BOXES, DEVICES, ETC., ON THE PBB.
5. GRIND, PRIME AND TOUCH UP PAINT ALL WELDS.
6. PCA HOSES, ELBOWS, DUCTS, ETCETERA SHALL BE INSTALLED IN SUCH A MANNER SO AS NOT TO RESTRICT AIR FLOW THROUGHOUT THE OPERATIONAL RANGE OF THE PBB.

SHEET NOTES:

- 1 AS REQUIRED FOR INSULATED DUCT PROVIDED.
 - 2 HOSE REEL SHOWN IS A DESIGN INTENT. SUBMIT DETAILS FOR APPROVAL.
 - 3 HOSE LENGTH INDICATED ARE A MINIMUM LENGTH ONLY. PROVIDE SUFFICIENT OUTPUT HOSE TO REACH THE PCA SERVICE PORT OF ALL AIRCRAFT THAT PARK AT EACH GATE.
 - 4 PROVIDE AND INSTALL (1) ONE PRIMARY HOSE REEL AND (1) ONE EXTENSION HOSE REEL.
- HOSE LENGTH'S: (1) PRIMARY - 85'
(1) EXTENSION - 60'

No.	Issue	By	Date
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2			
3			
4			

NEW PCA DETAILS -
PART THREE
PCA ADD ALT.

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NEW PASSENGER BOARDING
BRIDGE
AIP NO. 3-20-013-044
TOPEKA REGIONAL AIRPORT

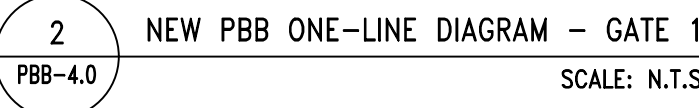
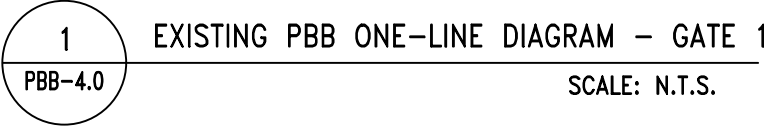
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Sheet
PBB-4.3




1. ALL CIRCUIT LENGTHS ARE ESTIMATES AND DEPENDANT ON EXACT LOCATION OF PENETRATION THROUGH BUILDING FACE AND LOCATION OF EQUIPMENT. CONTRACTOR TO VERIFY LENGTHS.
2. ALL GROUNDING TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
3. TAPE AND COIL ALL SPARE WIRES FOR FUTURE USE.
4. ALL TERMINATIONS SHALL BE MADE ON APPROVED TERMINAL STRIPS AND CONDUCTORS/CABLES CLEARLY LABELED.
5. FURNISH TERMINAL STRIPS AS NECESSARY.
6. ALL CONDUCTORS INSTALLED ON OR IN THE PASSENGER BOARDING BRIDGE SHALL BE NON-PVC INSULATED CONDUCTORS SUCH AS HALOGEN FREE LLDPPE (LINEAR LOW DENSITY POLYETHYLENE) OR XLPE (THERMOSET CROSS LINKED POLYETHYLENE).
7. EXISTING ELECTRICAL INFRASTRUCTURE BASED ON FIELD INVESTIGATIONS DOCUMENTED BY WSP IN REPORT #: 309000280-0/7520.3 MTA Cares ACT FUNDING PROGRAMING; TERMINAL PASSENGER BOARD BRIDGE TOPEKA REGIONAL AIRPORT. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND NOTIFY DESIGN TEAM IF THEY DO NOT MATCH.

- ① REMOVE
- ② EXISTING TO REMAIN
- ③ NEW
- ④ PCA SCOPE OF WORK SHALL BE BID AS AN ADD ALT.


No.	Date	By	Issue
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**EXISTING & PROPOSED
ONE-LINE DIAGRAMS –
GATE 1 PCA ADD ALT
BRIDGE**

**METROPOLITAN TOPEKA
AIRPORT AUTHORITY
NEW PASSENGER BOARDING
BRIDGE
AIP NO. 3-20-0113-044
TOPEKA REGIONAL AIRPORT**



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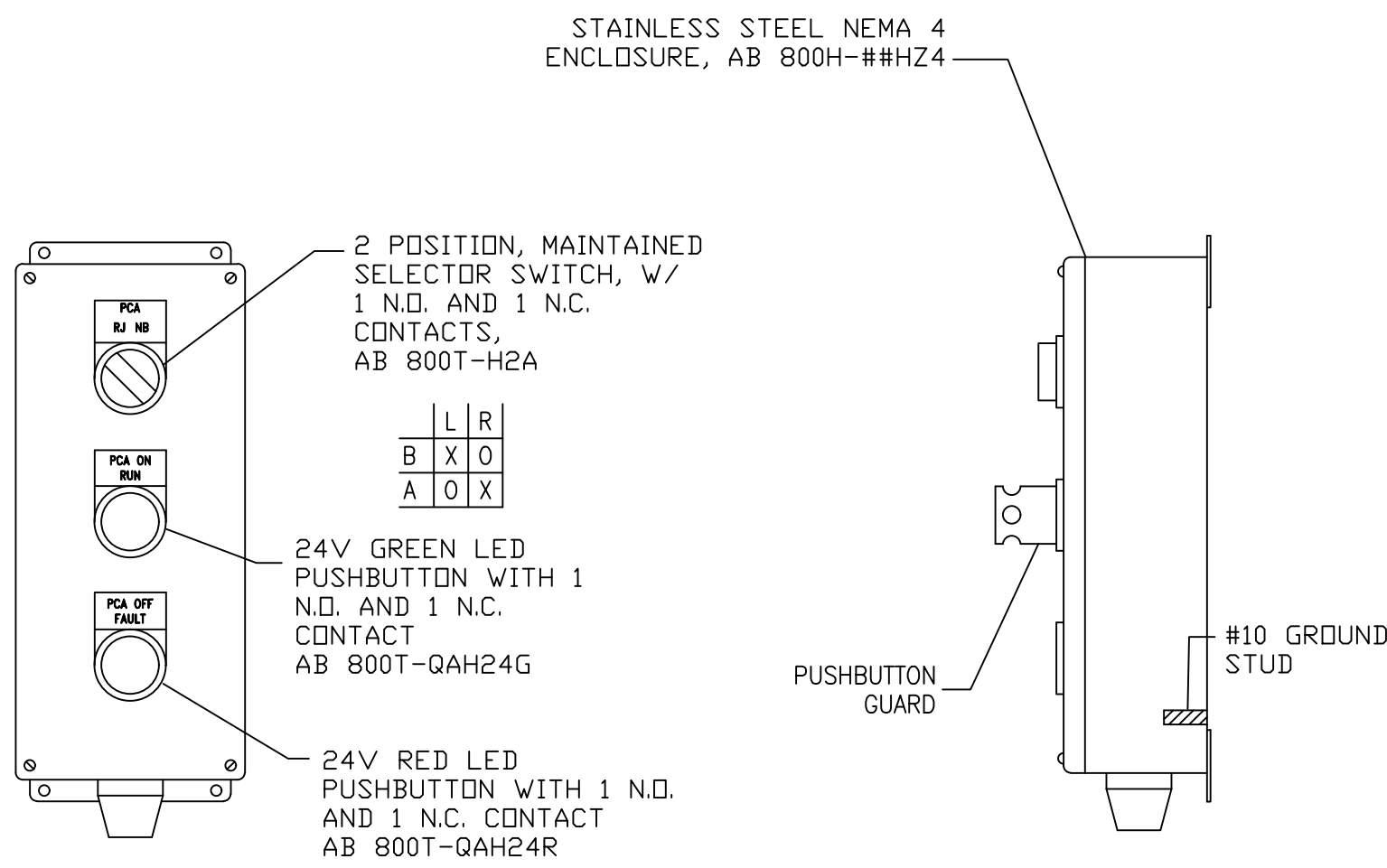


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Engineer:	
Designer:	
PB Job No.: 30900280G	
Date: 22SEP2022	



1 NEW PCA PUSHBUTON STATION – TYPE B
PBB–5.1 SCALE: N.T.S.

GENERAL NOTES:

1. LEGEND PLATES SHALL BE METAL AND SHALL BE ENGRAVED AS INDICATED, AND SHALL BE OF THE TYPE CAPTURED BETWEEN ENCLOSURE AND PUSHBUTTON LOCK RING. ENGRAVINGS SHALL BE PAINTED TO PROVIDE A HIGH CONTRAST BETWEEN THE LETTERING AND THE BACKGROUND.

2. ALL WIRE TERMINATIONS SHALL BE LABELED IN ACCORDANCE WITH THE SPECIFICATIONS.

3. ALL CONTROLLERS AND MOUNTING PLATES SHALL BE INSTALLED IN SUCH A MANNER AS TO ALLOW FOR FULL BRIDGE DESIGN MOVEMENT AND SHALL BE COORDINATED
- SUCH THAT OPERATION DOES NOT INTERFERE WITH HOSE BASKET OR OTHER ANCILLARY EQUIPMENT.

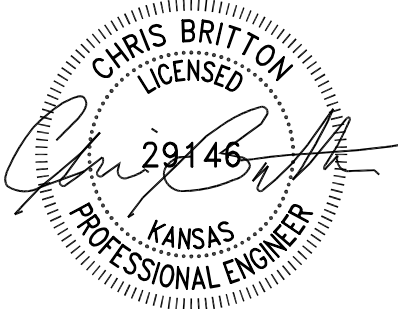
4. PROVIDE AND INSTALL A PUSHBUTTON MOUNTING PLATE OF SUFFICIENT SIZE TO ALLOW MOUNTING OF THE INDICATED PUSHBUTTON STATION.

5. ALL PUSHBUTTON ENCLOSURES AND DEVICES TO BE ALLEN BRADLEY OR EQUIVALENT.

6. LAYOUT SHOWN IS A DESIGN INTENT ONLY. PROVIDE, INSTALL AND COMMISSION A COMPLETE AND OPERABLE SYSTEM IN ACCORDANCE WITH THE DESIGN INTENT AND
- SPECIFICATIONS. SUBMIT EQUIPMENT LAYOUT DRAWINGS FOR APPROVAL.

7. PUSHBUTTONS SHOWN ARE FOR NEW PUSHBUTTON STATIONS ONLY.

8. CABLE LENGTHS SHOWN ARE A DESIGN INTENT ONLY. PROVIDE CABLES OF SUFFICIENT LENGTH TO SERVICE ALL AIRCRAFT PARKED AT THE GATE.



No.

Date

By

Issue

PUSHBUTTON DETAILS
PCA ADD ALT.

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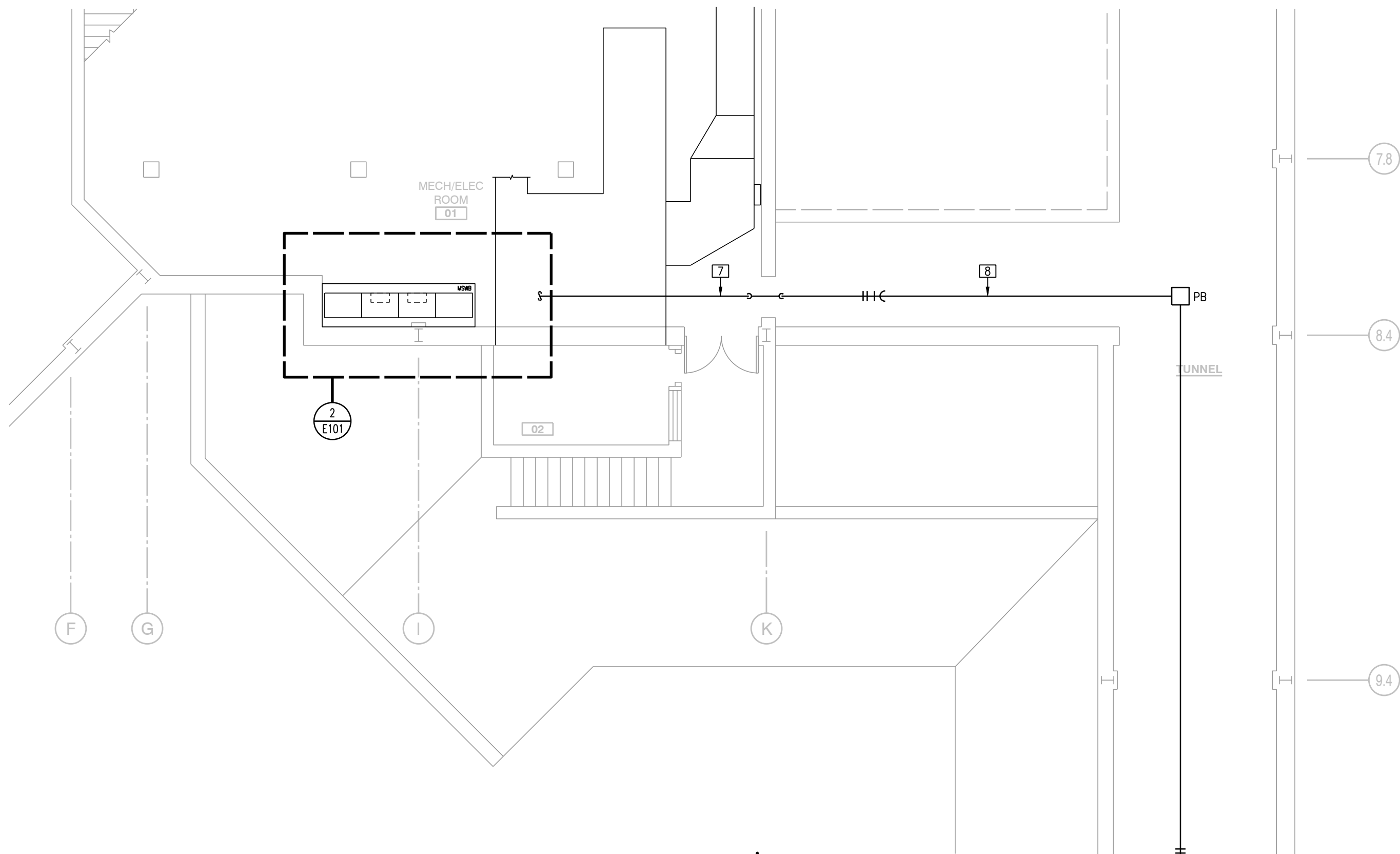
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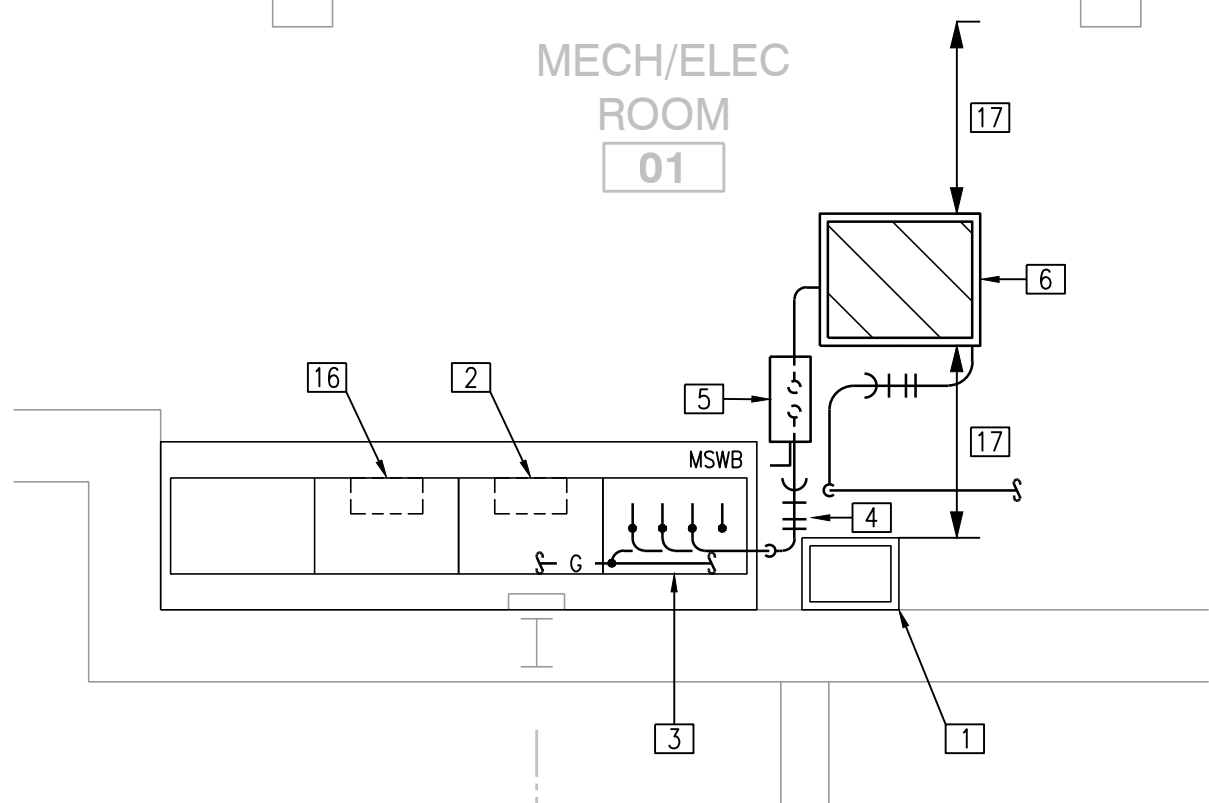
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PB Job No.: 309002806
Date: 22SEP2022

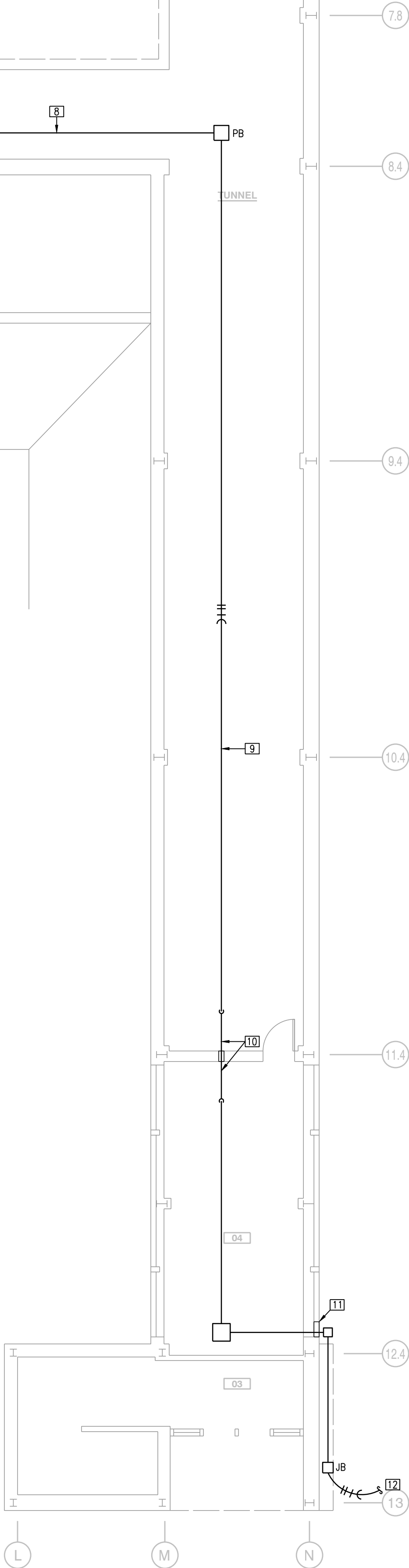
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PBB–5.1



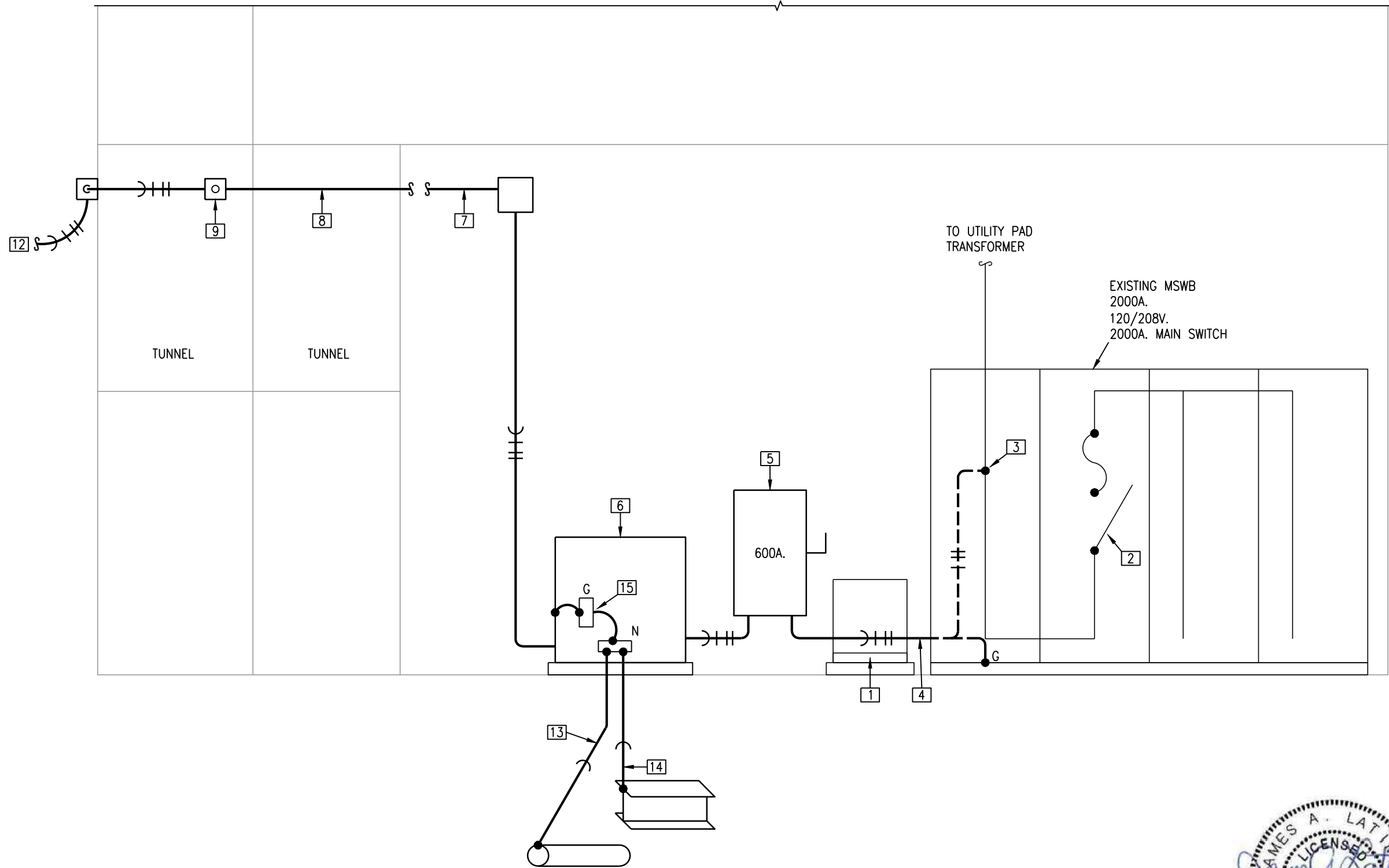
1 PARTIAL BASEMENT PLAN
1/8"=1'-0" (PCA-ADD ALT 1) POWER
NORTH



2 PARTIAL BASEMENT PLAN
1/4"=1'-0" (PCA-ADD ALT 1) POWER
NORTH



- LEGEND:
- 1 EXISTING 45 KVA 208/480V., 3-PHASE TRANSFORMER SERVING EXISTING PBB TO SERVE NEW PBB. FEEDER TO REMAIN FOR REUSE.
 - 2 EXISTING 2000A. MAIN SERVICE DISCONNECT SWITCH SHALL BE RELABELLED AS "MAIN ELECTRICAL SERVICE DISCONNECT SWITCH 1 OF 2".
 - 3 PROVIDE UL CLAMP-ON STYLE BUS TAP CONNECTIONS TO PHASE AND GROUND BUSES AS REQUIRED TO SERVE NEW PCA DISCONNECT SWITCH.
 - 4 (2) SETS OF (3) 350 KCMIL AND (1) #2/0 GRD. IN (2) 3"C.
 - 5 600A. 3P 208V. HEAVY DUTY D.S. FUSED AT 600A. RK-5. PROVIDE GALVANIZED STRUT SUPPORT STAND WITH PAD FEET AND BRACING ANCHORED TO FLOOR. PROVIDE NEC LABEL "MAIN ELECTRICAL SERVICE DISCONNECT SWITCH 2 OF 2. SERVES EXTERIOR PCA".
 - 6 225 KVA DRY-TYPE PAD TRANSFORMER 208V. 3-PHASE DELTA PRIMARY, 408V., 3-PHASE, 3-WIRE DELTA SECONDARY. PROVIDE 3 1/2" CONCRETE HOUSEKEEPING PAD. NEMA AND DOE 2016 ENERGY EFFICIENCY STANDARD COMPLIANT.
 - 7 ROUTE 480V. SECONDARY/PCA FEEDER UP TO ABOVE DUCTWORK AND OVER TO TUNNEL.
 - 8 (3) #4/0 CONDUCTORS AND (1) #4 GRD. IN 2"C.
 - 9 FEEDER IN TUNNEL SUPPORTED FROM STRUCTURE. REUSE EXISTING SUPPORT CHANNELS AND/OR PROVIDE NEW GALVANIZED ANCHORS AND HANGERS AS REQUIRED.
 - 10 PENETRATE CONCRETE WALL. REUSE EXISTING CORE DRILL. KEEP CONDUIT TIGHT TO STRUCTURE IN ALL OTHER AREAS.
 - 11 FIELD NOTCH CORNER OF EXISTING UNUSED LOUVER FOR CONDUIT PENETRATION. ROUTE NEXT TO EXISTING PBB CONDUIT.
 - 12 PROVIDE EXCESS CONDUCTOR LENGTH FOR EXTENSION TO PCA/PBB EQUIPMENT. REFER TO PBB PLANS FOR CONTINUATION. COORDINATE WITH PBB ENGINEER.
 - 13 DOWNSTREAM OCP NOT TO EXCEED 200A. RK-5.
 - 14 #2/0 GROUNDING ELECTRODE IN 3/4"C. TO COPPER WATER SERVICE.
 - 15 #2/0 GROUNDING ELECTRODE IN 3/4"C. TO BUILDING STEEL.
 - 16 #2/0 BONDING JUMPER.
 - 17 EXISTING 200A. SWITCH SERVING EXISTING PBB TRANSFORMER/FEEDER TO REMAIN TO SERVE NEW PBB.
 - 18 MAINTAIN 48" CLEARANCE FRONT AND REAR OF TRANSFORMER.



3 PARTIAL ELECTRICAL DISTRIBUTION RISER DIAGRAM
NO SCALE (PCA-ADD ALT 1)

