

RESPONSES TO QUESTIONS:

1. QUESTION: What company currently services the schools existing ESS system?  
RESPONSE: The system is maintained by the school district staff.
2. QUESTION: What company currently services the schools existing "Intercommunication System"?  
RESPONSE: The system is maintained by the school district staff.
3. QUESTION: A1.1 Note 15 Auditorium Seating. Request clarification; are we to use this note as specifications? Specifications for this item were not included in the spec book.  
RESPONSE: Specification Section 126113 – Fixed Audience Seating has been added via this addendum.
4. QUESTION: Request additional time for questions, a majority of our sub-contractors is just now picking up plans for review and will have questions.  
RESPONSE: Additional time for questions is not approved at this time.

SUBSTITUTION REQUESTS:

5. Section 074113 – Metal Roof Panels:
  - a. "Tite-Loc Plus" panels as manufactured by PAC-CLAD/Petersen Aluminum are approved as a substitution.
6. Section 089000 – Louvers and Vents:
  - a. American Warming & Ventilating (AWV) is approved as a manufacturer.
7. Section 097723 – Fabric-Wrapped Wall Panels and Diffuser Panels:
  - b. "Respond A-Series" panels as manufactured by Conwed Designscape/Wall Technology are approved as a substitution for absorber panels.
  - a. "Respond Diffuser" panels as manufactured by Conwed Designscape/Wall Technology are approved as a substitution for barrel diffuser panels.
8. Section 233113 – Metal Ducts:
  - a. "Model S0-S4" as manufactured by Jer-Air is approved as a substitution for spin-in collars.
9. Section 233300 – Air Duct Accessories:
  - a. "Model 1022" as manufactured by Nailor Industries is approved as a substitution for manual dampers.
  - b. "Model 1260" as manufactured by Nailor Industries is approved as a substitution for smoke dampers.

10. Section 233713 – Diffusers, Registers and Grilles:
  - a. “Models 61DV-O”, “5145H-O”, “4360”, “AUNI”, “ARNRA1”, “49-240”, and “49-241” as manufactured by Nailor Industries are approved as substitutions for diffusers, registers, and grilles.
11. Section 233723 – HVAC Gravity Ventilators:
  - a. “Model UFSH” as manufactured by Dur-Red Products is approved as a substitution for smoke hatch vents.
12. Sheet C6.4 – Construction Details:
  - a. “Main Header Row” system as designed and manufactured by Triton Stormwater Solutions is approved as a substitution for the underground detention system.
13. Sheet A1.4 – Reflected Ceiling Plan:
  - a. “Aluma Vault 1000” ceiling system as manufactured by Gordon Incorporated is approved as a substitution for the suspended curved metal ceiling systems referenced by RCP General Notes 4, 5, & 6. Provide a custom configuration as required to match the character, profile, dimensions, finishes, etc. of the systems that are currently specified.

CHANGES TO PROJECT MANUAL:

14. Section 074113 – Metal Roof Panels:
  - c. Paragraph 2.3.A.8: Change Panel Coverage requirement from “12” nominal” to “16” nominal”.
  - d. Paragraph 2.3.A.9: Change Panel Height requirement from “1.5” nominal” to “2” nominal”.
15. Section 084113 – Aluminum-Framed Entrances & Storefronts:
  - e. Add the new section in its entirety.
  - f. Note that this Section is applicable to Bid Alternate No. 1.
16. Section 084413 – Glazed Curtain Wall:
  - g. Add the new section in its entirety.
  - h. Note that this Section is applicable to Bid Alternate No. 1.
17. Section 126113 – Upholstered Audience Seating:
  - i. Add the new section in its entirety.
18. Section 238223 – Energy Recovery Units (Over 15,000 CFM):
  - j. Add the new section in its entirety.
  - k. Note that this Section is applicable to ERV-1. Refer to schedule information for RTU-2 on Sheet M0.1. Refer to schedule Remark 4 for additional information.

CHANGES TO DRAWINGS:

19. Sheet C2.1 – Staking and Traffic Control Plan:
  - a. Remove requirement for new fencing and gates at west end of Berrien Street.
  - b. Extend the new 4' wide sidewalk that is required along Berrien Street to the west to the intersection with Boundary Street. Note that this new sidewalk is currently shown to terminate at the new crosswalk and side building entrance.
  
20. Sheet C3.1 – Erosion and Sediment Control Plan – Initial Phase:
  - a. Add EZ-valve line stops at each end of the water main that is scheduled to be removed and is currently running north-south across the project site.
  
21. Sheet LS1.1 – Life Safety Plan:
  - a. Add a 1-hour fire barrier rating at the partition between Stage (Rm 129) and Set Design (Rm 148). Note that the openings in this wall shall be 45-min protected.
  
22. Sheet A1.1 – Floor Plan:
  - a. Revise Floor Plan Keynote #13 to require three (3) ADA-compliant pass doors (in lieu of one) at each partition system location.
  
23. Sheet A2.2 – Opening Schedule:
  - a. Add a 45-min fire rating requirement to opening 129B. Note that this is a 3'-0"x7'-0" wood door in a hollow metal frame.
  - b. Add a 45-min fire rating requirement to opening 129E. Note that this is a 10'-0"x12'-0" overhead coiling door.
  
24. Sheet S1.2 – Roof Framing Plan:
  - a. Incorporate the additional information provided in the attached Drawing 1/S1.2.
  
25. Sheet S3.2 – Framing Sections:
  - a. Add the attached Detail B/S3.2 to the sheet.

END OF ADDENDUM

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES & STOREFRONTS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish all necessary materials, labor, and equipment for the complete installation of the aluminum swing doors, door frames, hardware, and storefront framing system as shown on the drawings and specified herein.
- B. Section includes: Aluminum Swing Doors, including:
  - 1. YKK AP Model 35H Impact Resistant Heavy Duty Swing Doors for Insulating Glass.
- C. Related Sections:
  - 1. Glass: Contact YKK AP for approved glass types.
  - 2. Glazing: Structural silicone sealant.
  - 3. Single Source Requirement: All products listed below shall be by the same manufacturer.
    - a. Section 08 41 13 Aluminum-Framed Glass Doors.
    - b. Section 08 44 13 Glazed Aluminum Curtain Walls.

1.02 SYSTEM PERFORMANCE DESCRIPTION

- A. Performance Requirements: Aluminum swing doors shall meet all requirements of ASTM E 1886, ASTM E 1996 and South Florida Building Code Protocols TAS 201, TAS 202, and TAS 203 and comply with the following specific performance requirements indicated.
  - 1. Air Infiltration (Single Acting Butt Hinges, Continuous Hinges, or Offset Pivots): Air infiltration shall be tested in accordance with ASTM E 283 at static pressure of 1.57 PSF (75 Pa). Infiltration shall not exceed 0.50 CFM/FT<sup>2</sup> for single door or 1.00 CFM/FT<sup>2</sup> for pair doors.
  - 2. Water Infiltration: No uncontrolled water other than condensation on indoor face of any component tested in accordance with ASTM E 331 at a test pressure differential of 10.5 psf (503 Pa). Water test to be performed immediately after design pressure test. Standard 35H Entrances are intended for 1st floor applications.
  - 3. Structural: Door corner structural strength shall be tested per YKK AP's dual moment test procedure and certified by an independent testing laboratory to ensure corner integrity and weld compliance. Certified test procedures and results are available upon request.
  - 4. Structural Uniform Load Test:
    - a. Doors:
      - 1) Positive Pressure:
        - 70 PSF – For Air Only or Air and Water Threshold; monolithic glazing.
        - 90 PSF – For Air Only Threshold, 70 PSF – Air and Water Threshold; insulating glazing.
      - 2) Negative Pressure: 90 PSF
  - 5. Forced Entry Resistance: Tests performed simultaneously with 300 lb. forces applied to the active door panel within 3" of the locks in the direction that would tend to open the door while 150 lb. forces are applied in both perpendicular directions to the 300 lb. force simultaneously.
  - 6. Thermal Performance: When tested in accordance with AAMA 1503 and NFRC 102:
    - a. Condensation Resistance Factor (CRF<sub>f</sub>): A minimum of 28.
    - b. Thermal Transmittance U Value: 0.77 BTU/HR/FT<sup>2</sup>/°F or less.

### 1.03 SUBMITTALS

- A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Section. Product data, shop drawings, samples, and similar submittals are defined in Conditions of the Contract".
- B. Product Data: Submit product data for each entrance series specified.
- C. Substitutions: Whenever substitute products are to be considered, supporting technical data, samples, and test reports must be submitted ten (10) working days prior to bid date in order to make a valid comparison.
- D. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, and finish colors.
- E. Samples: Submit verification samples for colors. Minimum 2½ inch by 3 inch (61mm by 73 mm) samples on actual aluminum substrates indicating full color range expected in installed system.
- F. Quality Assurance / Control Submittals:
  - 1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. Installer Qualification Data: Submit installer qualification data.
- G. Close-out Submittals:
  - 1. Warranty: Submit executed warranty documents specified herein, endorsed by YKK AP authorized official and installer.
  - 2. Project Record Documents: Submit project record documents, including operation and maintenance data for installed materials in accordance with Division 1 Project Close-out (Project Record Documents) Section.

### 1.04 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project. If requested by Owner, submit reference list of completed projects.
  - 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction process.
- B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

### 1.05 PRODUCT CONDITIONS / SITE CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

### 1.06 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by an Authorized company official.
  - 1. Warranty Period: Manufacturer's one (1) year standard warranty commencing on the substantial date of completion for the project provided that the warranty, in no event, shall start later than six (6) months from the date of shipment by YKK AP America Inc.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS (Acceptable Manufacturers/Products)

- A. Acceptable Manufacturers: YKK AP America Inc.  
270 Riverside Parkway, Suite A  
Austell, GA 30168  
Telephone: (678) 838-6000; Fax: (678) 838-6001

#### 1. Impact Resistant Entrances:

YKK AP Model 35H Impact Resistant and Blast Mitigating Entrances.

- a. 35H Description: 3-7/8" (98.36 mm) Door Stile, 2-3/8" thick.
2. Corner Construction: Fabricate door corners joined by concealed reinforcement secured with screws and sigma deep penetration welding.
3. Glazing: Manufacturer's standard glazing stops with EPDM glazing gaskets to prevent water infiltration at the exterior and structural silicone sealant for wet glazing, EPDM silicone compatible gasket for dry glazing with fixed stops at the interior.
4. Weather-stripping: Manufacturer's standard elastomer type in replaceable rabbets for stiles and rails.
- 5a. Standard Hardware:
  - (1-1/2 to 2) pair of Grade 1 mortised butt hinges per leaf. Ball bearing 4-1/2" x 4" NRP Stainless Steel US32D finish.
  - (1) Adams Rite® MS1850 three point hookbolt lock on active leaf or single door. (1) Adams Rite two point lock on inactive leaf.
  - (2) H-4202 Keyed cylinders
  - LCN 4040 surface mounted closer
  - (1) Adams E9-0503 mill finish (air only) threshold.
  - Sargent® Rim Panic – WS-AD8500.

### 2.02 MATERIALS

- A. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 Aluminum Alloy.
- B. Aluminum Sheet:
1. Anodized Finish: ASTM B 209 (ASTM B 209M), 5005-H14 Aluminum Alloy, 0.050" (1.27 mm) minimum thickness.

### 2.03 ACCESSORIES

- A. Manufacturer's Standard Accessories:
1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series less steel exposed fasteners, countersunk, finish to match aluminum color.
  2. Perimeter Sealant: Non-skinning type, AAMA 803.3.
  3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer. Glazing gaskets in accordance with ASTM C 864.
  4. Glazing Adhesive: Dow Corning® 995 Structural Silicone Sealant.

### 2.04 FABRICATION

- A. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.
1. Hardware: Drill and cut to template for hardware. Reinforce frames and door stiles to receive hardware in accordance with manufacturer's recommendations.

2. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.

## 2.05 FINISHES AND COLORS

### A. YKK AP America Anodized Plus® Finish:

CODE	DESCRIPTION
YB1N	Medium Bronze Anodized Plus®

### B. Anodized Finishing: Prepare aluminum surfaces for specified finish; apply shop finish in accordance with the following:

1. Anodic Coating: Electrolytic color coating followed by an organic seal applied in accordance with the requirements of AAMA 612-02. Aluminum extrusions shall be produced from quality controlled billets meeting AA-6063-T5.
  - a. Exposed Surfaces shall be free of scratches and other serious blemishes.
  - b. Extrusions shall be given a caustic etch followed by an anodic oxide treatment and then sealed with an organic coating applied with an electrodeposition process.
  - c. The anodized coating shall comply with all of the requirements of AAMA 612-02: Voluntary Specifications, Performance Requirements and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum. Testing shall demonstrate the ability of the finish to resist damage from mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss.
  - d. Overall coating thickness for finishes shall be a minimum of 0.7 mils.

### C. Finishes Testing:

1. Apply 0.5% solution NaOH, sodium hydroxide, to small area of finished sample area; leave in place for sixty minutes; lightly wipe off NaOH. Do not clean area further.
2. Submit samples with test area noted on each sample.

## PART 3 EXECUTION

### 3.01 MANUFACTURER'S INSTRUCTIONS / RECOMMENDATIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, installation instructions, and product carton instructions. The latest installation instructions for this product are available at [www.ykkap.com](http://www.ykkap.com).

### 3.02 EXAMINATION

- A. Site Verification of Conditions: Verify conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.
  1. Verify location of preset anchors, perimeter fasteners, and block-outs are in accordance with shop drawings.

### 3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
  1. Aluminum Surface Protection: Protect aluminum surfaces from contact with lime, mortar, cement, acids, and other harmful contaminants.

3.04 INSTALLATION

- A. General: Install manufacturer's system in accordance with shop drawings, and within specified tolerances.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon request, provide manufacturer's field service consisting of site visit for inspection of product installation in accordance with manufacturer's instructions.

3.06 ADJUSTING AND CLEANING

- A. Adjusting: Adjust swing doors for operation in accordance with manufacturer's recommendations.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to owner's acceptance, and remove construction debris from project site. Legally dispose of debris.
- C. Protection: The General Contractor shall protect the installed product's finish surfaces from damage during construction.

END OF SECTION 084113



SECTION 084413 - GLAZED ALUMINUM CURTAIN WALL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Aluminum Curtain Wall Systems:

1. YKK AP Series YHC 300 OG (Outside Glazed) Impact Resistant Aluminum Curtain Wall System.

B. Related Sections:

1. Sealants: Dow Corning® 995 Structural Silicone Sealant.
2. Glass and Glazing: Refer to Division 8 Glass and Glazing Section for glass and glazing requirements.
3. Single Source Requirement: All window and door products shall be by the same manufacturer.

1.02 SYSTEM PERFORMANCE DESCRIPTION

A. Performance Requirements: Provide aluminum curtain wall systems that comply with performance requirements indicated, as demonstrated by testing manufacturer's assemblies in accordance with South Florida Building Code Test Protocols TAS 201, TAS 202 and TAS 203.

1. Wind Loads: Completed curtain wall system shall withstand wind pressure loads normal to wall plane indicated:
  - a. Structural Performance:
    - 1) REFER TO "DESIGN PRESSURE RATING SCHEDULE" ON THE DRAWINGS.
2. Deflection: Maximum allowable deflection in any member when tested in accordance with ASTM E 330 with allowable stress in accordance with AA Specifications for Aluminum Structures:
  - a. Without Horizontals: L/175 or 3/4" (19.1mm) maximum.
  - b. With Horizontals: L/175 or L/240 + 1/4" (6.4mm) for spans greater than 13'-6" (4.1m) but less than 40'-0" (12.2m).
3. Thermal Movement: Provide for thermal movement caused by 180 degrees F. (82.2 degrees C.) surface temperature, without causing buckling stresses on glass, joint seal failure, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or detrimental effects.
4. Air Infiltration: Completed curtain wall systems shall have 0.06 CFM/FT<sup>2</sup> (1.10 m<sup>3</sup>/h-m<sup>2</sup>) maximum allowable infiltration when tested in accordance with ASTM E 283 at differential static pressure of 6.24 PSF (299 Pa).
5. Water Infiltration: No uncontrolled water, other than condensation, on indoor face of any component when tested in accordance with ASTM E 331 at test pressure differential of 20 PSF (958 Pa). Water test to be performed immediately after design pressure test.
6. Thermal Performance: When tested in accordance with AAMA 1503.1 and NFRC 102:
  - a. Condensation Resistance Factor (CRF<sub>f</sub>): A minimum of 72.
  - b. Thermal Transmittance U Value: .42 BTU/HR/FT<sup>2</sup>/°F or less.  
Note: The CRF for the glazed system as a whole will be affected by the characteristics of the glass specified.
7. Acoustical Performance: Acoustical Performance: When tested in accordance with ASTM E 1425:
  - a. Sound Transmission Class (STC) shall not be less than 37.
  - b. Outdoor-Indoor Transmission Class (OITC) shall not be less than 32.

1.03 SUBMITTALS

- A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections.
- B. Product Data: Submit product data for each type curtain wall series specified.
- C. Substitutions: Whenever substitute products are to be considered, supporting technical data, samples and test reports must be submitted ten (10) working days prior to bid date in order to make a valid comparison.

- D. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors and textures.
- E. Samples: Submit verification samples for colors on actual aluminum substrates indicating full color range expected in installed system.
- F. Quality Assurance / Control Submittals:
  - 1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. Installer Qualification Data: Submit installer qualification data.
- G. Closeout Submittals:
  - 1. Warranty: Submit warranty documents specified herein.
  - 2. Project Record Documents: Submit project record documents for installed materials in accordance with Division 1 Project Closeout (Project Record Documents) Section.

#### 1.04 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project. If requested by Owner, submit reference list of completed projects.
  - 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction process.
- B. Mock-Ups (Field Constructed): Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, and workmanship standard.
  - 1. Mock-Up Size: Full large window unit
  - 2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
  - 3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.
- C. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

#### 1.05 PROJECT CONDITIONS / SITE CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

#### 1.06 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by an authorized company official.
  - 1. Warranty Period: Manufacturer's one (1) year standard warranty commencing on the substantial date of completion for the project provided that the warranty, in no event, shall start later than six (6) months from the date of shipment by YKK AP America Inc.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS (Acceptable Manufacturers/Products)

- A. Acceptable Manufacturers:
  - YKK AP America Inc.  
270 Riverside Parkway, Suite A  
Austell, GA 30168  
Telephone: (678) 838-6000; Fax: (678) 838-6001
- 1. Curtain Wall System: YKK AP YHC 300 OG Curtain Wall System.

B. Curtain Wall Framing System:

1. Description: Framing System shall be thermally improved. Horizontal and vertical members shall have a nominal face dimension of 3 inches, depth as indicated on the shop drawings. Framing system shall provide a flush glazed appearance on all sides with no protruding glass stops.
2. Glazing: Manufacturer's standard silicone compatible EPDM glazing gaskets to inhibit water infiltration at the exterior and Dow Corning® 995 Structural Silicone Sealant with fixed stops at the interior; interior spacers are to be silicone.

2.02 MATERIALS

- A. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 Aluminum Alloy.
- B. Aluminum Sheet:
  1. Anodized Finish: ASTM B 209 (ASTM B 209M), 5005-H14 Aluminum Alloy, 0.050" (1.27 mm) minimum thickness.

2.03 ACCESSORIES

- A. Manufacturer's Standard Accessories:
  1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel fasteners. Joint fasteners may be concealed.
  2. Sealant: Non-skinning type, AAMA 803.3
  3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; exterior glazing silicone compatible EPDM gaskets, in accordance with ASTM C 864, designed to lock into gasket reglet, interior by means of silicone spacer and structural silicone adhesive.
  4. Glazing Adhesive: Dow Corning® 995 Structural Silicone.

2.04 RELATED MATERIALS (Specified In Other Sections)

- A. Glass: Refer to Division 8 Glass and Glazing Section for glass materials.

2.05 FABRICATION

- A. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.
  1. Hardware: Drill and cut to template for hardware. Reinforce frames and door stiles to receive hardware in accordance with manufacturer's recommendations.
  2. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.

2.06 FINISHES AND COLORS

- A. YKK AP America Anodized Plus® Finish:

CODE	DESCRIPTION
YB1N	Medium Bronze Anodized Plus®
- B. Anodized Finishing: Prepare aluminum surfaces for specified finish; apply shop finish in accordance with the following:
  1. Anodic Coating: Electrolytic color coating followed by an organic seal applied in accordance with the requirements of AAMA 612. Aluminum extrusions shall be produced from quality controlled billets meeting AA-6063-T5.
    - a. Exposed Surfaces shall be free of scratches and other serious blemishes.

- b. Extrusions shall be given a caustic etch followed by an anodic oxide treatment and then sealed with an organic coating applied with an electrodeposition process.
  - c. The anodized coating shall comply with all of the requirements of AAMA 612: Voluntary Specifications, Performance Requirements and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum. Testing shall demonstrate the ability of the finish to resist damage from mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss.
  - d. Overall coating thickness for finishes shall be a minimum of 0.7 mils.
- C. Finishes Testing:
- 1. Apply 0.5% solution NaOH, sodium hydroxide, to small area of finished sample area; leave in place for sixty minutes; lightly wipe off NaOH; Do not clean area further.
  - 2. Submit samples with test area noted on each sample.

### PART 3 EXECUTION

#### 3.01 MANUFACTURER'S INSTRUCTIONS / RECOMMENDATIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, installation instructions, and product carton instructions. The latest Installation Manual can be found at [www.ykkap.com](http://www.ykkap.com).

#### 3.02 EXAMINATION

- A. Site Verification of Conditions: Verify conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

#### 3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

#### 3.04 INSTALLATION

- A. General: Install manufacturer's system in accordance with shop drawings, and within specified tolerances.
  - 1. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or bituminous coating.
  - 2. Shim and brace aluminum system before anchoring to structure.
  - 3. Verify curtain wall system allows water entering system to be collected in gutters and wept to exterior. Verify weep holes are open, and metal joints are sealed in accordance with manufacturers installation instructions.
  - 4. Seal metal to metal curtain wall system joints using sealant recommended by system manufacturer.

#### 3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon request, provide manufacturer's field service consisting of site visit for inspection of product installation in accordance with manufacturer's instructions.
- B. Field Test: Conduct field test to determine watertightness of curtain wall system. Conduct test in accordance with AAMA 501.2.

#### 3.06 ADJUSTING AND CLEANING

- A. Adjusting: Adjust swing doors for operation in accordance with manufacturer's recommendations.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to owner's acceptance, and remove construction debris from project site. Legally dispose of debris.

- C. Protection: The General Contractor shall protect the installed product's finish surfaces from damage during construction.

END OF SECTION 084413

## SECTION 126113 - UPHOLSTERED AUDIENCE SEATING

### PART 1: GENERAL

#### 1.01 Section Includes:

- A. Fixed seating for theaters, where multiple seating is required.

#### 1.02 Related Documents:

- A. All applicable provisions of the Building and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

#### 1.03 Description of Work:

- A. Provide all labor, materials, equipment and services to complete the installation of the multiple seating, as indicated on the drawings and as specified herein.

#### 1.04 Performance:

- A. Manufacturer performance shall be demonstrated by providing a list of not less than five (5) installations of similar size that have been in service for a minimum period of five (5) years.
- B. Gray iron shall be of a quality and strength in accordance with ASTM A48-64 for Class 25 gray iron castings.
- C. Wood used in the construction of the arms or end panels shall be hardwood. All veneers used in plywood shall be well seasoned hardwoods.
- D. Molded polyurethane foam shall meet Cal TB-117 Burn Test and ASTM D3574-05.

#### 1.05 Submittals:

- A. Complete Seat Plan: Submit drawings fully describing the seat plan developed from Architects prints of the building. Include details of all chairs, sizes, widths, anchorage and accessories.

#### 1.06 Quality Assurance:

- A. All component parts of the product are to be made under direct control of the manufacturer. Utilize testing and inspection procedures to assure uniform high quality component parts and finished product.

## PART 2: PRODUCT

### 2.01 Acceptable Manufacturer:

- A. Manufacturer: American Seating
- B. Product: Spirit
- C. See Drawing Sheet A1.1, Keynote 15 for overview of system requirements

### 2.02 Operation:

- A. The product must have two independent, fully operative pivot mechanisms for a consistent fold. Pivot mechanisms are gravity lift and may not utilize spring lift or spring assist and require no adjustment or lubrication. The hinge mechanisms must accommodate curved rows from a minimum radius of eight (8) feet thru a maximum to straight rows.
- B. Seat and back will operate together to maintain proper ergonomic angle between the seat and back as the back angle is adjusted. Seat-to-back angle will range from 97 degrees at 16 degree back angle to 100 degrees at 21 degree back angle.

### 2.03 Construction:

- A. Wood Back: The wood back shall be high-back option and have a deep curve veneer plywood rear panel, an upholstered front panel and two attaching wings.
  - 1. The upholstered inner panel is 7-ply 7/16" thick plywood formed on a true curve of 18" radius with length of 22 1/2" on high back.
  - 2. Padding consists of a 4" thick polyurethane foam pad.
  - 3. The pad is cemented to the inner plywood panel and covered with selected upholstering material.
  - 4. The rear panel is 5-ply 5/16" thick plywood formed on the same radius as the front panel. The 28" long rear panel provides a back extension to protect the rear of the seat from occupants behind. Outer veneer is rotary cut hardwood in the manufacturer's standard species offering. Rear panel is attached to front panel with seven #8 x 7/8" oval head screws.
  - 5. Back attachment to standards is made using two powder coat finished back wings which thru bolt to the standards using black finish smooth head machine screws and mating mini nuts with smooth covers to minimize catching or snagging. Back wings to be 14 gage steel, cut and formed to attach to the rear of the inner panel using mating steel inserts and two threaded fasteners per back wing.
- B. Seat: Two seat widths accommodate 19", 20", 21", 22", 23" and 24" chairs. Seat is made of an upholstered, compound curve inner structure with wrap-around

polypropylene shell outer panel.

1. The inner structural panel consists of 0.10" thickness compound curved 20% glass reinforced polypropylene with deep web structure. The multi contour inner structure provides comfort of springs without noise and freedom from worry of wood fatigue or damage from drying, moisture or aging.
2. Wrap around plastic outer panel is provided with a vertical flange extending to the top and around the sides to provide fabric protection and sleek appearance. The outer panel is 0.10" molded polypropylene plastic having a haircell textured surface to provide an attractive mar-resistant appearance and is supplied in the manufacturer's standard colors.
3. Padding shall consist of molded polyurethane foam pad. It shall be non-hardening and non-oxidizing. It shall resist acids, alkalis, oils, greases, soaps, abrasions, moisture, mildew and tearing. The pad shall be 3" thick at the center under an occupant's pelvis and 1.5" thick at the seat front.
4. The upholstery cover is fastened to the inner panel with staples for a taut sleek appearance.
5. It shall be possible to remove the seat from the standards without disturbing the standards.
6. Seats can be provided with number plates located centrally near the front edge. Area provided for number plates shall be recessed to prevent wear and abrasion of the plate and eliminate snagging. Attaching of number plates shall be by tamper resistant mechanical fastening.
7. Seat hinge shall be completely enclosed in seat assembly and shall automatically fold at all times without adjustment. Seat shall fold to  $\frac{3}{4}$  fold for a traditional appearance. The seat must also fold manually to 100% to provide additional clearance when necessary. Hinges consist of an 80 ksi steel axle securely fastened to the standards to prevent disengaging from the standard. Rotation of the seat about hinge pivot shall be on a self lubricating Acetyl spherical bearing requiring no maintenance. The up stop of the seat shall be cushioned to reduce noise.
8. The seat will withstand a 600 pound vertical load centered 3" from the front edge, bounce 300 pound load applied 2" front of center for 1,000 cycles, 200 pound load applied on front center edge, 200 pound load applied on a front corner edge and seat rise cycled 100,000 times, all without damage to the seat or chair (each test applied separately).

C. Standards: Standards provide the structural support base for the chairs and must be one piece solid cast iron construction. Standards are to be free of welds, hollow forms or stamped cut shapes. The standard contains anchor points for holding the back, seat and arm rest in accurate and secure positions.

1. Material is ASTM A48-64, Class 25 gray iron which is poured with a sculpted outer surface. Standards may be furnished floor mounted or riser mounted. The mounting foot or pad will be a smoothed shape without sharp



projections.

- a. Floor Mounted: Provided in four versions to fit level through 1:6 floor inclines while maintaining a proper seat height. The foot pad shall measure a minimum of 7" long x 2 5/8" wide. Floor standards shall be securely attached to the floor at not less than two points and shall have no projection to form a stumbling hazard.

#### 2.04 Finish:

A. Cast Iron Parts: Cast iron standards shall be provided with a hybrid epoxy powder coat over a primer coat in one of the manufacturer's standard colors. Finish treatment will be done using the described below procedure:

B. Steel Parts: Chair back wings shall be provided with a hybrid epoxy powder coat in the color black using the following procedure:

1. Pre-final finish cleaning in a 7-stage bonderizing process.
2. Powder coat finishing of parts in an electrostatic system.
  - a. Parts shall be coated with a thermosetting epoxy powder.
  - b. Cured powder coat to have dry film thickness of 1.0 to 2.0 mils.
  - c. Parts shall be high temperature cured in a gas fired convection oven.
  - d. Cured powder coat must pass; ASTM D3363-74 Hardness 2H, ASTM D2794-69 Impact Resistance 120 in-lbs without cracking, ASTM D522-60 Flexibility no cracking or loss of adhesion, ASTM B117-73 Salt Spray 144 hours with no corrosion, ASTM D1654-79a Salt Spray maximum 1/8" creep from scribe line, ASTM D3359-83 Adhesion 5B, ASTM G53-96 Light Resistance 48 hour exposure with no chalking, 75% gloss retention and color change less than 1.5 deltaE CIE and Hoffman Scratch Hardness Tester no substrate appearance with 1,000 gram load.

#### 2.05 Options and Accessories:

A. End Standard Treatment: Laminated end panel treatment is high pressure decorative laminate applied to both sides over a 9 ply hardwood plywood base with radial burnished edges shaped in a contemporary design. Available in manufacturer's standard laminate offering.

B. Row and Seat Identification Plates: Plates are clear anodized aluminum of .025" thickness. Size of seat identification plate is 1 11/16" x 7/8". Seat numbers are 36-point, Arial, Helvetica or New Times Roman font style. Size of row identification plate is 2 13/16" by 1 3/4". The row numbers/letters are 125 point, Arial, Helvetica or New Times Roman font style. Characters shall be etch and fill with black baking enamel. Row plates shall be provided with adhesive backing and seat plates provided with two (2) holes for attachment using tamper resistant

mechanical fasteners.

C. Wood Arms: The wood arm rest consists of a softly contoured wood arm rest available in eight standard stain finishes or custom finishes.

D. ADA Swing Arm: The ADA arm is a cast iron swing arm which raises from its normal position 70 degrees to align with the chair back and allowing easy access to the chair. The arm swivels on a self lubricating bushing to maintain smooth consistent operation. The arm must support a 200 pound horizontal load and 250 pound vertical load without damage or adverse effect to its operation.

E. Aisle light: Aisle lights shall be available as a fixture for all end standard treatments. The fixture shall be factory assembled and carry UL listing as a 120volt incandescent fixture. The lamp cover shall be cast iron with a optional recess for mounting the row plate above the light output. Lamps shall be accessible from the front for replacement. Fixtures to be of identical construction for: incandescent lamps of 12, 24 and 120 volt, 1500 hour , 6 watt bulb which carry a UL listing mark; or 120 volt 40,000 hour LED 0.67 watt bulb which does not carry the mark. Wiring terminates at the bottom of the end panel in a powder coated steel junction box and has three wire pigtail of hot, neutral and ground for electrical connection. Connection of electrical to aisle lights is by the electrical contractor.

1. Provide Oval Aisle Light Option at each row.

F. Tablet Arms, Life Safety Code: The tablet arm shall provide a writing surface and a unique folding action which permits the tablet arm to fold between the occupants of two chairs, out of the way and easily accessible when needed. The tablet arm movement must meet NFPA 101 Life Safety Code.

1. The tablet arm mechanism shall consist of a cast iron tablet arm support securely attached to the tablet arm writing surface, and a tablet arm hinge which will provide for easy tablet arm folding operation. The tablet arm folds by raising 90 degrees to a vertical position then pivots downward 180 degrees, positioning itself alongside the standard just below the arm rest.

The tablet arm is held in place in its folded park position by a spring actuated mechanism. The spring tension shall prevail during the first 45 degrees of pivoting motion, starting at the stored position. The remainder of the pivoting cycle shall be free of spring tension making the return to the writing position possible with a quick easy motion, not requiring occupant to bend or reach. The transmission of the spring tension shall be made with nylon cam and cam finger, to minimize noise and insure long wear life.

2. The tablet arm spring and pivot mechanism shall be housed in a finish matching cast iron support which is attached to the middle and end standards using two graded fasteners.

3. The writing surface is horizontal grade (HGS) high pressure decorative laminate for both top and bottom surfaces adhered to a moisture

resistant plywood core that is made with no added urea formaldehyde, and finished along the sides with a radial burnished edge. The writing surface is attached to the tablet arm support by no less than six screws.

4. The tablet arm assembly shall be capable of supporting a critical load of at least 200 pound on a point directly in front of the occupant.

5. The standard size tablet arm is 107 square inches measuring at maximums 11 5/8" x 11 5/8".

### PART 3: INSTALLATION, EXECUTION, AND WORKMANSHIP

#### 3.01 Site Preparation

A. Preparation of site shall be by the General Contractor. Any deviation of site conditions contrary to approved shop drawings shall be called to the attention of the owner's representative prior to commencing work.

#### 3.02 Delivery

A. Delivery to the job site shall be coordinated by the seating contractor with the general contractor (or owner.) Proper storage of the product before installation and continued protection during and after the installation shall be the responsibility of the general contractor.

#### 3.03 Installation

A. Installation shall be by an authorized factory trained installer.

B. The installation is to be performed in a manner satisfactory to the architect and/or owner.

C. Installation will be in accordance to the approved seat plan and drawings.

D. The complete installation of the product as called for, and detailed on the drawings, shall be provided in strict accordance with the drawings and manufacturer's standard specification, instructions and recommendations.

END OF SECTION

SECTION 238223 - ENERGY RECOVERY UNITS (OVER 15,000 CFM)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Work Included:
  - 1. Casing
  - 2. Filters
  - 3. Wheels
  - 4. Fans
  - 5. Control Panel

1.3 SUBMITTALS

- A. General: All submittals shall comply with the requirements of Division 1 - GENERAL REQUIREMENTS and Section 230500 – COMMON WORK RESULTS FOR HVAC.
- B. Product Data: Data shall be submitted on the following items:
  - 1. Casing
  - 2. Filters
  - 3. Wheels
  - 4. Fans
  - 5. Controls
- C. Operation and Maintenance Instructions: Data shall be provided for the following items:
  - 1. Filters
  - 2. Fans
  - 3. Wheels
  - 4. Controls

1.4 QUALITY ASSURANCE

- A. Standards
  - 1. Air Movement and Control Association (AMCA):
    - a. Standard 210, Laboratory Method of Testing Fans for Rating.
  - 2. American Society for Testing and Materials (ASTM):
    - a. Standard A283, Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars.
    - b. Standard E90, Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions.

- c. Standard E413, Classification for Determination of Sound Transmission Class.
  - 3. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):
    - a. Standard 52, Methods of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
  - 4. American Refrigeration Institute (ARI):
    - a. Standard 410, Forced Circulation Air-Cooling and Air-Heating Coils.
    - b. Standard 1060, Rating Air to Air Energy Recovery Ventilation Heat Exchangers.
  - 5. Anti-Friction Bearing Manufacturers Association, Inc. (AFBMA):
    - a. Standard 9, Load Ratings and Fatigue Life for Ball Bearings.
    - b. Mechanical Power Transmission Association (MPTA) and Rubber Manufacturer's Association (RMA):
    - c. Engineering Standards for Drives Using Narrow Multiple V-Belts.
    - d. Engineering Standards for Drives Using Classical Multiple V-Belts.
  - 6. National Electrical Manufacturer's Association (NEMA):
    - a. Standard MG1, Motors and Generators.
- B. Qualification of Manufacturers
  - 1. Energy recovery unit shall be the product of a manufacturer whose primary business is the manufacture of acoustical housing air handling systems. Manufacturer shall have produced the product for a minimum of 5 years and shall submit evidence of such experience with submittals.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Energy recovery unit shall be total enthalpy, air-to-air, rotary wheel type with arrangement as indicated on the drawings. Unit shall be factory assembled, housing, enthalpy wheel, filter banks, supply fan, exhaust fan, and controls. For shipping purposes, the unit may be shipped in sections and field connected. Energy recovery units shall be:

Manufacture	Model
MicroMetl	---
Semco	FVT Series
Greenheck	ERVe Series

### 2.2 HOUSING

- A. Panels

1. Unit housing panels shall be double wall panels interlocked to provide housing dimensions and openings indicated on the drawings. Panels shall be 2 inch thick sandwich construction with 16 gauge (minimum) solid galvanized cold rolled steel sheet on the exterior, 16 gauge (minimum) galvanized cold rolled steel sheet on the interior, and acoustical filler between. Outside of panel shall be rated for exterior installation.
2. Filler shall be 3# fiberglass or mineral wool, noncombustible , inert mildew-resistant and vermin-proof insulation.
3. Internal panel reinforcement shall be 18 gauge (minimum) cold rolled steel tubes or angles, spaced so that vertical span does not exceed 30 inches. Perimeter and internal reinforcement and panel face and back sheets shall be welded and riveted to form metal sheathed panel. The face sheet shall be welded and riveted to the panel assembly to compress and hold in place the fill materials. Panel assembly shall hold the fill materials in place under conditions of vibration encountered in shipping, installation, and in the operation of completed structure.
4. The panel assembly shall be acoustically rated in accordance with ASTM E90 and ASTM E413 to meet the following absorption and transmission values.
  - a. Sound Transmission Loss, dB

OCTAVE BAND CENTER FREQUENCY								
	63	125	250	500	1000	2000	4000	8000
Loss	-	21	21	34	44	50	50	-

- b. Sound Absorption Coefficients

OCTAVE BAND CENTER FREQUENCY								
	63	125	250	500	1000	2000	4000	8000
Coefficients	-	0.9	1.1	1.11	1.06	1.03	1.03	-
		4	9					

**B. Access Doors**

1. Access doors shall be double wall type with frame installed in housing panel section and located where indicated on the drawings. Doors shall be same construction as the wall panel. Door clear opening shall be 24 inches wide by 60 inches high (minimum).
2. Frame shall be 16 gauge (minimum) galvanized steel.
3. Doors mounted on negative pressure plenums shall open to the exterior. Doors mounted on positive pressure plenums shall open to the interior.
4. Sides and head of door and frame shall receive two (2) sets of closed-cell neoprene compression seals. Acoustic labyrinth shall be created when door is in closed position.
5. Hardware
  - a. Two (2) level swing butt-type hinges finished in US 26-D satin chrome shall be supplied with each door.
  - b. Two (2) concealed flush-mounted spring loaded slam lock shall be supplied with each door. Handles shall be provided on the interior and exterior.

6. Assembly and adjustment of door, frame, acoustic seals, and hinges shall take place at factory.

### 2.3 FAN ENCLOSURE HOUSING

#### A. Panels

1. In addition to the unit housing, the fan section shall have an acoustical enclosure consisting of wall, roof, and floor panels. Panels shall be field erected double wall type interlocked to provide enclosure dimensions and openings indicated on the drawings.
2. Wall and roof panels shall be 4 inches thick with 16 gauge (minimum) solid galvanized cold rolled steel sheets on exterior, 22 gauge (minimum) perforated galvanized cold rolled steel sheets on interior, and acoustical filler.
3. Floor panels shall be 4 inches thick with 16 gauge (minimum) solid galvanized cold rolled steel sheets on exterior, 16 gauge perforated galvanized steel sheets on interior, and acoustical filler.
4. Filler shall be noncombustible, inert mildew-resistant and vermin-proof.
5. Internal panel reinforcement shall be 18 gauge (minimum) cold rolled steel and spaced so that vertical span does not exceed 24 inches. Perimeter and internal reinforcement and panel face and back sheets shall be welded and riveted to form metal sheathed acoustical panel. Spot welds shall be not more than 2 inches apart. Prior to attaching the face sheet the panel shall be damped and filled with sound retardant and absorbing elements. The fill shall be slightly larger and thicker than the inside dimensions of the panel. No voids will be tolerated. The face sheet shall be welded and riveted to the panel assembly to acoustically compress and hold in place the fill materials. Panel assembly shall hold the fill materials in place under conditions of vibration encountered in shipping, installation, and in the operation of completed structure.
6. The panel assembly shall be acoustically rated in accordance with ASTM E90 and ASTM E413 to meet the following absorption and transmission values.
  - a. Sound Transmission Loss, dB

OCTAVE BAND CENTER FREQUENCY

	63	125	250	500	1000	2000	4000	8000
Loss	-	21	27	38	48	58	66	67

- b. Sound Absorption Coefficients

OCTAVE BAND CENTER FREQUENCY

	63	125	250	500	1000	2000	4000	8000
Coefficients	-	0.8	1.20	1.1	1.09	1.10	1.03	0.93
		9		6				

#### B. Access Doors

1. Access doors shall be as specified hereinbefore under HOUSING.

## 2.4 FILTERS

- A. Air filter bank shall be factory installed in the energy recovery unit. Filter bank main frame shall be galvanized steel angle iron with retaining clips. Frame shall be constructed in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible. Filter bank shall be front access.
- B. Filters shall be as specified in Section 234100 – PARTICULATE AIR FILTERS.

## 2.5 ENERGY RECOVERY WHEEL

- A. Energy recovery unit shall be the rotary desiccant exchanger type utilizing total energy transfer (enthalpy) media. Unit shall include wheel, wheel housing, rotor seals, rotor support system, purge section, drive system, and rotation speed controllers.
- B. Wheel media shall be aluminum, coated to prevent corrosion. Desiccant shall be non-migrating adsorbent desiccant capable of sensible and latent energy transfer. Media shall be provided in pie shaped segments to allow field erection or replacement of one section at a time. Media segments shall be held in place by a structural spoke system.

## 2.6 SUPPLY AND EXHAUST FANS

- A. Fans shall be single or double width, centrifugal type with galvanized steel scroll housing. Fans shall have backward inclined, air foil blades. Fan sound power level at five feet from fan shall not exceed value indicated on the drawings in the third octave band mid-frequency with dB referenced 10\*\*10 to the minus 12. Fans shall be constructed and rated in accordance with AMCA 210 for air quantity and system total static pressure.
- B. Fans shall be statically and dynamically balanced. Units specified to be variable frequency driven shall be balanced over the full range of modulation.
- C. Fans shall be mounted and keyed to fan shaft. Fan shafts shall be turned, ground, and polished hot rolled steel with a maximum RPM not to exceed 80% of the first critical speed. Fan shaft shall not pass through its first critical speed as the unit comes up to rated RPM.
- D. Shaft bearings shall be self-aligning pillow block ball type. Bearings shall have AFBMA Standard No. 9 rated L-50 life of not less than 200,000 hours at the maximum catalogued RPM for the fan; bearings rated at design conditions will not be acceptable. Bearings shall be grease lubricated and regardless of location bearings shall have extended grease lines to allow lubrication while the unit is operating. Each grease line shall terminate with a grease fitting.
- E. Where capacity modulation is scheduled on the drawings, the fan shall have stable operation at both full load and at minimum CFM-static pressure indicated.



F. Fan Drives

1. Fan drive shall consist of V-belt and sheaves.
2. Belts shall be designed for 150 percent (minimum) of the connected motor capacity. Belt speeds shall be between 1000 and 6000 feet per minute. The area of the belt contact on the smaller sheave shall be not less than 120 degrees. Expanded metal belt guard covering all sides of belt shall be provided.
3. Sheaves shall be fixed pitch type selected based on the scheduled design conditions. Sheaves shall be as large as the minimum size recommended for each belt section by MPTA and RMA Standards 1974 and 1977. The motor sheave shall comply with NEMA MG1-14.42a for minimum diameter and maximum width. Centerline distance between fan and motor sheave shall not exceed three times the sum of the sheave diameters nor be less than the diameter of the larger sheave.
4. Where required, a second fixed sheave shall be provided and installed based on the final balanced air requirements.

- G. Fan, motor and drive assembly shall be mounted on a common steel frame with laterally stable, freestanding springs.

2.7 MOTORS

- A. Fan motors shall comply with Section 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT.
- B. Motors shall be totally enclosed, fan cooled (TEFC) type with Class B insulation designed for 40 degree F. ambient operation. Motors shall be mounted on adjustable steel bases. Unit belt drives shall have expanded metal 100% coverage belt guards.
- C. Motor shall be sized to drive the fan taking into account belt losses. Whenever starting requirements exceed operating requirements, the motor shall be large enough to start the fan without overheating. As a minimum, motors shall be sized at 120 percent of design brake horsepower requirements. No motor shall be selected within the service factor range. Where necessary to provide practical drive ratios for low fan RPM, a 1200 RPM motor shall be used. Motor RPM shall not exceed 1800 RPM.
- D. In calculating the fan break horsepower, the following shall be added to the external static pressure indicated on the drawings:
1. Casing losses.
  2. Coil losses.
  3. Air density.

## 2.8 DAMPERS

- A. Motor operated dampers shall be installed on the unit intake [and exhaust] louvers.
- B. Dampers shall be multi-blade design with opposed blades. Dampers shall be constructed of not less than 16-gauge galvanized steel blade mounted in galvanized steel channel frame. Blade spacing shall not exceed 6 inches and the top and bottom edges of the blades shall be crimped to stiffen the blades. Damper blades shall be interconnected by rods and linkages to provide simultaneous operation of all blades. Damper shall be provided with an extended rod to permit installation of a damper regulator. Motor operator shall be mounted on the unit housing adjacent to the damper.

## 2.9 STATIC PRESSURE RELIEF DAMPER

- A. Static pressure relief damper shall be the counter-balanced type, constructed of galvanized steel channel frame and blades. Blade width shall not exceed 6-1/2" and blades shall be interconnected by linkages to provide simultaneous opening or closing of all blades. Blades shall have full length closed cell compressible foam seals to minimize leakage. Bearings shall be 1/2" diameter ball type. Maximum allowable damper panel size shall be 48" width by 96" high. Counter-balance close upon loss of air flow.

## 2.10 LOUVERS

- A. Louvers shall be constructed of extruded aluminum (6063-T5 alloy) with all joints welded and provided with 3/4" expanded aluminum mesh birdscreen on the rear face of the louver. Louver performance shall be AMCA certified and unit shall bear the AMCA seal. Louver blades shall be not less than .094" thick, head/sill .094" and jambs .102" thick. Except as otherwise specifically indicated herein, blade angle shall be 35° and centerline spacing of blades shall not exceed 3-1/2". Louvers over 60" long shall be fabricated in multiple sections, with each section not exceeding 60" in length; provide minimum (0.081" thick), aluminum interlocking, sliding mullion between sections to permit expansion and contraction. Louver blades over 48" long shall be provided with intermediate aluminum braces on the rear face of the louver.
- B. Louver shall be provided with a factory applied baked enamel finish to match housing finish.

## 2.11 ELECTRICAL SUPPLY

- A. A main electrical power and control panel shall be mounted on the unit housing or within an accessible service compartment. The panel shall include:
  - 1. Main fused disconnect switch.
  - 2. Motor starter for the supply, exhaust, and wheel motors. Starters shall include H-O-A switch.
  - 3. Fused disconnect switch for each motor.
  - 4. Control relays.

- B. The unit control panel shall be mounted beside the main electrical panel or integrated into the main electrical panel. The control panel shall include:
  - 1. Control power transformer.
  - 2. Status indicator lights for:
    - a. Supply fan.
    - b. Exhaust fan.
    - c. Wheel.
    - d. Defrost operation.
    - e. Wheel supply entering and leaving temperatures (digital).
    - f. Wheel exhaust entering and leaving temperatures (digital).
- C. Wheel control shall include a variable speed unit designed to modulate the wheel rotation to maximize energy transfer. Control shall include A/C inverter, temperature sensors, humidity sensors, and frost prevention.
- D. Power and control wiring from the panels to the controlled devices shall be factory pre-wired. Wiring outside the panels shall be in conduit.

### PART 3 - EXECUTION

#### 3.1 STORAGE

- A. Energy recovery unit shall be stored with shipping skids in place and covered with 6 mil polyethylene sheet, taped in place, to protect the components. Under no condition shall unit be stored in direct contact with earth.

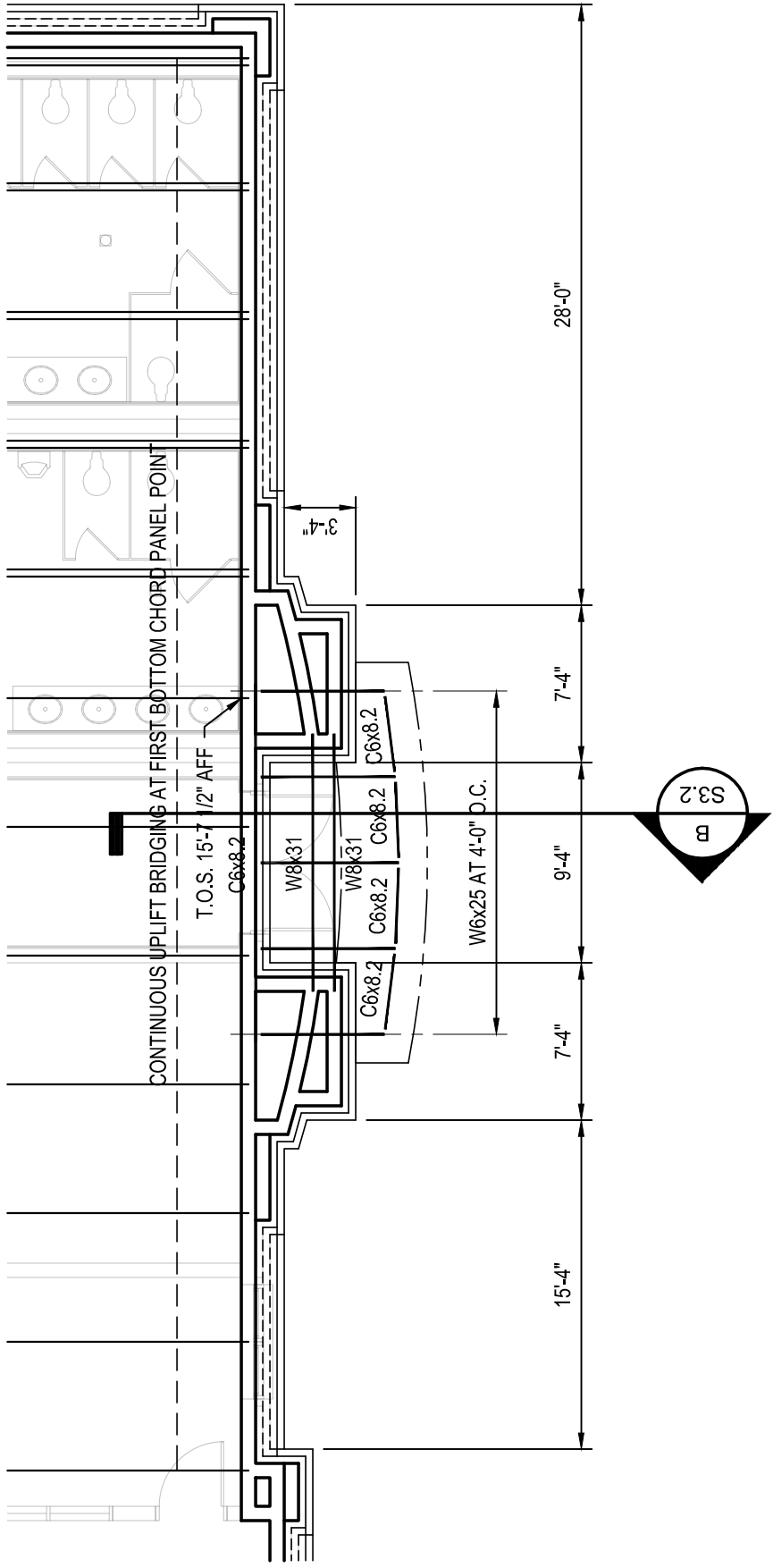
#### 3.2 INSTALLATION

- A. All fans shall be leveled and aligned before starting. All joints between fan sections and wall shall be sealed air tight.
- B. When used, gravity shutter counterbalance shall be adjusted to specifications.
- C. Drain pan discharge shall be combined and piped to floor drain outside housing.
- D. All filters and filter racks shall be aligned with the equipment and sealed to prevent any air loss.
- E. Filter gauges shall be installed per the manufacturer's instructions and shall be mounted so as to be read from the floor in front of the gauge.
- F. All doors shall be leveled and latches adjusted so as not to permit any air leakage.

3.3 FIELD START-UP

- A. The contractor shall be responsible for insuring that the unit manufacturer's field start-up instructions are adhered to. Each unit shall have instructions attached to it at time of shipment.

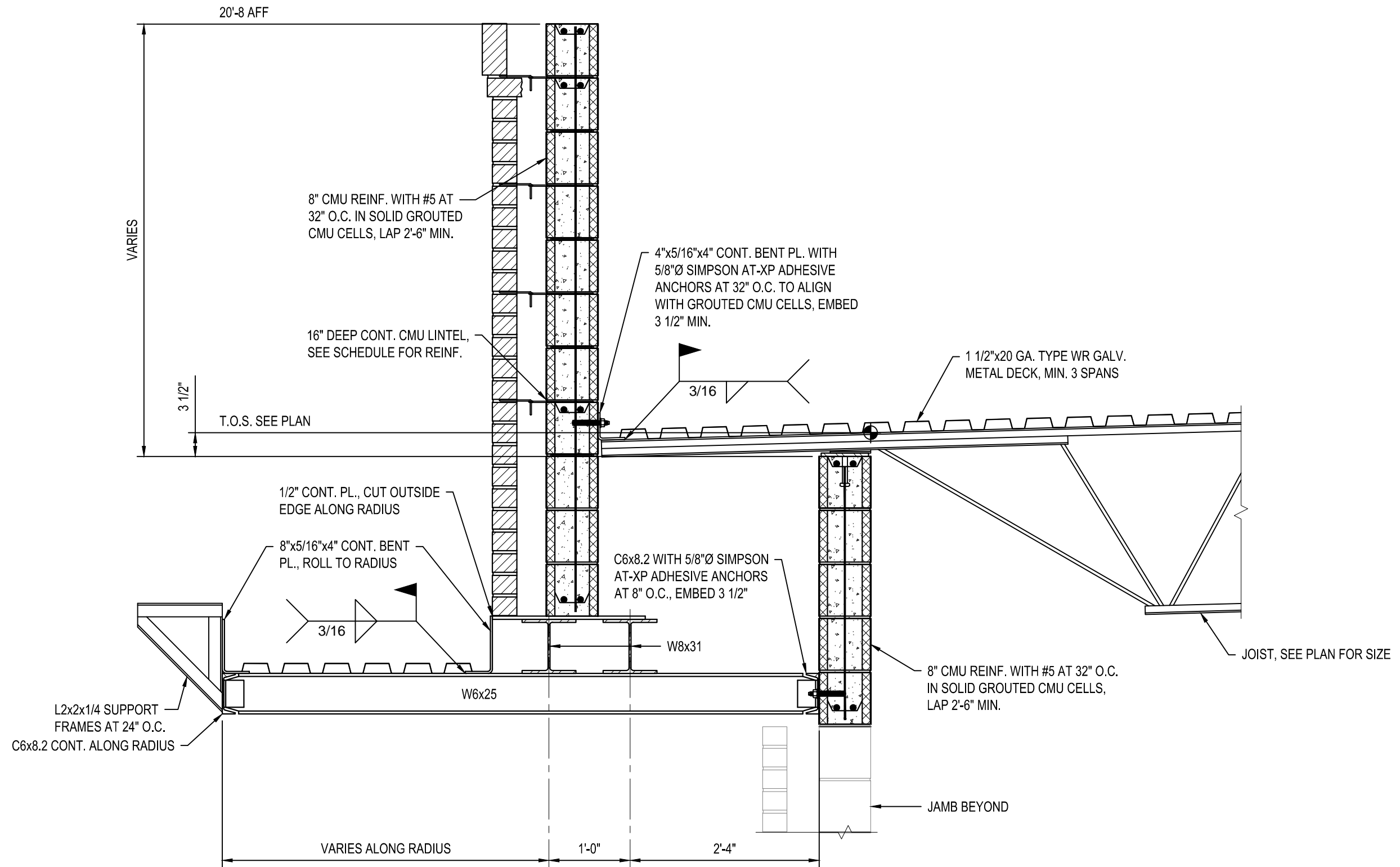
END OF SECTION 238223



**1**  
**S1.2**

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**ROOF FRAMING PLAN**  
 SCALE: 1/8"=1'-0"



B  
S3.2

SECTION

SCALE: 3/4" = 1'-0"