



**ADDENDUM #:** 1  
**DATE:** January 19, 2022

SW PROJECT #: 2021-04088

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**PROJECT:** Gray's Creek Elementary School HVAC & Window Replacement  
**OWNER:** Cumberland County Schools  
**CITY, STATE:** Hope Mills, NC

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This Addendum is hereby made a part of the Contract Documents to the same extent as if originally included therein. This Addendum must be acknowledged on the Form of Proposal and shall be placed with the Contract Documents.

Drawings and Project Manual dated December 23, 2021 for this project are hereby modified, corrected, or supplemented as follows:

### SPECIFICATIONS

1. Table of Contents  
Replace with updated copy
2. Division 00 - Bid Form  
Replace with updated copy
3. 012100 – Allowances  
Added section to clarify allowance requirement of \$15,000
4. 012300 – Alternates  
Added alternate for window manufacturer, West Window Corp
5. 088000 – Glazing  
Updated glass type S-1 to G-2
6. 238123 – Wall Mounted Packaged Air-Cooled Heating and Cooling Units  
Removed low ambient control option  
Provide 7 day programmable combination thermostat/humidistat with auto changeover and provide separate CO2 sensor

### DRAWINGS

1. Sheet A111  
Updated elevations
2. Sheet A112  
Updated elevations
3. Sheet H102  
Added electrical information for replacing RTU-1 and RTU-2  
Added HP-C17 for replacement
4. Sheet H400  
Revised Packaged Air-Cooled Unit Schedule  
Indicated Coil Size in HW Coil Schedule



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**Gray's Creek Elementary HVAC and Window Replacement**
**DIVISION 00 - GENERAL CONDITIONS**
**Title**


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- Invitation to Bid
- Instruction to Bidders
- Notice to Bidders
- MBE Instructions
- Guidelines for Recruitment and Selection of Minority Business for Participation in State Construction Contracts (Includes Appendix E – MBE Documentation for Contract Payments)
- Bid Form
- Bid Bond
- Performance and Payment Bonds
- Formal Construction Contract and General Conditions
- Daily Work Log
- Change Order
- Sales Tax Report
- Miscellaneous Specialty Items
- Davis-Bacon and Related Acts
- Davis-Bacon Act Poster
- Prevailing Wage Building Construction
- Certified Payroll

**DIVISION 01 - GENERAL REQUIREMENTS**
**Section**
**Title**


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011100	Summary of the Work
<b>012100</b>	<b>Allowances</b>
012300	Alternates
013100	Project Management and Coordination
015000	Temporary Facilities and Controls
017700	Project Closeout
019913	General Requirements
019916	Work in Existing Buildings
019926	Owner Instruction and Training

**DIVISION 08 - OPENINGS**
**Section**
**Title**


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084113	Aluminum-Framed Entrances and Storefronts-GC
088000	Glazing-GC

**DIVISION 12 - FURNISHINGS**
**Section**
**Title**


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122400	Horizontal Blinds-GC
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**Gray's Creek Elementary HVAC and Window Replacement**

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**DIVISION 23 – HVAC**

<b>Section</b>	<b>Title</b>
230210	HVAC Summary of Work
230510	HVAC Basic Requirements
230511	Electrical Provisions for HVAC Work
230517	Sleeves and Sleeve Seals for HVAC Piping
230521	HVAC Piping Specialties
230523	HVAC General-Duty Valves for Hydronic Piping
230529	Hangers and Supports for Piping, Ductwork and Equipment
230548	HVAC Vibration Control
230553	HVAC Painting and Identification
230555	HVAC Pipe Flushing, Testing and Cleaning
230557	HVAC Air Distribution System Cleaning
230593	HVAC Testing, Adjusting and Balancing
230596	HVAC Systems Commissioning
230719	HVAC Piping Insulation
230913	Instrumentation and Control Devices for HVAC
230923	Extension of Existing Direct Digital Control System for HVAC
230924	OEM Controls
231126	Liquefied Petroleum Gas Piping
232113	Above Ground Hydronic Piping
232123	Hydronic Pumps
234113	Particulate Air Filtration, Low Efficiency (MERV 6-8)
235100	Vents, Breechings, and Stacks
235240	Horizontal Fire Tube Boilers
235253	Steam Boiler Accessories
238120	Split System Heat Pump Units
238121	Packaged Air-Cooled Heating and Cooling Units
238123	Computer-Room Air Conditioners
238216	Air Coils

**END OF TABLE OF CONTENTS**

**BID FORM**

**Gray's Creek Elementary School HVAC and Window Replacement**

Cumberland County Board Of Education  
Fayetteville, NC

The undersigned, as Bidder, hereby declares that the only person or persons interested in this Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The Bidder further declares that he has examined the site of the Work and the Contract Documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed. The Bidder proposes and agrees if this Proposal is accepted to contract with Cumberland County Schools, Fayetteville, North Carolina, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the **Gray's Creek Elementary School HVAC and Window Replacement** in accordance with the plans, specifications, and contract documents to the full and entire satisfaction of Cumberland County Schools, Fayetteville, North Carolina with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the Contract Documents, for the sum of:

**Project: Gray's Creek Elementary School HVAC and Window Replacement**  
Installation and sales taxes are included.

**TOTAL Base Bid** \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$) \_\_\_\_\_)

**TOTAL Alternate No. 1 Bid** \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$) \_\_\_\_\_)

**TOTAL Alternate No. 2 Bid** \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$) \_\_\_\_\_)

**TOTAL Alternate No. 3 Bid** \_\_\_\_\_

\_\_\_\_\_ **Dollars (\$** \_\_\_\_\_ **)**

Minority Status *:	Form of Minority Certification**:
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\*Non-minority, Black, Hispanic, Asian/American, White Female, Socially and Economically Disadvantaged  
\*\*Not Applicable, Local Agency, Self-Identified, State of NC HUB, Federal Agency, State of NC DOT, Out of State Agency, Unknown (Note: In July 2009, businesses will be required to be certified through the State of NC HUB)

**BID FORM**

**Gray's Creek Elementary School HVAC and Window Replacement**  
Cumberland County Board Of Education  
Fayetteville, NC

The Bidder further proposes and agrees hereby to commence work under this contract and fully complete all work thereunder as specified in the Supplementary General Conditions. Applicable liquidated damages shall be stated in the Supplementary General Conditions.

Respectfully submitted this \_\_\_\_\_ day of \_\_\_\_\_, 2021.

\_\_\_\_\_  
*(Name of firm or corporation making bid)*

Witness: By: \_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_  
*(Proprietorship or Partnership)*

(Owner/Partner/Corp. President or Vice President only)

Address: \_\_\_\_\_

License No.: \_\_\_\_\_

Federal ID No.: \_\_\_\_\_

**(CORPORATE SEAL)**

ATTEST:

By: \_\_\_\_\_

Title: \_\_\_\_\_

*(Corp. Sec. or Ass't Sec. only)*

ADDENDA USED IN COMPUTING THIS BID

ADDENDUM NO. 1 \_\_\_\_\_





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**SECTION 012100 - ALLOWANCES**

**PART 1 - GENERAL**

**MISCELLANEOUS ALLOWANCE:**

- A. General: The General Contractor shall provide in the base bid a miscellaneous allowance. Contractor's profit and overhead shall be included in bid and is not included in this allowance. Unused portion of allowance will be returned to the Owner at the end of the job by change order (See Supplementary General Conditions). Note that this process included an additional 10% on any amount returned.
- B. Scope: To be used for miscellaneous items as directed by the Engineer on the Owner's behalf. Written approval on Cumberland County Schools Allowance Reduction Form is required prior to any allowance reduction.
- C. Amount of Allowance: \$15,000.

**END OF SECTION 012100**



**SECTION 012300 - ALTERNATES****PART 1 – GENERAL****RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to this section.

**SUMMARY**

This section includes administrative and procedural requirements for alternates.

**DEFINITION**

Alternate: An amount proposed by bidders and stated on the Form of Proposal for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

Alternates described in this Section are part of the Work only if enumerated in the Agreement. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

**PROCEDURES**

Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

Execute accepted alternates under the same conditions as other work of the Contract.

A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION****SCHEDULE OF ALTERNATES****Alternate No. 1: Glazing and Solar Protection**

1. Base Bid: Provide Basis of Design Insulated Glazing Product (GL-2) with Aluminum Horizontal Blinds installed at each window.
2. Alternate: Provide Basis of Design Obscured Glass (S-1) at each window location and no venetian blinds.

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Gray's Creek Elementary HVAC and Window Replacement

Alternates

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Alternate No. 2: Air Distribution Cleaning

1. Base Bid: No cleaning of existing ductwork required.
2. Alternate: Clean existing supply and return ductwork as indicated on the drawings:

Refer to specification section 230557 HVAC Air Distribution System Cleaning

**Alternate No. 3: Owner Preferred Brand Alternate**

***Indicate cost to provide and install preferred windows manufactured by West Window Corporation (WestCo) Commercial Aluminum Windows in lieu of other manufacturer's products.***

**END OF SECTION 012300**

## **SECTION 088000 – GLAZING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Glass for windows, doors, interior borrowed lites, storefront framing, glazed curtain walls.
2. Glazing sealants and accessories.
3. Miscellaneous glazing materials.

**B. Related Requirements:**

1. Section 084113 “Aluminum Framed Entrances and Storefronts” for storefront systems and metal infill panels (M-1)

#### **1.2 DEFINITIONS**

- A. Glass Manufacturers:** Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses:** Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC:** International Building Code.
- D. Interspace:** Space between lites of an insulating-glass unit.

#### **1.3 COORDINATION**

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.**

#### **1.4 PREINSTALLATION MEETINGS**

**A. Preinstallation Conference:** Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glazing; 12 inches square.
- C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer manufacturers of insulating-glass units with sputter-coated, low-E coatings glass testing agency and sealant testing agency.
- B. Product Certificates: For glass.
- C. Product Test Reports: For coated insulating glass and glazing sealants, for tests performed by a qualified testing agency.
  - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- A. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.
- B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

- D. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
  - 1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" "Section 084413 "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.

#### 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
  - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
  - 2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  - 3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
  - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

#### 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

#### 1.11 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- B. Basis-of-Design Product: Subject to compliance with requirements, provide Cardinal Industries LoE240 with Argon gas or a comparable product by one of the following:
  - a. PPG
  - b. Vitro
  - c. PRL
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
  - 1. Obtain tinted glass from single source from single manufacturer.
  - 2. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

### 2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
  - 1. Design Wind Pressures: Meet or exceed design wind pressure of existing windows.
  - 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
  - 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.



- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
  - 2. For laminated-glass lites, properties are based on products of construction indicated.
  - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  - 4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
  - 5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
  - 6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

### 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: "Glazing Manual."
  - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
  - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Ceramic-Coated Vision Glass: ASTM C 1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in GANA's "Engineering Standards Manual."
- E. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.

## 2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
  - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  - 2. Perimeter Spacer: Thermally broken aluminum.
  - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.
  - 4. Acoustic Performance: Where required, provide product tested according to ASTM E413-87 with a minimum 41 STC
  - 5. Provide Low-E and reflective coatings where indicated

## 2.6 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.
- B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. GE Construction Sealants; Momentive Performance Materials Inc.
  - b. Pecora Corporation.
  - c. The Dow Chemical Company.
  - d. Tremco Incorporated.

## 2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
  1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
  1. Elastomeric with Shore A durometer hardness of 85, plus or minus 5.
  2. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
  1. Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks:
  1. Elastomeric with Shore A durometer hardness per manufacturer's written instructions.
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product

manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
  - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  2. Presence and functioning of weep systems.
  3. Minimum required face and edge clearances.
  4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

#### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior, or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

#### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.

- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

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

### 3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.7 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.

- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

### 3.8 INSULATING GLASS SCHEDULE

- A. Glass Type G-1: Low-E-coated, clear insulating glass:
  - 1. Basis-of-Design Product: Cardinal Glass Industries LoE-240
  - 2. Overall Unit Thickness: 1 inch.
  - 3. Minimum Thickness of Each Glass Lite: 6 mm.
  - 4. Outdoor Lite: Fully tempered float glass.
  - 5. Interspace Content: Argon.
  - 6. Indoor Lite: Fully tempered float glass.
  - 7. Low-E Coating: Sputtered on second surface.
  - 8. Winter Nighttime U-Factor: 0.28 maximum.
  - 9. Summer Daytime U-Factor: 0.26 maximum.
  - 10. Visible Light Transmittance: 58 percent minimum.
  - 11. Solar Heat Gain Coefficient: 0.27 maximum.
  - 12. Safety glazing required.
- B. Glass Type ~~S-1~~G-2: Obscured Glass
  - 1. Basis-of-Design Product: PPG Graylite II + Solargray
  - 2. Overall Unit Thickness: 1 inch.
  - 3. Minimum Thickness of Outer Lite: 1/4".
  - 4. Outer Lite: Graylite II Fully tempered.
  - 5. Interspace Content: Argon.
  - 6. Inner Lite: Solarygray fully tempered tinted glass.
    - a. Minimum Thickness of Each Glass Ply: 1/8".
    - b. Interlayer Thickness: 0.060 inch.
  - 7. Low-E Coating: Sputtered on second surface
  - 8. Winter Nighttime U-Factor: 0.47 (hr x sqft x °F)
  - 9. Summer Daytime U-Factor: 0.50 (hr x sqft x °F)
  - 10. Visible Light Transmittance: 4 percent minimum.
  - 11. Solar Heat Gain Coefficient: .21 maximum
  - 12. Safety glazing required.

END OF SECTION 088000





**Gray’s Creek Elementary HVAC and Window Replacement  
Wall Mounted Packaged Air-Cooled Heating and Cooling Units**

**SECTION 238123 – WALL MOUNTED PACKAGED AIR-COOLED, HEATING AND COOLING UNITS**

**PART 1 - GENERAL**

**RELATED DOCUMENTS**

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

**Unit components shall meet the specific requirements of the following Specification sections:**

<b>Component</b>	<b>Section</b>
Electrical service	230511
Coils	238216
Filters	234113

**QUALITY ASSURANCE**

AHRI Compliance:

Testing and rating of packaged air-cooled heating and cooling units shall be in accordance with AHRI Standard 340/360 or AHRI Standard 210/240, as applicable.

Rate outdoor air-cooled unit sound power levels according to AHRI 270, *Sound Rating of Outdoor Unitary Equipment*, or AHRI 370, *Sound Rating Of Large Outdoor Refrigerating And Air-Conditioning Equipment*, as applicable.

ASHRAE Compliance: Refrigeration system construction of packaged units shall be in accordance with ASHRAE 15, *Safety Code for Mechanical Refrigeration*.

North Carolina Building Code Compliance: Packaged units shall meet or exceed the minimum efficiency rating required by the *North Carolina State Building Code: Energy Conservation Code* when tested, rated, and certified in accordance with AHRI 210/240 or 340/360, as applicable.

**Extended Warranty: The Contractor shall provide an extended parts and labor warranty on each refrigeration compressor in addition to guarantees and warranties required under the General Conditions to the Construction Contract.**

The *parts* portion of the warranty shall be directly from the manufacturer to the Owner.

The *labor* portion of the warranty shall also be provided directly from the manufacturer to the Owner.

Exception: Where a manufacturer labor warranty is not available, the Contractor shall provide a labor warranty directly to the Owner.

This warranty shall provide for repair or replacement of the covered compressor, **including removal and/or replacement of refrigerant**, that becomes inoperative as a result of defects in materials or workmanship within 4 years after the date ending the initial 1-year guarantee period for the Project.

Acoustic Criteria: HVAC equipment shall be selected and installed to comply with the acoustic criteria defined in Section 230510.

**Gray's Creek Elementary HVAC and Window Replacement****Wall Mounted Packaged Air-Cooled Heating and Cooling Units****SUBMITTALS**

General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this specification. Where a submitted item does not **comply fully** with each and every requirement of the Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying features of items are very specific. See Section 019913 for exact requirements.

Manufacturer's Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, required clearances, weights, furnished specialties and accessories, and installation and start-up instructions.

**PART 2 - PRODUCTS****1.0 GENERAL**

Furnish and install a self-contained, vertical, exterior wall mount, through-the-wall heat pump to be manufactured by Bard Manufacturing Company, Inc. The unit shall be approved and listed by Intertek ETL Listed (ETL US/C). Unit shall be factory assembled, pre-charged, pre-wired, tested and ready to operate. Unit performance shall be certified in accordance with the Air Conditioning Heating and Refrigeration Institute (AHRI) Standard 390-2003 for Single Package Vertical Units. Unit efficiency shall be specified by EER, IPLV and COP.

Manufacturers: Capacities shall be as indicated on drawings and units shall be manufactured by Bard Manufacturing Company, Inc. or prior approved equal.

**2.0 CONSTRUCTION FEATURES****2.1 CABINET**

Construction shall be a single, enclosed, weatherproof casing constructed of 20-gauge galvanized steel. Unit base is constructed of 16-gauge galvanized steel. Each exterior casing panel to be bonderized and finished with baked-on exterior polyester enamel paint prior to assembly. The baked-on cured paint finish shall pass the industry rub test with a minimum of 72 rubs MEK (Methyl Ethyl Ketone) or standard rub test of a minimum of 100 rubs using Toluene. Cooling section shall be fully insulated with 1-inch fiberglass to prevent sweating and to muffle sounds. Openings shall be provided for power connections. Access openings appropriate for outside structure to all fan motors and compressor for making repairs and for removing internal components without removing unit from its permanent installation. A separate service door provides access for changing filters. Fresh air intake and outdoor coil shall be protected from intrusions by a sturdy metal grating with less than 1/4 inch openings.

Color shall be the following:

Buckeye Gray

**2.2 DRAIN PAN**

Drain pan shall be constructed of 20-gauge galvanized steel, bonderized and finished with baked-on exterior polyester enamel paint.

**2.3 INSULATION**

Portions of the unit that come in contact with the indoor air stream shall be insulated with high density 1 inch fiberglass, foil faced insulation.

**2.4 MOUNTING BRACKETS**

Full-length side mounting brackets shall be an integral part of the cabinet. Bottom mounting bracket shall be provided

**2.5 REFRIGERATION SYSTEM**

~~All models shall use a high efficiency 2 stage scroll compressor with step capacity providing 2 stages of control in cooling and heating. Single stage heating capacity via the compressor is not acceptable. Compressor shall be designed with R-410A non-ozone depleting refrigerant in compliance with Montreal Protocol 2010 EPA requirements. The compressor shall be covered by a 5-year parts warranty. The refrigeration circuit shall be equipped with factory installed high and low pressure controls, and liquid line filter dryer. The refrigeration control shall be factory installed.~~

**Gray's Creek Elementary HVAC and Window Replacement****Wall Mounted Packaged Air-Cooled Heating and Cooling Units**

1 Compressor shall be attached to a double isolated floating mounting system and include a sound blanket and  
2 discharge muffler.

3  
4 *All models shall use a high efficiency hermetic scroll compressor. The compressor shall be covered by a 5-*  
5 *year parts warranty. The refrigeration circuit shall be equipped with factory installed high and low pressure*  
6 *controls, suction and liquid access valves, compressor control module and liquid line filter dryer. A*  
7 *refrigerant metering device is included. Compressor shall be mounted on rubber grommets. Unit shall be*  
8 *provided with R-410A (HFC) non-ozone depleting refrigerant.*

**2.6 CONDENSER FAN MOTOR**

10 The condenser fan, motor and shroud shall be of slide out configuration for easy access.

**2.7 INDOOR BLOWER MOTOR**

12  
13  
14 The indoor blower motor shall be high efficiency ECM motor. It shall include soft start and shall be self-adjusting to  
15 provide proper airflow at varying static pressure. Blower wheels shall be curve blades.

**2.8 ELECTRICAL COMPONENTS**

16  
17  
18 Electrical components are easily accessible for routine inspection and maintenance through front service panels.  
19 Circuit breaker is standard on all 208/230-volt models and rotary disconnect standard on all 460-volt models. Circuit  
20 breaker/rotary disconnect access is through lockable access panel. Phase rotation monitors shall be installed on all  
21 3-phase units to prevent reverse rotation.

**2.9 CONTROL CIRCUIT**

22  
23  
24 The internal control circuit shall consist of a current limiting 24VAC type 50VA transformer (75VA on hot-gas reheat  
25 dehumidification models---See 6.0). The defrost circuit shall consist of a solid-state electronic heat pump control. A  
26 30-minute timer shall inflate a defrost cycle if the outdoor coil temperature indicates the possibility of an iced  
27 condition. The thermistor sensor, speed-up terminal for service, and a ten-minute defrost override shall be standard  
28 on the electronic heat pump control. To prevent rapid compressor short cycling, a five-minute time delay circuit shall  
29 be factory installed. A low-pressure bypass shall be factory installed to prevent nuisance tripping during low  
30 temperature start-up.

31  
32 Phase rotation protection and phase failure protection shall be standard factory installed features on all equipment  
33 with three-phase power. If unit is wired incorrectly phase monitor will lock out compressor operation and red warning  
34 light shall energize. Once power wiring is corrected at field power wiring location, a green light will energize on phase  
35 monitor. If a phase of power is lost, the phase monitor will also lock out

**3.0 HEAT OPTIONS****3.1 Electric Heat**

36  
37  
38  
39 The heat pump shall have a factory installed electric resistance heater available that is designed specifically for  
40 application in the T Series heat pump. Heater shall include automatic limit safety controls.

**4.0 VENTILATION OPTIONS****4.1 ENERGY RECOVERY VENTILATOR**

41  
42  
43  
44  
45 The Energy Recovery Ventilator (ERV) shall consist of rotary wheels in an insulated cassette frame with seals, drive  
46 motor and belt. The ERV assembly shall also include intake and exhaust blowers. The entire assembly shall easily  
47 slide in or out of the ventilation section, allowing for maintenance or replacement. The total energy wheel shall be  
48 coated with silica gel desiccant, permanently bonded without the use of binders or adhesives. The coated segments  
49 shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve or deliquesce in the  
50 presence of water or high humidity. All diameter and perimeter seals shall be provided as part of the cassette  
51 assembly and shall be factory set. Drive belts shall not require external tensioners or adjustment. Cassette wheels  
52 shall include rims to prevent belts from slipping off wheels. Intake and exhaust blowers shall have selections of high,  
53 medium or low speed and selected independently, to allow for positive pressurization if desired. The ERV cassette  
54 including parts and media shall include 5year warranty subject to terms and conditions of Bard's warranty.

55  
56  
57 The ERV thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84,  
58 Method of Testing Air-to Air Heat Exchangers and ARI Standard 1060, Rating for Air-to-Air Energy Recovery  
59 Ventilation Equipment Cassettes, and shall be listed in the ARI Certified Products. Unit complies with ANSI/ASHRAE  
60 Standard 62.1 Ventilation for Acceptable Air Quality.

**Gray's Creek Elementary HVAC and Window Replacement****Wall Mounted Packaged Air-Cooled Heating and Cooling Units****5.0 FILTER OPTIONS**

5.1 Provide 2" Fiberglass – Pleated – MERV 8

**HOT GAS REHEAT**

6.1 The dehumidification circuit incorporates an independent heat exchanger coil in the supply air stream in addition to the standard evaporator coil. This coil reheats the supply air after it passes over the cooling coil, and is sized to nominally match the sensible cooling capacity of the evaporator coil. Extended run times in dehumidification mode can be achieved using waste heat from the refrigeration cycle to achieve the reheat process, while at the same time large amounts of moisture can be extracted from the passing air stream. Models that also have electric heaters installed have the electric heat inhibited during dehumidification mode, although it remains available for additional reheat during certain conditions. The dehumidification cycle shall be energized by a rise in relative humidity above set point. The unit shall energize in the cooling mode and also a two position valve will energize, allowing hot refrigerant gas to pass thru the reheat coil, reheating the cold air leaving the evaporator coil. The dehumidification cycle shall have on/off capability. If the thermostat calls for cooling or heating during the dehumidification cycle, the unit shall drop out of dehumidification to satisfy the call from the thermostat. A solid state circuit board shall control the dehumidification function. The dehumidification option shall be factory installed.

**7.0 UNIT CONTROL OPTIONS**

~~7.1 Low ambient control for cooling operation to 0 degrees~~

7.2 Outdoor thermostat except on dehum equipped models

**8.0 OPERATING CONTROLS (Field Installed)**

8.1 Electronic **7 day** programmable, **combination thermostat/humidistat with auto changeover**, ~~with humidity monitoring and optional: Provide separate CO2 sensor~~

~~1. Humidity control on dehum models only~~

~~2. Remote temperature sensor~~

~~3. Remote outdoor thermostat~~

~~8.2 CO2 Control for CRV or ERV ventilation operation~~

**9.0 INSTALLATION**

9.1 Installation shall be done in strict adherence to Bard's Installation Instructions.

**ELECTRICAL CONNECTION**

General: The unit shall be provided with single-point power connection, factory-wired to the power connection lug set. Electrical connection work shall be in accordance with Section 230511.

Equipment Servicing Receptacles: The Contractor shall provide integral, factory-mounted and wired 120 Volt Ground Fault Circuit Interrupter (GFI) receptacle with outdoor enclosure with each unit.

**PART 3 - EXECUTION****INSTALLATION**

Install units where indicated, in accordance with equipment manufacturer's published installation instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes. Arrange installation to provide access space around units for service and maintenance.

Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. Install piping adjacent to unit to allow for required access for service and maintenance.

Do not operate unit fans until filters are in place. Install new filters in units prior to final acceptance.

Touch-up factory exterior paint as required to repair scratches or other damage.

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Gray's Creek Elementary HVAC and Window Replacement

Wall Mounted Packaged Air-Cooled Heating and Cooling Units

1 **OWNER INSTRUCTION AND TRAINING**

2

3 Provide Owner instruction and training in accordance with Section 019926.

4

5

6 **END OF SECTION 238121**

