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February 22, 2023

# BID ADDENDUM No. 2

Re: Phase 1A – Bond Improvements
Bedford Central School District

SED No. 66-01-02-06-0-003-021 (FLHS)

SED No. 66-01-02-06-0-007-011(FLMS)

SED No. 66-01-02-06-0-006-015 (MKES) SED No. 66-01-02-06-0-002-016 (BVES)

SED No. 66-01-02-06-0-004-020 (BHES)

SED No. 66-01-02-06-0-009-014 (WPES)

SED No. 66-01-02-06-0-001-016 (PRES)

BBS File No 22-225A-G

This addendum contains changes to the requirements of the contract drawings and/or project manual. Such changes shall be incorporated into the contract documents and shall apply to the work with the same meaning and force as if they had been included in the original documents. Wherever this addendum modifies a portion of a paragraph of project manual or any portion of the drawing, the remainder of the paragraph or drawing affected shall remain in force.

The conditions of the basic project manual shall govern all work described in this addendum. Wherever the conditions of work and the quality or quantity of materials or workmanship are not fully described in this addendum, the conditions of work, etc. included in the basic project manual for similar items of work shall apply to the work described in this addendum.

The "Conditions of the Contract" apply to all work described in this addendum.

The following changes shall be and are hereby made:

Note: The Prebid Walkthrough Attendance Sheet is included in this addendum for reference.

## PROJECT MANUAL MODIFICATIONS

- 1. Section 01 33 00 Electronic Submittal Procedures 1.6A.1 Revise the priority submittals to the following:
  - 1. FRP Doors & Hardware
  - 2. Aluminum and Glass (Windows & Interior vestibules)
  - 3. HVAC Units
  - 4. Light Fixtures & Switchgear
  - 5. Interior Doors & Hardware
  - 6. Transaction Windows
  - 7. Fire Shutters
  - 8. Bedford Hills Stone Flagging
  - 9. Structural Steel & Rebar
  - 10. All other submittals critical to schedule

## 2. 111480 - Athletic Equipment

The attached specification shall be added to the bid documents.

#### 3. 15250 - MECHANICAL INSULATION

a. The attached specification shall be added to the bid documents.

#### CONSTRUCTION DRAWING MODIFICATIONS

#### FOX LANE MIDDLE SCHOOL

## **ELECTRICAL**

## 1. <u>Drawing E4.01 ELECTRICAL DETAILS</u>

a. Construction Drawing is hereby deleted and replaced with the attached drawing.

## MOUNT KISCO ELEMENTARY SCHOOL

# **ARCHITECTURAL**

# 1. Drawing A2.01 PROPOSED PLANS, ELEVATIONS AND DETAILS

a. Construction Drawing is hereby deleted and replaced with the attached drawing.

# BEDFORD HILLS ELEMENTARY SCHOOL

## **ARCHITECTURAL**

# 1. <u>Drawing A1.01 DEMOLITION PLANS AND SECTIONS</u>

a. Construction Drawing is hereby deleted and replaced with the attached drawing.

## 2. Drawing A2.01 SECUIRTY VESTIBULE ENLARGED FLOOR PLANS

a. Construction Drawing is hereby deleted and replaced with the attached drawing.

# 3. Drawing A4.01 BUILDING ELEVATIONS SECTIONS AND DETAILS

a. Construction Drawing is hereby deleted and replaced with the attached drawing.

# 4. <u>Drawing A6.01 WALL SECTIONS AND DETAILS</u>

a. Construction Drawing is hereby deleted and replaced with the attached drawing.

## **BIDDER RFI'S**

# 1. Question:

Per contract documents of submission of bid: They are requesting hold harmless agreement. There isn't an agreement in the spec.

BBS Response: Hold Harmless Agreement is not required for submission of bids.

#### 2. Question:

Please advise if a grate is required for precast trench drain at window well, A2.02 MKES.

BBS Response: At existing steps provide grate for precast trench drain 8' minimum each side. Paint.

## 3. Question:

Please clarify the difference between CPT1 and CPT2 at BHES. Floor type chart only lists CPT1, a tile product. In the specifications, first carpet listed is a broadloom product.

BBS Response: Refer to revised drawing.

## 4. Question:

Please provide specifications for new fixed basketball hoops in shelter, A10.01 FLMS.

BBS Response: Refer to attached specification included in this addendum.

# 5. Question:

Drawing A1.01 MKES, section 3 notes existing drywall ceiling and VCT floor to remain and protect. Drawing A2.01 MKES, section 1 and 3 shows new ACT drop ceiling and LVT/VCT/T1 floor finishes. Please confirm existing ceiling and walls remain and new finishes installed over existing.

BBS Response: Refer to revised drawing.

# 6. Question:

Please provide details for new concrete walk on A2.01 MKES, section 2.

BBS Response: Concrete walk shall be omitted. Refer to revised drawing in this addendum.

## 7. Question:

Drawing A2.01 MKES, section 6 Elevation 1-c shows new window, this is not on the schedule. Please confirm frame is HM and 20 min fire rated

BBS Response: Refer to revised drawing.

# 8. Question:

Please confirm new linear grilles in existing casework are one (1) piece entire length of casework or several pieces. Please provide sizes including height of new grille. Drawing reference A2.02 MKES, detail 4.

**BBS Response:** Countertop removal and preservation for reinstallation of countertop existing grille by G.C. Survey of cabinet base by G.C. prior to start for Architect review. Note: Reinstall countertop grille and survey cabinets only in rooms to receive new floor leveler.

## 9. Question:

BHES drawing A1.01 plan view 2 shows to remove stone down to subbase at lower step level; drawing A2.01 does not show anything new going back. Please clarify.

**BBS Response:** Refer to revised drawing.

## 10. Question:

FLMS -\_A0.01 & 02 Please provide explanation of door note "Required El"

BBS Response: This is Egress Inches for code compliance. Shown for permitting purposes only.

#### 11. Question:

MKES -\_A2.01 Please provide drawings, sections, details and specifications for new concrete walk

BBS Response: Concrete walk at Mt. Kisco shown on A2.01 shall be omitted from bid.

## 12. Question:

BHES -\_A2.01 Please provide drawings, sections, details and specifications for new concrete decking and stairs. A2.01 Please provide drawings, sections, sections and specifications for new handrails.

BBS Response: Refer to revised drawing included in this addendum.

#### 13. Question:

DwgE0.02FLHSkeyed notes ED01 & ED03. Please provide exact conduit & cable requirements. Information given in notes is in adequate to produce an estimate.

**BBS Response:** Refer to drawing E0-03 for conduit and wire sizes. Existing feed from ADMIN building is to be removed and replaced with new. Conduit and wire sizes from Maintenance building are provided in drawing E0-03.

## 14. Question:

Dwg E0.03 FLHS keyed note E-01. What is size of existing conduit & cable to be spliced.

**BBS Response:** Conduit and wire size indicated to be "2-1/2" SCHEDULE 40 PVC CONDUIT with (4)#3/0, #2G." on drawing. Refer to note on "UE" near Maintenance building.

## 15. Question:

Dwg E0.03 FLHX and E0.04 FLHS. Please advise dimensions for all site handholes. Are quazite polymer concrete handhole acceptable?

**BBS Response:** Note E09 states to size hand holes per NEC 314.28. Yes, handholes may be quazite polymer concrete handholes.

# 16. Question:

 $\label{lem:posterior} DwgE0.03 FLHS keyntoe E08. Please provide a part number for the sportfield specialty combo box that is to be used as a bases of design.$ 

**BBS Response:** Part number shall be Sportsfield Specialties Combox/Communication box - CBTS1830.

# 17. Question:

Dwg E0.04 What is scope of work for the pump house panel?

BBS Response: Pump house panel to provide power to new receptacles as indicated.

END of Addendum #2

 $\rat{DDS}$  Architects, Landscape Architects and Engineers, P.C.

# BBS ARCHITECTS LANDSCAPE ARCHITECTS ENGINEERS

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Project Name: Bedford Phase 1A Bond Improvements	Date: _2/14/23
Meeting Location: Fox Lane HS	Time: _3:30pm
BBS File No.: 22-225	Meeting No.:

Name (Please Print)	Representing	Email/Contact
GREG OCOMMOR	BBS ARCHITECTS	o comor @ 665 AncH. Com
Dave Stack	ACL Bight Electric	DETRE LE DECENTRATE LE COM
JO LUN GODSELL	PIAREA	GOOP SELL @ PLACE A MOOTHERS.
Juha Makelginen	Vinco Builders	adicobe Viveo Builders
STU GORDON	BBS ARCHITECTS	gordone bbsard.com
John P. Jackson	ACLI	0
Uncont Fuois	GBCE	estimating egalarion
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STEVE MENDIZOUNN	PIEROTTI CORP.	STEVEMOPIEROTTICORP.COM
ANDREW SOKOLIK	EMPIRE	AND CEMPIREWIN DOOR

# DIVISION 11 - EQUIPMENT

# SECTION 11480 - ATHLETIC EQUIPMENT

#### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes:
  - 1. Fixed Basketball backstops and accessories.

#### 1.02 SUBMITTALS

- A. Submit in accordance with Section 01330 Submittal Procedures.
  - 1. List of proposed products and product data.
  - 2. Shop drawings showing layout, elevations, dimensions, fabrication details, method of attachment, loads to be transmitted to building structural members, requirements for supplementary bracing or structural support members and electrical wiring diagrams.
  - 3. Manufacturer must provide calculations and reports for tests preformed by an independent testing laboratory accredited by the American Association of Laboratory Accreditation (A2LA) that clearly demonstrate compliance with minimum safety factors included in product specifications.
  - 4. Samples of fabric for selection by Architect.
  - 5. Manufacturer's installation and maintenance instructions.

# 1.03 QUALITY ASSURANCE

- A. Source limitation: All components including suspension system, frame assembly, backboards, goals, electric winches, and controls for backstops shell be of a single manufacturer.
- B. All welding to be performed by personnel having passed Welder Qualification testing in accordance with American Welding Society (AWS) code D1.1 or higher. Manufacturer to provide certification and test results upon request.

## 1.04 DELIVERY, STORAGE, AND HANDLING

A. Provide volleyball floor sleeves, covers and floor inserts in accordance with requirements of related trades that are responsible for installation. Do not deliver balance of athletic equipment until building is enclosed and other construction within gymnasium is substantially complete.

## 1.05 WARRANTY

A. All Basketball Backstop support structures including clamps, fittings and tube to have a minimum warranty of 25 years from date of substantial installation. Warranty for other items to be as indicated in product specifications.

## PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- Porter Athletic. 601 Mercury Drive Champaign, IL 61822 phone 217-367-8438 (Basis of Design)
- Draper, Inc.
- Or architect approved equal.
- A. Manufacturers of equivalent products submitted and approved in accordance with Section 01630 Product Substitution Procedures.

## 2.02 BASKETBALL BACKSTOPS

- A. Middle School Outdoor Shelter
  - 1. Type:
    - a. Basketball backstop shall be the DRAPER EZ FOLD Model TF-20, ceiling-suspended, forward folding by Draper, Inc. of Spiceland, IN.
    - Backstop shall be a welded together main frame b. constructed from steel mechanical tubing to form a rigid tetrahedral "T" design of back-to-back right triangles. The main stem shall be 6" OD 11-ga. steel tubing, the top of the "T" shall be 4" OD 11-ga. steel tubing and the side braces shall be 2-1/4" OD 14-ga. steel tubing. Side braces shall join stem no higher than 4'6" above goal (18" above top of backboard). The main stem shall be long enough to allow ±6" height adjustment of either fan or rectangular banks. The folding front brace shall be jackknife type, fully adjustable, self-locking in the down position and constructed of 2-1/2" OD 13-ga. (outer) steel tubing and 2-1/4" OD 14-ga. (inner) steel tubing.
    - c. Pivot or hinge joint for folding of backstop shall not exceed 15" from roof structure except when required by architectural conditions for coordination with other trades or equipment. Pivot or hinge point to be designed in a manner to provide a minimum structural capacity of 25,000 Lbs. and a safety factor of 55:1. The main backstop frame shall pivot on 1-1/4" minimum solid steel shaft secured in a milled bearing hole in 1/2" minimum steel plate hangers to insure accurate positioning of bank.
    - d. Bank attached to the 6" OD main stem by heavy-duty bank hangers. Hangers constructed of 1" x 2" 11-ga.

steel tubing and formed 1/4" steel plate with slotted holes for lateral adjustment. All banks shall have one upper bank hanger and include a goal brace, which attaches directly to the goal mounting plate and directly to the 6" main stem of the backstop to eliminate any strain on the bank and help prevent glass breakage. This direct mount feature shall conform to NCAA recommendation No. 5-F.

- e. Backstop shall be supported from 4" OD 11-ga. steel mechanical tubing anchored to roof structure by means of heavy steel support hangers. Attachment to building structure to be with clamps capable of supporting a minimum of 20,000 lbs. each.

  Superstructure shall be designed with a minimum of four attachment clamps to produce a combined minimum attachment point safety factor of 75 to 1 and manufacture must be able to present independent testing data to substantiate safety factor.

  Superstructure tubes shall be reinforced with bridging and/or bracing when truss centers exceed 10'0".
- f. Backstop shall be provided with custom powder coat finish as selected from manufacturers standard offering of a minimum of 25 colors.

#### 3. Bank:

- a. Backboard shall be the DRAPER Model 503136 rectangular glass backboard by Draper, Inc. of Spiceland, IN.
- b. Backboard shall be 3'6" x 6'0" to meet all NCAA, NFHSA and professional requirements. Backboard frame of a heavy, brushed aluminum extrusion for maximum durability. Extended frame section of high tensile aluminum (6063-T5). Ends of the frame extrusions mitered and fitted with a flush, plated steel gusset type mounting bracket on all four corners, incorporating keyhole slots for mounting the backboard to the support structure at standard mounting centers.
- c. Goal mounting structure of a heavy, formed steel assembly, secured to the lower horizontal frame member to minimize stress on the glass section. Special steel sleeves at the goal mounting hole locations to secure rear structure to front mounting plate, forming a unitized assembly to minimize shock to the glass. Entire frame including goal-mounting structure fitted with a shock absorbing neoprene material to cushion and protect the glass section.
- d. 1/2" thick, fully tempered glass section with uniform load and impact strength. Official white border and

- target area is permanently fired into front side of glass section so that it cannot wear away.
- e. Goal mount structure provided with two holes (7/16") and two studs (3/8"-16) to secure backboard and goal to a direct mount "goal brace" feature which relieves all stress and shock on the backboard conforming to the latest NCAA Rules (BR-73, D-5). Goal mounting holes (4) to be standard 5" (horizontal) x 4" (vertical) mounting centers.
- f. Backboard shall be covered by a Lifetime Limited Warranty when installed on a Draper EZ Fold basketball backstop with Goal Brace or Direct Mount Height Adjuster.

## 4. Backboard Safety Padding:

- a. Backboard Edge Padding shall be the DRAPER Model 5032XX bolt-on backboard safety padding by Draper, Inc., Spiceland, IN.
- b. Molding process produces a super tough "skin" on the outside of the foam padding for long life. Pre-molded square corners for improved player safety. Molded-in steel track and bolt-on attachment system eliminate frustrating re-gluing or taping. Meets or exceeds all NCAA and High School Federation specifications. NCAA approved gray color. (Also available: Royal Blue, Scarlet, Navy, Columbia Blue, Kelly Green, Gold, Forest Green, Orange, Purple, Black, and Maroon.) 5-year warranty when installed indoors.

# 5. Goal:

- a. Goal shall be the DRAPER Model 503040 180° tube-tie breakaway goal by Draper, Inc. of Spiceland, IN.
- b. Goal is designed to withstand shock loads due to a player slam dunking and/or hanging on the rim. The rim shall deflect down when a static load of 230 pounds is applied from front, sides or anywhere between. The rim assembly floats on chromium ball bearings for smooth any direction flexibility. The rim will return to the playing position once the load is removed. The function of the breakaway goal shall meet NCAA specifications, which state: "A movable basket ring shall have rebound characteristics identical to those of a non-movable ring." Goal shall be set at factory for proper flex and rebound requirements. This goal features Draper's easyadjust system, which allows the end-user to adjust the breakaway point to conform to latest NCAA recommendations.
- c. Goal features tube-tie net attachment, which consists of a series of small tubes welded below the rim and a

1/8" nylon cord which passes through the tubes, catching the net loops between the tubes. The tubetie provides superior strength and a smooth attachment system for maximum player safety. Rim shall be fabricated from a 5/8" diameter steel rod formed into an 18" inside diameter ring. Inside of ring shall be positioned 6" from the face of backboard by a heavy-duty mounting plate with mounting holes centered to match 5" x 5" or 5" x 4" backboard mounting holes. Goal will mount on standard glass, fiberglass, and wood banks.

d. Rim shall be rigidly braced by means of die cut steel braces formed and welded to underside of rim for maximum support. Goal shall be powder coated in an official durable orange powder coat. Goal shall be furnished with zinc plated mounting hardware. Goal provided with white nylon Anti-Whip Net. The top half of the anti-whip net is made of durable fibers encased in tough 100% nylon, preventing the net from whipping up on the rim. The lower half is all nylon. Goal to have seven-year limited warranty

## PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Coordinate support of basketball backstops with roof structure to ensure proper distribution of loads and adequacy of attachment points. Ensure that building structure has been designed for loads of specific gymnasium divider to be provided. Provide additional structural framing members as required in accordance with Section [\_\_\_\_] [\_\_\_\_]. Coordinate configuration, size, and installation of basketball backstops and gymnasium divider curtains with height, slope, and type of building structure and lighting fixtures, mechanical equipment, ductwork, fire-suppression system, bleachers, athletic equipment, and other potential obstructions.
- B. Field-verify dimensions prior to fabrication.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and shop drawings.
- B. Install even, plumb and level.
- C. Install control switch such that operator has view of complete basketball backstop during lowering and raising.
- D. Adjust limit switches of electric winch to ensure accurate position in both stored and lowered positions.

# 3.03 TESTING AND DEMONSTRATION

A. Demonstrate to Owner's designated representatives complete operation and required maintenance.

#### END OF SECTION

## DIVISION 15 - MECHANICAL

# SECTION 15250 - MECHANICAL INSULATION

PART 1 - GENERAL

## 1.01 WORK INCLUDED

- A. Duct Insulation.
- B. Pipe Insulation.
- C. Equipment and Specialties Insulation.
- D. Acoustical Wrap.

#### 1.02 RELATED WORK

- A. Division 15 Mechanical, General
- B. Division 15 Hangers and Supports
- C. Division 15 Sleeves and Seals
- D. Division 15 - Pumps
- E. Division 15 - Refrigerant Piping System
- F. Division 15 - Ductwork.

#### 1.03 DEFINITIONS

- A. R: Thermal resistance of insulation, in units of hr-sf-deg F/Btu.
- B. Run-out: Piping not more than 12 feet long that runs to an individual unit.
- C. Subject to Damage: Items installed exposed less than 8 feet above the walking surface (i.e., floor platform, roof, grade, etc.) adjacent to the item.

## 1.04 QUALITY ASSURANCE

A. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E 84, NFPA 255, and UL 723.

## 1.05 SUBMITTALS

- A. All submittals shall comply with Section 15010.
- B. Provide product data on all insulation materials to be used. Indicate thickness to be used.

# 1.06 GENERAL REQUIREMENTS

A. Code Compliance: Contractor shall insulate all systems with the materials and thicknesses as required by code, but in no case

Mechanical Insulation 15250 - 1

shall the insulation be less than that specified herein. In some cases the specified insulation exceeds code, and shall be provided as specified. Not all systems requiring insulation by code are specified but shall be provided with insulation where required by code.

- B. Insulation at Hangers: Insulation shall be continuous through hangers on all insulated systems (except ductwork). Inserts at hangers are specified in Section 15090 and are considered as part of the hanger and support system. Inserts are required to be installed at the time of pipe installation and are intended to be installed by the Contractor installing the pipe hanger/supports. See Section 15090.
- C. All adhesives, sealants, mastics and similar materials shall be low-VOC type and comply with Section 15010 low-VOC requirements.

#### 1.07 REFERENCES

- A. ASTM A 653: Standard Specification For Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- B. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM C 547: Standard Specification for Mineral Fiber Pipe Insulation.
- D. ASTM C 1136: Standard Specifications for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- E. ASTM C 1290: Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
- F. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- G. NCIIS: National Commercial & Industrial Insulation Standards, published by Midwest Insulation Contractors Association,  $5^{\rm th}$  Edition.
- H. NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials.
- I. UL 723: Tests For Surface Burning of Building Materials.

## PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 15010.
- B. Insulation: Johns Manville, Armacell, Owens-Corning, Knauf, Pittsburgh Corning, GLT, Halstead, Thermal Pipe Systems.

- C. Accessories: Johns Manville, Armacell, Owens-Corning, Knauf, Pittsburgh Corning, GLT, Halstead, Duro Dyne, Gustin Bacon, Childers, RPR, Tee Cee, JPS, Buckaroos.
- D. Acoustical Wrap: Kinetics Noise Control.
- E. Fire Protection Duct Wrap: 3M.

#### 2.02 DUCT INSULATION

- A. Flexible Glass Fiber:
- B. Material: Inorganic glass fibers, bonded with a thermosetting resin.
- C. Jacket: All-purpose, factory-applied, laminated glass-fiberreinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.
- D. Board: ASTM C 612, Class 2, semi-rigid jacketed board.
  - Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
  - 2. Density: 3 pcf average maximum.
- E. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets. (maximum 25% compression installed)
  - 1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
- F. Adhesive: Produced under the UL Classification and follow-up service.
  - 1. Type: Non-flammable, water-based.
  - Service Temperature Range: Minus 20 to 180 deg F (Minus 29 to 82 deg C).
- G. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

# 2.03 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd.
  - 1. Tape Width: 4 inches

- 2. Cloth Standard: MIL-C-20079H, Type I.
- 3. Tape Standard: MIL-C-20079H, Type II.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
  - 1. Stainless Steel: Type 304, 0.020 inch thick.
  - 2. Aluminum: 0.0070 inch thick.
- C. Wire: 14-gauge nickel copper alloy, 16-gauge, soft-annealed stainless steel, or 16-gauge, soft annealed galvanized steel.
- D. Corner Angles: 28-gauge (0.3 mm), 1 inch by 1 inch (25 mm by 25 mm) aluminum, adhered to 2 inches by 2 inches (51 mm by 51 mm) kraft paper.
- E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

# 2.04 SEALING COMPOUNDS

- A. Vapor Barrier Compound: Water-based, fire-resistive composition.
  - 1. Water Vapor Permeance: 0.08 perm maximum.
  - 2. Temperature Range: Minus 20 to 180 deg F.
- B. Weatherproof Sealant: Flexible-elastomer-based, vaporbarrier sealant designed to seal metal joints.
  - 1. Water Vapor Permeance: 0.02 perm maximum.
  - 2. Temperature Range: Minus 50 to 250 deg F.
  - 3. Cooler: Aluminum.
- C. Duct Insulation installed R values:
  - 1. General: Provide insulation densities and thicknesses to achieve the following R values. R values are for the insulation only, in their installed thickness, considering installed duct wrap stretch and in accordance with code.
  - 2. Lining: Where ducts have internal lining, the insulating properties of the lining may be credited toward meeting the required insulation R value.
  - 3. Supply Air Ductwork:
    - a. Inside Building and within conditioned space: No insulation required.

- b. Inside Building but not within conditioned space: R-6.
- 4. Return Air Ductwork:
  - a. Inside Building and within conditioned space: No insulation required.
  - b. Inside Building but not within conditioned space: R-6.
- 5. Outside Air Ductwork: Same insulation for ducts within conditioned space: R-8.
- 6. Exhaust and Relief Ductwork:
  - a. Inside Building and within conditioned space: No insulation required except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated with R-8 insulation.
  - Inside Building but Not within conditioned space: R-6.

#### 2.05 PIPE INSULATION

#### A. Glass Fiber:

- Type: Rigid molded type, constructed of glass fibers bonded by a thermosetting resin, complying with ASTM C 1290, Type III. Insulation factory molded to match pipe size applied to. Johns Manville "Micro- Lok" (or approved).
- 2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforces with glass fiber and bonded to aluminum foil, with longitudinal self-sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
- 3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/hr-sq ft-deg F at 75° F.
- 4. Operating Temperature Limits: 0° F to 850° F.

# B. Elastomeric Insulation:

- 1. Type: Flexible cellular elastomeric insulation, factory formed to match pipe sizes applied to, complying with ASTM C 534, Type 1. Armacell "AP/Armaflex SS", Armaflex Shield (or approved equal).
- 2. Thermal Conductivity: Shall not exceed 0.27 Btu-in/hr-sq ft-deg F at 75° F.
- Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.

- 4. Operating Temperature Limits: -20° F to 180° F.
- Weather Protection: Where installed outdoors provide Zeston 2000 PVC cover.

# C. Pipe Fittings:

1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as pipe insulation.

# D. Pipe Insulation Types:

- 1. Aboveground-Inside Building:
  - a. Hydronic Piping Systems: Glass fiber.
  - b. Cooling Coil Condensate: Glass fiber or elastomeric.
  - c. Refrigerant Piping: Elastomeric.
  - d. Other Systems: Glass fiber.
- E. Pipe Insulation Thickness:

#### COLD SERVICE INSULATION MATERIAL SCHEDULE

TYPE	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
A & B	Refrigerants, Brine, and Fluids below 40 F.	Flex. Elastomeric Foam	Less than 8 8 and Up	1 1-1/2
С	Chilled Water, domestic cold water, and other fluids 40 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All sizes	1

#### HOT SERVICE INSULATION MATERIAL SCHEDULE

	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
D	Domestic Hot water, Domestic Hot Water recirculating, and other fluids 105 F to 140 F.	Flex. Elastomeric Foam or Fibrous Glass	Less than 1- 1/2 1-1/2 &over	1 1-1/2
E	Heating hot water, and other fluids 141 F to 200 F.	Fibrous Glass	Less than 1- 1/2 2 &over	1-1/2
F	Steam (LPS) to 15 psig 201 F-250 F	Fibrous Glass	Less than 4	2-1/2
G	Water and other fluids 251 F to 350 F.	Fibrous Glass	Less than 1	2 4-1/2
Н	Water and other fluids Above 350 F.	Fibrous Glass	Less than 1	4- 1/2 5

- 1. Provide minimum piping insulation thickness indicated, in inches.
- 2. Where a system operates over temperature ranges calling for different insulation thicknesses, the thicker insulation requirements shall be met.
- 3. Cooling system condensate piping (i.e., from a cooling coil) shall be considered to operate at  $53^{\circ}$  F.
- 4. Refrigerant piping (RG or RS piping) returning from an evaporator (i.e., cooling coil) to a compressor shall be considered to operate at  $40^{\circ}$  F.

- 5. Outdoor Piping: Piping exposed to outside air or located outside the building/thermal envelope, shall have insulation thickness increased by 0.5 inch from that indicated above.
- 6. Hydronic heat pump piping shall be considered to operate at 120° F (unless noted otherwise).
- 7. Cold water piping shall be considered to operate at 56° F (unless noted otherwise).

#### Underground piping:

- A. Underground chilled water and hot water:
  - 1. All underground pre-insulated pipe 1 1/2" 12" shall be similar to thermal pipe systems, inc. heat-tite® piping with ring-tite joints.
  - 2. Steel carrier pipe shall be black steel of the type, grade, and class specified by the design engineer. the pipe shall be suitable for use at maximum hydrostatic working pressure of 150 psi at 250°f.
  - 3. Each joint shall automatically provide for expansion and contraction through the ethylene propylene diene monomer (epdm) sealing rings in the grooves of the pre-insulated ductile iron coupling.
  - 4. Casing pipe shall be [polyvinyl chloride (pvc) meeting the minimum classification requirements of astm d-1784] or [high density polyethylene (hdpe)]. the thickness shall be in accordance with the thermal pipe systems published data.
  - 5. The insulation shall be polyurethane foam completely encapsulated on each end by a compression rubber end seal.
  - 6. The rubber end seals shall be an ethylene propylene diene monomer (epdm) heat resistant compound.
  - 7. Fittings may be uninsulated using welded steel or ductile iron class 150 fitting with a groove and rubber ring. fittings may also be pre-insulated by thermal pipe systems, inc. using the same carrier pipe, insulation thickness, and casing as the straight lengths of pipe.
  - 8. After completion of hydrostatic testing, joints shall be closed using factory supplied 30 mil high temperature tape. it shall be applied circumferentially around the seam between the coupling and pipe casing.
- F. Underground steam and steam condensate piping:
  - 1. All underground pre-insulated steam and condensate pipe 3" 12" shall be similar to thermal pipe systems, inc. super temp-tite® piping with ring-tite joints.

- 2. Steel carrier pipe shall meet the requirements of astm a-53 or a-106, grade b. each end of the carrier pipe shall be machined and metalized to provide a non-corrosive surface for the sealing rings. the metalizing shall be high nickel alloy applied to an excess thickness and then machined to the required outside diameter.
- 3. Each joint shall automatically provide for expansion and contraction through the sealing rings in the grooves of the bronze joining coupling. the sealing rings shall be stainless steel spring loaded molded and machined teflon. pipe must be assembled with the lubricant supplied by thermal pipe systems, inc.
- 4. Casing pipe shall be fiberglass reinforced thermosetting resin pipe (rtrp) manufactured by a filament winding process. the pipe shall be wound to meet astm d2310 classified rtrp-12e.
- 5. The composite insulation shall be a twocomponent system. the initial insulation shall be calcium silicate satisfactory for temperatures to 1200°f and shall conform to astm c-533 and mil spec mil-1-2781. the secondary insulation shall be polyurethane foam completely filling the void between the calcium silicate and casing.
- 6. The rubber end seals shall be a highly saturated hitrile (hsn) or ethylene propylene diene monomer (epdm) heat resistant compound.
- 7. Fittings shall be pre-insulated by thermal pipe systems, inc. using the same carrier pipe, insulation thickness, and casing as the straight lengths of pipe.

## 2.06 EQUIPMENT AND SPECIALTIES INSULATION

## A. Flexible Glass Fiber:

- 1. Type: Flexible blanket insulation, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 553, Type III. Johns Manville "812 Spin-Glas" (or approved).
- 2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforces with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape constructed of jacket material with adhesive to seal all joints.
- 3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/hr-sq ft-deg F at  $75\,^{\circ}$  F.
- 4. Operating Temperature Limits: 40° F to 450° F.
- 5. Density: 1.5 lb/cu ft.

#### B. Elastomeric:

- 1. Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type II.
- Thermal Conductivity: Shall not exceed 0.30 Btu-in/hr-sq ft-deg F at 75° F.
- Water Vapor Transmission: Water vapor permeance shall not exceed
   0.08 perms.
- 4. Operating Temperature Limits: -20° F to 220° F.
- 5. Weather Protection: Where installed outdoors provide with manufacturer's weather proof coating to protect from UV and weather exposure.

#### C. Removable Insulation Blankets:

1. Type: Flexible blanket insulation pads, for insulating valves, unions, strainers, and similar items. Constructed of exterior fabric enclosure sewn around interior insulation, held in position with a closure system that allows for removal of the blanket. Contractor or factory fabricated.

#### 2. Enclosure:

- a. Hot Applications: Glass fiber mat, ¼ inch thick, noncombustible, service temperature up to 1200° F. JPS Glass Fabrics "Glastex 2025" (or approved).
- b. Cold Application: Silicone impregnated glass fiber cloth, water resistant, ¼ inch thick. Claremont "Claretex SL" (or approved).
- 3. Insulation: Thermal insulating wool, 1-inch thick, complying with ASTM C 553. Maximum thermal conductivity 0.22 Btu-in/hr-sq ft-deg F at 75° F. Provide in layers to give equivalent R value to the adjacent insulated piping. Owens Corning "Fiberglass Brand TIW, Type II".
- 4. Closure System: Steel lacing anchors with spindles and self-locking washers, fabricated of minimum 14 gauge stainless steel, with stainless steel wire ties. AGM Industries "Series NLA" (or approved).

## D. Metal Jacket:

- 1. Steel: Minimum 24 gauge galvanized steel complying with ASTM A 653. Provide with longitudinal slip joints and 2-inch laps.
- 2. Aluminum: Minimum 0.020-inch thick aluminum, alloy 3003 or 5005, complying the ASTM B 209. Provide with longitudinal slip joints and 2- inch laps.

- E. Equipment and Specialties Insulation Types and Thickness:
  - Unless a specific type of insulation is specified or noted, any of the insulation materials specified in this specification section may be used provided such application is in conformance with NCIIS.
  - 2. Insulation Thickness: Insulation thickness shall be the same as that specified for the piping or ductwork connected to item, or as specified for the system the item is installed in (unless noted otherwise). Insulation thickness shall in no case be less than 1 inch thick.

#### 3. Valves:

- a. 2 inches and Smaller: Insulate with same material as piping system.
- b. 2-1/2 inches and Larger: Removable blanket insulation.
- 4. Control Valves: Removable blanket insulation.
- 5. All equipment and specialties where access is required shall have removable insulation blankets; other removable insulation materials per NCIIS may be used where preapproved by the Engineer. Items requiring such removable insulation include, but are not limited to, the following:
  - a. Strainers.
  - b. Pumps.
  - c. Balancing valves.
  - d. Pressure/temperature/flow measuring devices.
  - e. Pump suction diffusers.
  - f. Heat exchanger heads.

# 2.07 ACCESSORIES

- A. Adhesive, Caulks, Mastics, and Coatings: As recommended by insulation material manufacturer and suited for the application.
- B. Bands: ½ inch wide, of stainless steel, galvanized steel, or aluminum construction, to match with materials used with.
- C. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor- discharge welding and galvanized speed washer. Pin length shall be as required for insulation thickness used with. Welded pin holding capacity 100 lb., for direct pull perpendicular to the attached surface. Style and type to suit application.

D. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness used with. Adhesive as recommended by the anchor pin manufacturer as appropriate for surface temperatures and materials used with, and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface. Style and type to suit application.

#### 2.08 ACOUSTICAL WRAP

- A. Type: Composite material having an outer foil faced sound barrier wrap with an internal sound decoupling insulation. Kinetics Noise Control KNM-100ALQ (or equal).
- B. Construction: Outer sound barrier material shall be flexible 1.10 inch think, 1 lb/sf (minimum) barium sulfate loaded limp vinyl sheet, bonded to an outside layer of aluminum foil. Interior sound decoupling insulation shall be 1-inch-thick fiberglass batting quilted to a non-woven porous scrim-coated glass cloth in a 4-inch diamond stitch pattern. Material shall be suitable for temperatures form 40 to 200 degrees F.
- C. Acoustic Rating: STC (sound transmission coefficient) 28 (or better).
- D. Vibration Damping Material: Kinetics Noise Control KDD or DKC-E-162.

#### PART 3 - EXECUTION

## 3.01 GENERAL

- A. Pre-Insulation Review: No covering materials shall be applied until systems to be covered have had all tests satisfactorily completed, have had all required inspections, and have been satisfactorily reviewed by the Architect-Engineer. All systems shall be examined by the Contractor to confirm cleanliness and other conditions are appropriate to allow for insulation installation.
- B. Insulation Work Review: No insulated items shall be concealed in the building structure or buried until the insulation work has been satisfactorily reviewed by the Architect-Engineer, and has had all required inspections.
- C. Standards: Materials shall be installed in accordance with manufacturers' written instructions, NCIIS, and shall comply with materials and methods specified herein. The more stringent requirements govern.
- D. Joints/Seams: Joints shall be staggered on multi layer insulation. Locate seams and joints in least visible location.

- E. Insulation Protection: Insulation shall be kept clean and dry and shall be protected from dirt, damage, and moisture.

  Insulation that becomes dirty, damaged, or wet and cannot be restored to like new condition will be rejected, and shall immediately be removed from the jobsite.
- F. Insulation Interruptions: Insulation shall be neatly finished at all supports, protrusions and interruptions. Provide adhesive and tape seal to maintain vapor barrier integrity.
- G. Equipment and Floor Protection: Cover existing equipment and finished floors to protect such items from insulation fiber and dust. Keep all such existing areas in a "broom clean" condition at the end of each day. Take precautions in these areas to prevent glass fiber and insulation dust from entering ventilation systems or areas adjacent to the work.
- H. Glass Fiber Insulation General:
  - 1. Finish all insulation ends with joint sealing tape or vapor barrier mastic, no raw edges allowed.
  - Joints: Tightly butt adjacent insulation sections together without any voids. Provide overlap of jacket material over all joints.
- I. Items To Be Insulated: Provide insulation on all ductwork, all piping, all items installed in these duct and piping systems, all air and liquid energy conveying systems and components, all air and liquid energy storage, all equipment, and all energy consuming devices specified as part of Division 15, except where such insulation has been specifically excluded.
- J. Items Excluded From Being Insulated:
  - 1. Fire Sprinkler piping (except where heat traced).
  - Sanitary sewer drain lines (except traps at handicap accessible fixtures).
  - 3. Factory pre-insulated underground piping.
  - 4. Stops and risers at plumbing fixtures (except at handicap accessible fixtures).
  - 5. Factory insulated water heaters (except for base on electric water heaters).
  - 6. Factory insulated tanks.
  - 7. Electric motors.
  - 8. Fans.
  - 9. Factory insulated or factory lined air handler (heat pumps).
  - 10. Overflow condensate drains.

- 11. Pumps.
- 12. Relief valves and associated drain piping.
- 13. Hose bibs (except where used as drains hot water systems).
- 14. Water meter.
- 15. Underground cold water piping and associated underground items
- 16. Underground hydronic system piping, 5 feet beyond building foundation wall.

#### 3.02 DUCT INSULATION INSTALLATION

- A. Types and Thickness: Insulate all ducts with insulation type and thickness (to provide the required R value listed in this specification.
- B. General: Insulation shall be firmly butted at all joints. All longitudinal seams for flexible insulation shall overlap a minimum of 2 inches. All joints and seams shall be finished with appropriate joint sealing tape.
- C. Attachment: For rectangular ducts over 24 inches wide, duct insulation shall be additionally secured to the bottom of the ductwork with mechanical fasteners on 18 inch centers to reduce sagging. Washers shall be applied without compressing the

insulation. Protruding ends of fasteners shall be cut off flush after washers are installed. All seams, joints, penetrations, and damage to the facing shall be sealed with joint sealing tape or vapor retardant mastic or appropriate joint sealing tape.

## 3.03 PIPE INSULATION INSTALLATION

- A. Types and Thickness: Insulate all piping with insulation type and thickness as specified in "Part 2 Products". All piping shall be insulated except where specifically excluded.
- B. General: All ends shall be firmly butted together and secured with joint sealing tape. All jacket laps and joint sealing tape shall be secured with outward clinch staples at 4 inch spacing, or by use of a suitable adhesive. Seal all jacket penetrations with vapor barrier mastic.
- C. Elastomeric Pipe Insulation: Flexible elastomeric cellular insulation shall be installed with seams and joints sealed with rubberized contact adhesive. Insulation with pre-applied adhesive is not permitted. Insulation exposed to weather and not shown to have jacketing shall be protected with UV resistant PVC jacketing as recommended by the manufacturer after the adhesive is dry and cured. A brush coating of adhesive shall be applied to both butt ends to be joined and to both split surfaces to be sealed. The adhesive shall be allowed to set until dry to touch

but tacky under slight pressure before joining the surfaces. Insulation seals at seams and joints shall not be capable of being pulled apart one (1) hour after application. Insulation that can be pulled apart one (1) hour after installation shall be replaced.

- D. Pipe Hangers: Provide insulation tight up to pre-insulated pipe supports at pipe hangers; seal all joints with joint sealing tape. Pre-insulated pipe supports are specified in Section 15090.
- E. Pipe Sleeves: Run insulation continuous full size through sleeve. Coordinate work with fire seal work and confirm fire sealant system is approved for use with insulated pipes; see division 15.

## 3.04 EQUIPMENT AND SPECIALTIES INSTALLATION

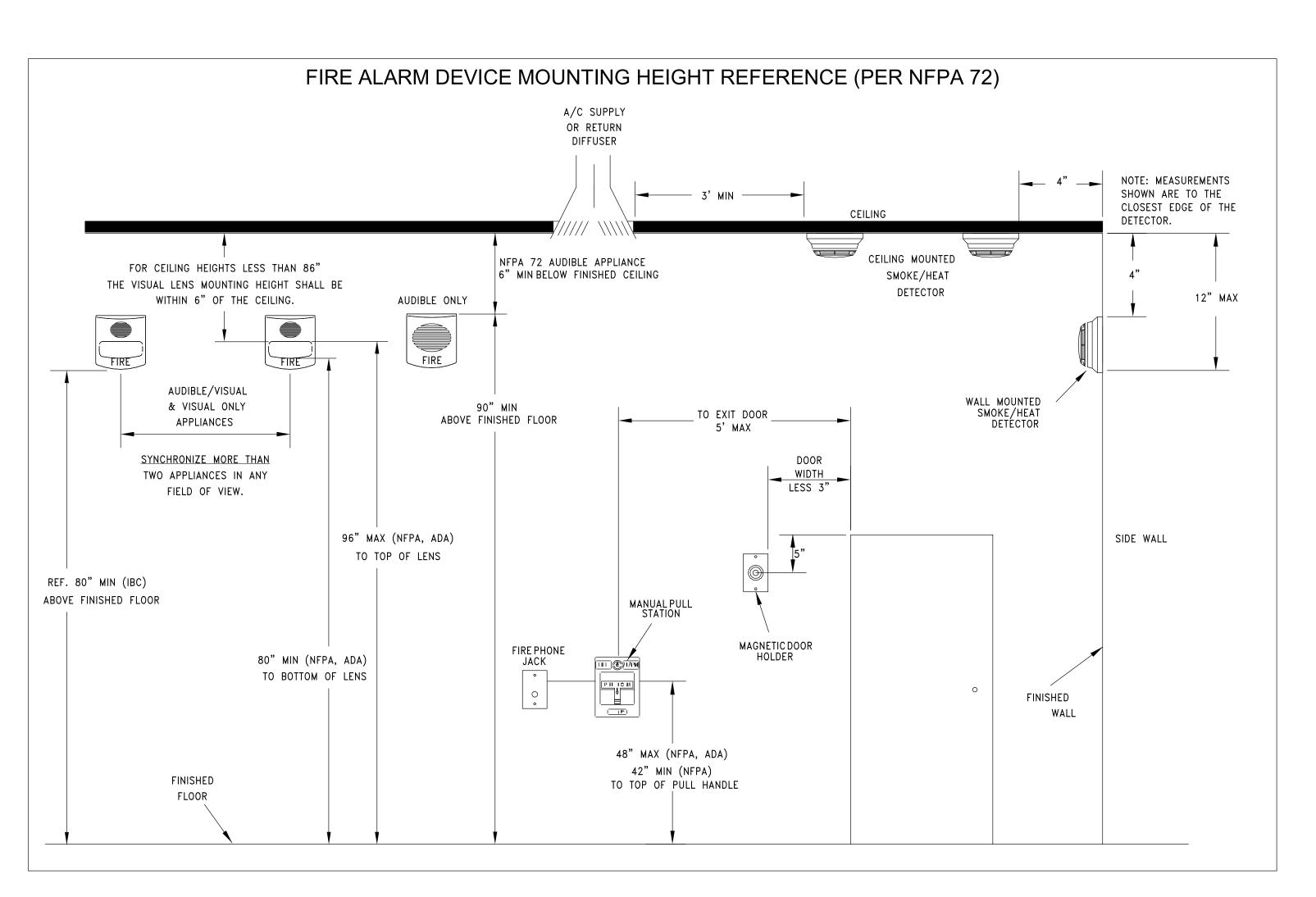
- A. Types and Thickness: All equipment and items installed in insulated duct and piping systems shall be insulated except where specifically noted not to be; reference paragraph 3.01. Insulation type and thickness shall be as specified in "Part 2 Products".
- B. General: Apply insulation as close as possible to equipment by grooving, scoring, and beveling as necessary. As required, secure insulation to equipment with studs, pins, clips adhesive, wires or bands. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. Comply with NCIIS.
- C. Removable: All equipment and specialties where access is required for maintenance, repair, service, or cleaning shall have insulation installed so that it can be easily removed and reinstalled without being damaged and without requiring new insulation.
- D. Handicap Lavatories: Insulate P-trap and HW supplies below lavatory where exposed.
- E. Nameplates: Do not insulate over nameplate or ASME stamps; bevel and seal insulation around.
- F. Jacketing: Provide all equipment with vapor retardant jackets.

#### 3.05 ACOUSTIC WRAP

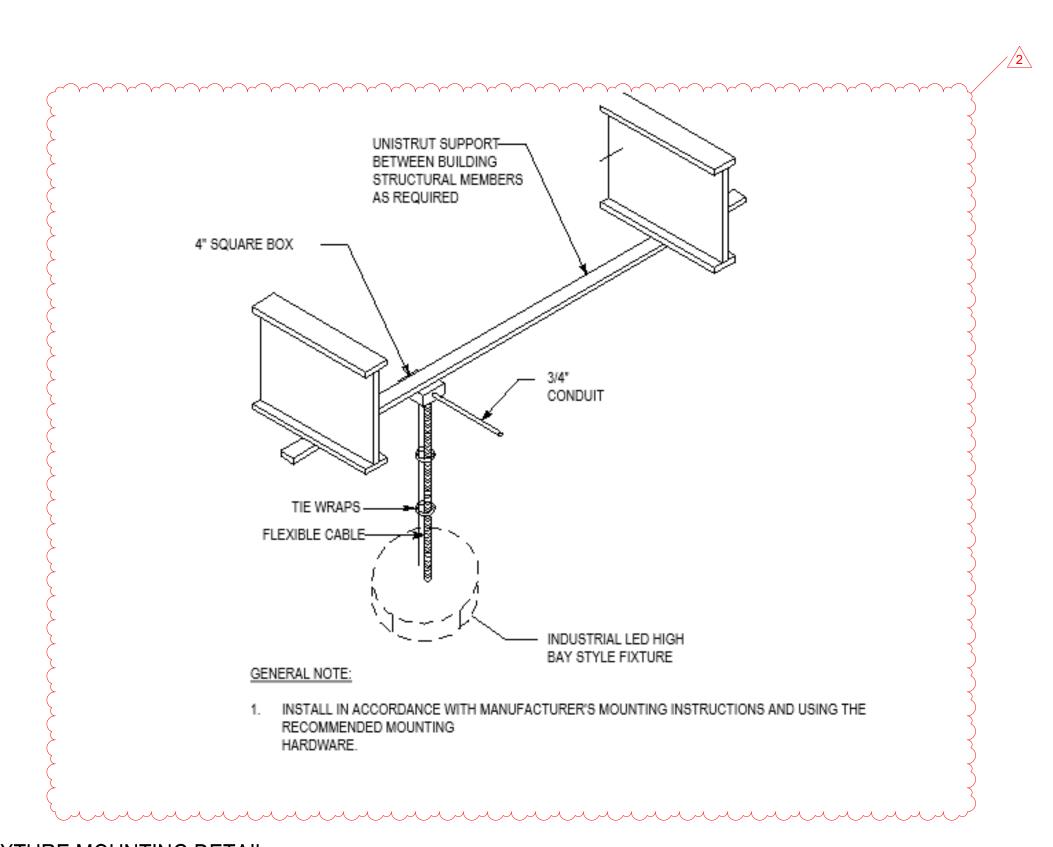
- A. Install in accordance with manufacturers written instruction and NCIIS.
- B. On ductwork less than 20 gauge, apply vibration damping material on outside of duct before applying thermal insulation or acoustic wrap.
- C. Overlap all interior sound insulation joints with a minimum 2 inch overlap of the exterior sound barrier.
- D. Acoustical insulation shall not be compressed.

E. Where installed on ducts requiring thermal insulation, install thermal insulation over acoustic wrap.

END OF SECTION



2 TYPICAL FIRE ALARM HEIGHT
SCALE: NTS



1 TYPICAL HIGHBAY LIGHTING FIXTURE MOUNTING DETAIL SCALE: N.T.S.

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