

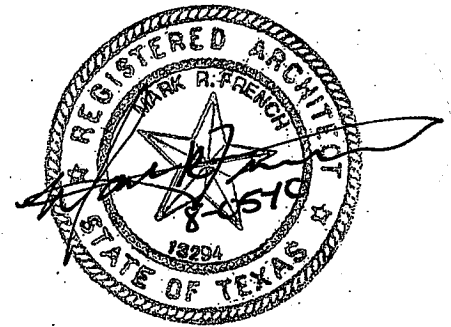


Bay Architects
 18201 Gulf Freeway
 Post Office Box 891209
 Houston, Texas 77289
 Tel 281.286.6605
 Fax 281.286.9606

ADDENDUM NO. 03
 August 05, 2010

Project: **Package A – 2010: Misc. Renovations and Additions to Cook Middle School and E.L.C. No. 2**
 Cypress-Fairbanks Independent School District

Prepared by: Bay Architects, Inc. (mail)
 18201 Gulf Freeway Post Office Box 891209
 Webster, Texas 77598 Houston, Texas 77289
 (281) 286-6605



Bay Project No.: 0930 (10-02-2196R-FP)

Prepared for: Prospective Proposers

PART A NOTICE TO PROPOSERS

01. Receipt of this Addendum shall be acknowledged on the Proposal Form. Failure to do so may subject Proposers to disqualification. Each Proposer shall make necessary adjustments and submit his proposal with full knowledge of all modifications, clarification, and supplemental data included therein.
02. This Addendum forms part of the Contract Documents and shall be incorporated integrally therewith. Where provisions of the following supplemental data differ from those of previously issued documents, this Addendum shall govern.
03. The following Contract Documents have been issued to date delineating the Work (Project):

Construction Documents	July 20, 2010
Addendum No. One	July 29, 2010
Addendum No. Two	August 05, 2010
04. This Addendum consists of ADD-03-01 through ADD-03-05; sketches ADD3-SKE 01 and 02; with attached Sections 15250 (2 pages), 17750 (10 pages) & 17760 (6 pages) all prepared by JSE Engineers. Total pages included in this Addendum: 25 pages.

PART B CHANGES TO PRIOR ADDENDA

05. None

PART C CHANGES TO THE PROJECT MANUAL

06. Section 15250 – Plumbing Insulation
 - a. Add entire spec section attached to this addendum.
07. Section 15300 Mechanical Piping Systems
 - a. Add the following paragraph:
 - 3.02 CONDENSATE DRAIN PIPING
 Type “L” copper or Schedule 40 galvanized steel.

08. Section 15350 - Plumbing Piping Systems
- a. Paragraph 1.02 – General Requirements, Item D: Delete Star Pipe cast iron pipe. All piping, fittings and valves shall be manufactured in the USA.
 - b. Paragraph 206 – Testing Piping Systems, Item B: Domestic water piping shall be tested with water at 125-psig (compressed air testing will not be accepted).
 - c. Paragraph 3.02 – Interior Domestic Water, Item B1: Tyco Grinnell grooved copper piping system shall be accepted as equal to Victaulic.
09. Section 15450 – Plumbing Fixtures, Drains & Equipment
- a. Paragraph .02 – General Requirements:
 - 1) Item K1 – Water Closets, Lavatories and Urinals: Add Kohler.
 - 2) Item K2 – Sinks and Service Sinks: Delete Moen.
 - 3) Item K4 – Drinking Fountains: Delete Oasis. Add Elkay.
 - 4) Item K9 – Floor Drains, Cleanouts and Carries: Delete Mi-Fab. Add Wade.
 - 5) Item K10 – Roof Drains: Delete Mi-Fab. Add Wade.
 - 6) Add Item K12 – Locker Showers: Acorn or Bradley shall be acceptable.
 - b. Paragraph 2.02 – Roof Drains, Item A:
 - 1) Revise model number to Zurn Model ZC-100-EB-DP-GD-VP.
 - 2) Delete Mi-Fab from list of acceptable manufacturers.
 - 3) Add Wade as an acceptable manufacturer.
 - c. Paragraph 2.03 – Cleanouts, Item B – Materials:
 - 1) Item 3 – Finished Floors: Revise model number to Zurn Model ZS-1400-VP.
 - 2) Item 4 – Outside Areas: Revise model number to Zurn Model ZN-1400-HD-VP.
10. Section 15650 – Mechanical Equipment
- a. Paragraph 2.01 – Air Handling Unit:
 - 1) Item A – Cabinets: Revise exterior sheet metal panel from 16 gauges to 18 gauge.
 - 2) Item K – Acceptable Manufacturers Add Carrier and York.
 - 3) Add Item K12 – Locker Showers: Acorn or Bradley shall be acceptable.
 - b. Paragraph 2.07 – Miscellaneous Fans:
 - 1) Delete Item C.
 - c. Paragraph 2.09 – Fan Coil Units:
 - 1) Item H – Acceptable Manufacturers: Delete American Air Filter and add York.
11. Section 15920 – Automated Temperature Controls
- a. Paragraph 2.04 – Sequence of Operation:
 - 1) Item A: Revise existing cooling tower control sequence to incorporate new bypass valve.
 - 2) Item B: Existing AHU-12 serving the kitchen was a 2-pipe VAV system with hot water reheat VAV boxes in the space. This unit is on a 4-pipe system with reheating coil. Revise sequence as required to accommodate.
12. Section 17750 - Network Cabling System
- a. Add new section in its entirety, per attached.
13. Section 17760 – Video Distribution System
- a. Add new section in its entirety, per attached.

PART D

CHANGES TO THE DRAWINGS

“Changes may be indicated on the enclosed 8-1/2 x 11 and/or 11” x 17” sheets.”

14. Sheet M1.1-co-Mechanical Floor Plan
- a. Drawing #2 – Showers Renovation: Install fire damper with access panel in all new and existing ducts penetrating fire-rated walls of Storage C106, C107, and C109. Also, provide a 12X12 return air opening with fire damper in each of this room.

15. Sheet M1.2-co-Mechanical Floor Plan
 - a. Drawing #2 – Kitchen Renovation: Provide a 12X12 return air opening with fire damper in Storage B107. Also, provide a 12X12 return air opening in Office B106.
16. Sheet M2.0-co-Mechanical Schedules and Details
 - a. Cooling Tower Schedule: Alternate number for tower shall be 4A for BAC, 4B for Marley, and 4C for EVAPCO.
17. Sheet E1.1-co – Composite Electrical and Security First Floor Plan, Area A
 - a. Add General Note: For exist security control panels with new 120V emergency circuits shown, disconnect and remove existing 120V normal circuits prior to connecting new emergency circuits.
18. Sheet E1.2-co – Composite Electrical and Security First Floor Plan, Area 2
 - a. Add General Note: For exist security camera power supplies with new 120V emergency circuits shown, disconnect & remove existing 120V normal circuits prior to connecting new emergency circuits.
19. Sheet E1.3 – co – Composite Electrical and Security Second Floor Plan, Area B
 - a. MDF E2-39A: Add one fire alarm visual and one smoke detector. Also, add one new receptacle centered on the north and south side of wall, left and right of the door entering the MDF room. Reconnect two new receptacles to existing circuit LH-21 and two new receptacles to existing circuit LH-20. Lastly, add one new light switch and connect to a new light relay to control lights in MDF room. See attached Drawing ADD3-SKE-02.
 - b. Add General Note: For exist security camera power supplies with new 120V emergency circuits shown, disconnect & remove existing 120V normal circuits prior to connecting new emergency circuits
20. Sheet E2.0-co- Lighting Floor Plan, Area A
 - a. PE Storage C106: Add relay symbol for relay circuit RHB-39D.
 - b. Boys Shower C105: Add relay symbol for relay circuit RHB-39E.
 - c. Girls C104: Add relay symbol for relay circuit RHB-37D.
 - d. Boys C102: Add relay symbol for relay circuit RHB-37C.
21. Sheet E2.1-co- Electrical Floor Plan, Area A
 - a. Office A102: Add J-box and 480V/3P disconnect switch with pilot light for FCU. Install and wire starter supplied by mechanical contractor adjacent to panel HA2 in mechanical mezzanine.
 - b. Office A102: Add duct smoke detector for FCU
 - c. Boys C102: Add 2 J-boxes for hand dryers on south wall. Connect to circuits LA2-15 and LA2-17. See Attached Drawing ADD3-SKE-01.
 - d. Girls C104: Add 2 J-boxes for hand dryers on north wall. Connect to circuits LA2-19 and LA2-21. See Attached Drawing ADD3-SKE-01.
 - e. Boys C102 & Girls C104: Add smoke detector for each restroom.
 - f. Drying B1-20: Change smoke detector to heat detector.
22. Sheet E2.2-co – Lighting Floor Plan, Area B
 - a. Dishwashing B103: Add one type XB exit light at exterior door and connect to existing emergency circuit EMH1-13 (2-10 +10G, ¾”C).
 - b. Food Prep B102: Add one type XB exit light at corridor door and connect to existing emergency circuit EMH1-13 (2-10 +10G, ¾”C).
 - c. Serving Area B101: Add five (5) type XB exit lights at five doors and connect to existing emergency circuit EMH1-13 (2-10 +10G, ¾”C).
23. Sheet E3.0-co – Kitchen Electrical Floor Plan
 - a. Freezer B105: Provide (7) wire from freezer to refrigeration rack outside, coordinate with FS drawings.
 - b. Provide label EM in a red color for each cash register on emergency circuit.

- c. Circuit LK-45 located near the time clock has been revised to LK-51 that serves 3 receptacles.
 - d. Add label EM in a red color for (2) receptacles on circuit ELK-8 located in Office B106.
 - e. Revise circuit located near Toilet B108 from LK2-33 to LK2-37 that serves 5 receptacles.
 - f. Relocate J-box on circuit LK-34 from north wall to west wall located in Dishwashing B103.
24. Sheet E4.1-co-Electrical Panel Schedules
- a. Panel LA2: Revise circuits 15, 17, 19, and 21 from spares to 3-10, 30A/1P.
 - b. Panel LA2: Provide normal ground bar instead of isolated ground bar for this panel.
 - c. Panel LH2: Circuit LH2-13 shall be new circuit added to this panel.
 - d. Panel LH2: Ref. note 3 below panel for all circuits with Description "Reconnect Exist".
 - e. Panel HK: Ref. note 1 below panel for circuit 7.
 - f. Panel LK: Revise circuit 51 from spare to read 3 receptacles with 3-12 wire. Also, revise the circuit breaker for circuit 16 and 22 from 80/3 to 60/3.
 - g. Panel LK2: Revise circuit 33 from 4 receptacles to 5 receptacles. Also, revise the load from 720 to 900.
 - h. Panel LK2: Revise circuit 37 from cash register to 5 receptacles. Also, revise the load from 500 to 900.
 - i. Panel LK2: Revise circuits 45 & 47 from cash register to spare.
 - j. Panel LK2: Circuit 30 shall be revised from spare to (4-4 +6G, 1.5"C, 60A/3P). Also, circuit 36 shall be revised from spare to (4-4 +6G, 1.5"C, 60A/3P). Lastly, circuit 34 shall be revised from spare to (4-4 +6G, 1.5"C, 60A/3P).
 - k. Panel ELK: Revise circuit ELK-5 from pressure relief to spare.
25. Sheet E4.2-co – Electrical Panel Schedules
- a. Panel EML2- provide 20A/1P CB for circuit EML2-32 to serve new camera power supply.
 - b. Panels EMH1 and EMH2: Delete note 1 below panels.
26. Sheet E5.0-co – Electrical Symbols and Details
- a. Electrical Legend and Symbols: Light switch shown on lighting plans shall be low voltage. Light switch shown on power plans shall be 120V or 277V. Data drop symbols denoted 1D shall be one data drops; 2D shall be two data drops, 3D shall be three data drops and 4D shall be four data drops.
 - b. Light Fixture Schedule: Add note: Lighting package submitted by Bell & McCoy is acceptable except type E. Acceptance does not amend the contract documents nor relieve the contractor of compliance with them.
27. Sheet ME1.0-el – Electrical and Mechanical Site Plan
- a. Provide note: Electrical Contractor shall provide conduit for new fiber optic cable outside building shall be 24" below grade. Field verify exact location. Saw cut and repair exist conc. paving as necessary.
28. Sheet E1.0-el – Electrical Floor Plans
- a. Provide note: New wall mounted IDF shall have lockable door.
29. Sheet E1.1-el – Electrical Schedules
- a. Electrical Load Analysis: Revise Electrical System Voltage from 480Y/277V to 208Y/120V.
30. Sheet P2.0-co – Plumbing Floor Plan - Kitchen
- a. Install canwash hydrant (WH-3) at approximately 36" AFF to center of box.
 - b. Kitchen Plumbing Connection Schedule:
 - 1) Connection P3: Revise to 15" AFF to match Kitchen Consultant's documents.
 - 2) Connection P4: Revise to 12" AFF to match Kitchen Consultant's documents.
 - 3) Connection P7: Revise to 36" AFF to match Kitchen Consultant's documents.

31. Sheet P3.0-co – Plumbing Details and Schedules
 - a. Detail 6 – Gas Pressure Regulator Detail (PRV): Revise GAS LOAD for PRV-1 to 1610 CFH.
32. Sheet P4.0 – Plumbing and Gas Riser Diagrams
 - a. Drawing 2 – Building Natural Gas Riser Diagram: Increase gas load for 2” gas serving two convection ovens and pizza oven to 560 CFH.

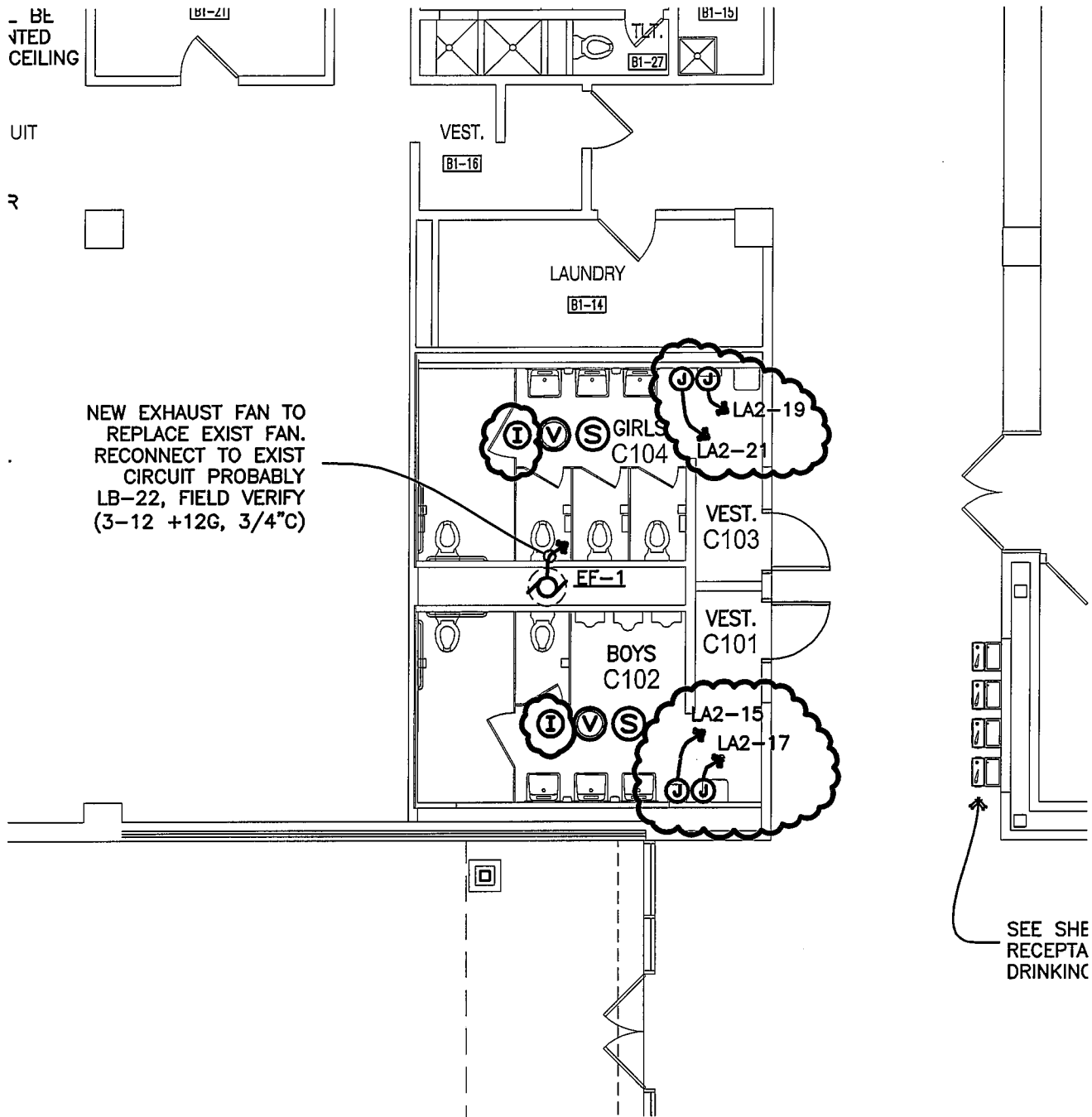
PART E NEW ISSUED DRAWING SHEETS

33. None

PART F RE-ISSUED DRAWING SHEETS

34. None

END OF ADDENDUM



PARTIAL ELECTRICAL FLOOR PLAN

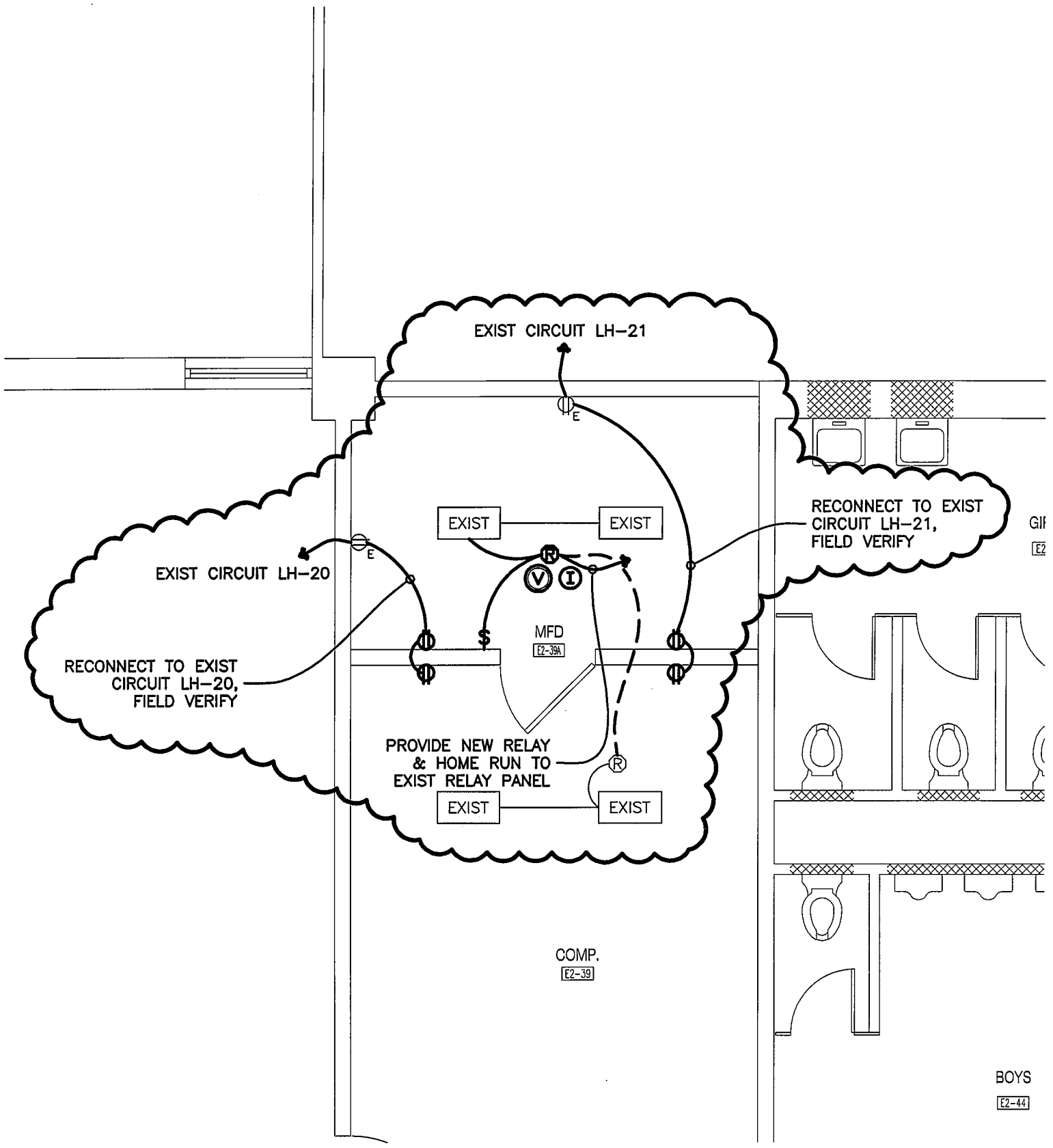


BAY ARCHITECTS

18201 GULF FREEWAY
 P.O. BOX 891209
 HOUSTON, TEXAS 77289
 281.286.6605

ADD3-SKE-01

1008
 1/4" = 1'-0"
 7/29/2010
 RE: E2.1-co



PARTIAL ELECTRICAL FLOOR PLAN



BAY ARCHITECTS

18201 GULF FREEWAY
P.O. BOX 891209
HOUSTON, TEXAS 77289
281.286.6605

ADD3-SKE-02

1008
1/4" = 1'-0"
7/29/2010
RE:1.3-co

SECTION 15250 - PLUMBING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

The General Provisions of the Contract, including General, Supplementary and Special Conditions, apply to the work specified in this Section.

1.02 GENERAL REQUIREMENTS

- A. Install all insulation in conformance with manufacturer's recommendations and these specifications.
- B. Insulation materials manufactured by the following list of companies will be acceptable provided their materials conform to these specifications (see Paragraph on Substitution): Armstrong, CertainTeed, Childers, Foster, Knauf, Koolphen, Manville, Owens-Corning, Pabco, Pittsburg-Corning and SPI.
- C. Flame Spread and Smoke Requirements:
 - 1. All jackets, adhesives, coatings, insulating materials and vapor barrier mastics for piping and equipment shall have a flame spread not higher than 25 and smoke developed rating not higher than 50.
 - 2. All materials containers shall have a U. L. Label.
- D. At each pipe support point, provide formed 16 gauge galvanized sheet metal saddle, with length three times pipe size, 8" minimum. For piping 1½" and larger, install a hard section of Koolphen K phenolic foam pipe insulation, with length three times pipe size, minimum 8" length, on lower 180° of piping, 360° if clamps are used on top of pipe, same thickness as adjacent insulation, to prevent compression at support bearing area. Seal and finish to match adjoining insulation.
- E. Install .020" thick aluminum jacket with minimum 2" overlap joint on all insulated piping exposed outside building. Install factory made aluminum covers on all elbows. Cut aluminum neatly to fit all tees, such that all insulation is covered by aluminum. Use waterproofing aluminum colored Foster 95-44 sealer to seal all joints. Provide .020x3/4" aluminum bands not more than 12" on center for all jacketing. Install aluminum covers on insulated pipe inside that is exposed to view in finished areas including inside gymnasiums. Cover is not required in mechanical or AHU rooms. Jacketing in contact with soil shall be .010" stainless steel.

PART 2 - MATERIALS AND METHODS

2.01 DOMESTIC COLD WATER PIPING

- A. Insulate all water piping outside and above grade, in exterior walls, within eight (8) feet of exterior walls, inside concrete block walls (not including 6" or deeper chase walls), central mechanical and boiler room piping, piping inside the building but outside the building insulation (i.e. above insulation on ceiling) and all piping subject to condensation with 1" thick factory molded fiberglass pipe covering, density not less than 3 pounds per cubic foot, conductivity (k) not higher than .25 at 100° mean temperature difference with factory attached fire retardant, vapor barrier jacket.

- B. For piping outside including pipe entry to building at grade and backflow preventers, provide 1" thick Molded Koolphen K phenolic foam pipe insulation. Install .010" stainless steel protective jacket from building wall to 6" below grade. Insulation and jacketing for backflow preventers shall be installed with easily removable sections to allow periodic servicing, testing and inspection of backflow preventer without damaging insulation installation or integrity.
- C. Install insulation over pipe and carefully connect seal sealing laps. Provide 3" butt strips at each joint between sections, sealed with Foster 85-20.
- D. Insulate fittings with pre-molded cover of same materials and thickness as pipe covering.

2.02 DOMESTIC HOT WATER PIPING

- A. Insulate all hot water supply and return piping, including booster heater piping and tempered water piping, with factory molded pipe covering made from glass fibers; 1" thick with density not less than 3 pounds per cubic foot; conductivity (k) not higher than .25 at 100° mean temperature difference; with factory attached fire retardant jacket.
- B. Secure all laps and joints with staples at 4" on center. Provide 3" butt strips at each joint between sections.
- C. Insulate fittings with pre-molded cover of same materials and thickness as pipe covering.

2.03 DRINKING FOUNTAIN DRAIN LINES

Insulate from connections to fountains to connection to next larger size drain, or, if drain runs into floor, from fountain to floor, with 1/2" thick pipe covering the same as for Domestic Cold Water Piping.

2.04 LAP AND JOINT ATTACHMENT

Self-sealing type jackets will be acceptable provided the laps are sealed per the manufacturers recommendations and the installation is 100% visually inspected by the insulation contractor's foreman.

2.05 STORM DRAINAGE PIPING ABOVE SLAB

- A. GENERAL: Insulate horizontal and vertical piping including roof drain bodies. Overflow drains and piping are included in this specification.
- B. MATERIALS: 1½" thick flexible fiberglass blanket with vapor barrier or 1" thick pipe insulation with vapor barrier.
- C. EXECUTION: Seal laps with white Foster 85-20 and staple at 4" on center. Vapor seal staples with Foster 30-35. Provide 3" butt strips at each joint between sections and seal as above. Install vapor stop every 15'-0" using Foster 30-35. Piping exposed to view in finished areas, including inside gymnasiums, shall have aluminum jacketing per specification.

END OF SECTION

SECTION 17750 - DATA CABLING SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

The General Provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section.

1.02 WORK INCLUDED

- A. For ELC2 School, there is no existing Data Cabling. Provide complete new Data Cabling System. For Cook Middle School, there is an existing Data Cabling System installed. This system shall be extended to the new construction. Provide a complete and tested cable distribution system for data interconnections (Local Area Network). The data distribution system shall include fully terminated multimode fiber optic cable, unshielded twisted pair cables, raceways, conduit, UTP termination devices, data communications outlets, patch panels, patch cables, racks and other incidental and miscellaneous premises wiring system hardware as required for a complete and usable system. Contractor shall install IDF's where shown on the Drawings. Should additional IDF's be required to meet project constraints, contractor shall include these in his bid and locate them with the approval of the Architect. Each IDF shall be connected to the MDF with a 12-strand multimode fiber optic cable.
- B. Network electronics equipment will be furnished by Owner.
- C. The finished installation shall be a complete Systimax Category 6 Solution and receive a minimum 20 year factory warranty.
- D. Conduit and outlet boxes will be provided by the electrical subcontractor under Section 16. Data cabling subcontractor shall coordinate with the electrical contractor to ensure that wall and floor sleeves are installed for proper installation.
- E. The data cabling sub-contractor shall also install the telephone cabling as described in Section 17780 and Drawing Details.
- F. Provide projectors and associated cabling and devices where noted on the drawings and as specified in Section 17755.

1.03 QUALITY ASSURANCE

- A. **INSTALLER QUALIFICATIONS:** The Data Cable System Installer shall be licensed and shall meet all applicable regulations of the State of Texas and Department of Labor insofar as they apply to this type of system. The installer shall be a firm normally employed in the low voltage and data cabling industry and shall provide a reference list of ten projects of similar size and contact names confirming successful Systimax Category 6 premises wiring system installations. He shall also be factory certified to design and install this system by Systimax.
- B. **STANDARDS:** All work shall be performed in accordance with the following standards and codes:
 - City Building Code
 - National Electric Code, latest Edition

1.04 REFERENCES

TIA/EIA-568-A EIA/TIA-569	Commercial Building Telecommunications Wiring Standard Commercial Building Standard for Telecommunication Pathways and Spaces
TIA/EIA-606	The Administration Standard for The Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding and Bonding Requirements for Telecommunications
EIA/TIA-455-A	Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices ad Other Fiber Optic Components
TIA/EIA TSB 67	Transmission Performance Specification for Field Testing of Unshielded Twisted-Pair Cabling Systems
TIA/EIA TSB 72	Centralized Optical Fiber Cabling Guidelines
ISO/IEC 11801	Generic Cabling Standard
EN 50173	Generic Cabling Standards for Customer Premises
ANSI/EIA/TIA 526-14	Optical Power Loss Measurements of Installed Multimode Fiber Cable Plan

1.05 ABBREVIATIONS

MDF	Main Distribution Frame
IDF	Intermediate Distribution Frame
UTP	Unshielded Twisted Pair

1.06 WARRANTY

- A. The selected system installer shall be factory certified by the manufacturer, and shall provide an end-to-end performance warranty of not less than twenty (20) years. The cabling contractor shall provide certification documentation. The performance warranty shall be issued by the manufacturer and shall warrant that all Category 6 cable links have been tested by-directionally (end-to-end) using a Level 2 tester, per TSB-67, and that all test results conform to the most current TIA/EIA-568-A and/or TSB-67 Link values.
- B. The warranty will also cover multimode fiber optic cabling. Performance testing shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, Method B.
- C. The warranty will stipulate that all products used in this installation meet the prescribed mechanical and transmission specifications for such products as described in ISO/IEC 11801, ANSI/TIA/EIA-568-A, or EN 50173. Quality and workmanship evaluation shall be solely by the Owner and designated representatives.

1.07 SUBMITTALS

- A. GENERAL: Comply with Sections 01300 and 16050.
- B. PRODUCT DATA: Complete product data for all cable, patch panels, cross-connect blocks, modular outlets, cable supports, cable labels, outlet devices and other products to be used in the installation.

- C. SHOP DRAWINGS: Proposed circuit routing and circuit grouping plan prepared by a BICSI certified registered communications distribution designer. The RCDD certification must have been granted on or before January 1, 2001. Any data runs exceeding 300 feet shall be brought to the Owner/Architect's attention before cabling commences.
- D. TESTING FORMS: Submit proposed Category 6 UTP cable test result forms, fiber optic test result forms, and a list of instrumentation to be used for systems testing.
- E. PROJECT CLOSEOUT: At completion of the project, include the following in the Close-out Documents:
 - 1. Complete manufacturer's product literature and samples for all approved substitutions to the products made during the course of the Project.
 - 2. INSPECTION AND TEST REPORTS - During the course of the Project, the Contractor shall maintain an adequate inspection system to insure that the materials supplied and the work performed conform to Contract requirements. The Contractor shall provide written documentation that indicated that materials acceptance testing was conducted as specified. The Contractor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
 - 3. OPERATING AND MAINTENANCE INSTRUCTIONS - Submit four copies of Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be in a three-ring binder labeled with the project name and description.
 - 4. AS-BUILT DRAWINGS - As-built drawings will include cable pathways, data outlet locations with correct labeling and MDF/IDF locations. The as-built drawings will be prepared using AutoCAD Version 2002. Provide the Owner with three prints of each drawing, and electronic versions of the as-builts on CDs.

PART 2 - PRODUCTS

2.01 GENERAL

All products shall be new and brought to the site in the original packaging. Electrical components shall bear all Underwriters Laboratories (U. L.) labels. All cable shall bear flammability testing ratings as follows:

- CM Communications Cable
- CMP Plenum Rated Communications Cable
- CMR Riser-Rated Communications Cable

2.02 TWISTED PAIR DATA CABLE

- A. Indoor data cables shall be plenum rated, 4 pair (high performance), 24 gauge Category 6 UTP certified cable, terminated on an 8 pin modular jack T568B configuration. Systemax 2071004EBL, blue color.
- B. Point of Service (POS) cables shall be plenum rated, 4 pair (high performance), 24 gauge, Category 6 UTP certified cable, terminated on an 8 position, non-keyed, modular RJ45 jack wired straight through. Systemax 2071004EBL, blue color. Cable shall be installed in underground conduit from cash registers to kitchen office.

- C. All data cable shall be home run to the patch panel distribution frames designated by the room number.

2.03 TERMINATIONS FOR DATA OUTLETS

- A. Systimax blue MGS 400BH-318 giga speed, 8 pin non-keyed, modular RJ45 jack per T568-B pin/pair configuration, Category 6 rated.
- B. Faceplates shall be stainless steel for six RJ45 outlets at all locations. Provide blue blank insert covers for unused station ports.

2.04 FIBER OPTIC CABLE

- A. Indoor Fiber Optic Cable shall be plenum rated, armored, U. L. listed type OFNP; twelve 50 micron graded index multimode fibers, each with a color-coded PVC buffer. Cable shall be capable of operating at 850 nm and 1300 nm. Systimax 5201 012A ZPAQ SPAQ
- B. Outdoor Fiber Optic Cable shall be Systimax (orange).
- C. Optical Fiber Connectors shall be SC type connectors.
- D. Run fiber optic cable from MDF to IDF room(s).
- E. Optical fiber patch cable shall be orange color, compatible Systimax cable, one meter in length, with SC type connectors. Provide one patch cable for each fiber pair at each MDF/IDF.

2.05 DATA CLOSET (MDF/IDF) CATEGORY 6 TERMINATION HARDWARE

- A. EQUIPMENT RACKS: Provide and install equipment racks in locations indicated on the project drawings. These racks are intended for use where more than 16 drops are terminated. Racks shall be equipped as specified. Racks shall be 19" x 84" floor-mount, aluminum construction, with double sided universal mounted spaces with #12-24 panel mounting holes. Hubbell #MCC84RR19ML or equal by Chatsworth Products, Panduit, Thomas & Betts and Wiremold. Contractor shall determine the number of new racks required. Install a maximum of four 48 port patch panels per rack. Leave a minimum of 10% spare ports on each patch panel.
- B. WALL CABINETS: Provide and install equipment racks in locations indicated on the project drawings. These racks are intended for use where 16 or fewer drops are terminated and with the approval of the Engineer and Owner. Racks shall be 24 inch wide by 48 inch tall by 18 inch deep, aluminum construction with brushed flat black finish. Provide double sided universal mounted spaces with #12-24 panel mounting holes. Hubbell MCC48WMC19 or Chatsworth CUBE-it Plus 11901-748. For each cabinet provide fan and filter, Hubbell MCCPSS19 power strip.
- C. DISTRIBUTION RACK GROUNDING: Rack shall be grounded using stranded #6 AWG insulated copper conductor. Provide all required bonding materials and hardware and bond to building grounding electrode system at building electrical service entrance. Chatsworth Products, Inc. (CPI) #08009-01.

- D. **FIBER OPTIC PATCH PANELS:** The enclosures used shall provide termination panels for SC type connectors and be of sufficient size and capacity to terminate 110% of the fiber count of the inside and outside fiber optic cables. Patch panels must be 19" rack mountable. Provide all termination accessories, enclosures and test for a complete fiber optic distribution system. Avaya LST1U-72/7 at MDF for fiber optic termination. Avaya PM 2303 SC/SC-48 or 24 for fiber optic distribution at MDF closets. Avaya PM 2303 SC/SC-24 at all IDF closets.
- E. **CATEGORY 6 PATCH PANELS:** The Category 6 data station cable shall be terminated on Category 6 RJ45 patch panels with circuit board construction. Patch panels shall consist of faceplates pre-assembled with communication port housings and shall be 19 inch rack mountable. Workstation patch panels shall terminate all workstation communications outlets. Furnish units that adhere to the performance requirements TIA/EIA-568A Standards. Avaya PM-G S3-48 with RJ-45 connectors.
- F. **POWER STRIP:** A power strip shall be installed vertically at the back of each data rack or horizontally at the base of the rack. Hubbell MCCPSS19.
- G. **UPS:** Tripp Lite Smart 2200RML2U Provide UPS for each new rack or cabinet.
- H. **CABLE MANAGEMENT PANELS:** Provide cable management panels as required for horizontal and vertical cable management. Vertical: Chatsworth 30165-703 Horizontal: Chatsworth 30139 Series between each patch panel. Transition Tray: Chatsworth #12183 and 1285-719, top and bottom for each rack. Rack Radius Dropouts: Chatsworth 12394-x01
- I. **PATCH CABLES:** Category 6, tangle free patch cables, modular/modular conforming to Category 6 protocol. Provide 7'-0" yellow patch cable for each data drop in the MDF/IDR rooms. Provide 50/50 split between 9'-0" and 19'-0" patch cables for each data drop at the workstations. Systimax

2.06 CABLE ROUTING/PATHWAY

- A. **CABLE TRAY - LADDER RACKS:** Metal cable tray shall be provided to affix to the top of all floor mount racks. Cable tray shall be used to brace racks to walls and to route cable from walls to racks in communication closets. Chatsworth Products, Inc. (CPI) 11252-0xx, or Chatsworth Products, Inc. (CPI) 11275-0xx.
- B. **CABLE SUPPORT SYSTEM:** Cable saddles, bridal rings or J-Hooks (wide based and rounded edges) shall be used to route all exposed cables (cable not in conduit or cable tray) in open access environments as well as in communications closets. Install at eight foot maximum intervals. Caddy.

2.07 CABLE LUBRICANTS

Lubricants specifically designed for installing communications cable may be used to reduce pulling tension as necessary when pulling cable into conduit. Dyna-Blue or American Polywater for Twisted pair cables. Optic Lube or Ideal for Fiber Optical Cable.

2.08 FIRE WALL SEALANT

Any penetration through firewalls (including those in sleeves) shall be sealed with an Underwriter Laboratories approved sealant, Flameseal.

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS

The Contractor shall familiarize himself/herself with the site before submitting proposal. Congested building areas shall be inspected by the Contractor to ensure coordination with the other trades during construction. NO EXTRAS SHALL BE PERMITTED BECAUSE OF THE CONTRACTOR'S FAILURE TO PROPERLY INVESTIGATE EXISTING CONDITIONS OR BUILDING DESIGN AT THE TIME OF THE PROPOSAL.

3.02 INSTALLATION

A. GENERAL

1. The Cabling Contractor shall furnish and install a complete data cabling system with all necessary wiring and devices. The General Contractor will provide a conduit and outlet box at each outlet location. The Cable Contractor shall furnish tie wraps, tape or hooks for slack-wire management where appropriate.
2. FIRE WALL PENETRATIONS: The Contractor shall avoid penetration of fire-rated walls and floors wherever possible. Where penetrations are necessary, they shall be sleeved with metallic conduit and resealed with an Underwriter Laboratories approved sealant. Contractor shall also seal all floor, ceiling and wall penetrations in fire or smoke barriers and in the wiring closet.
3. ALLOWABLE CABLE BEND RADIUS AND PULL TENSION: In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation. Refer to the cable manufacturers allowable bend radius and pull tension data for the maximum allowable limits.
4. CABLE LUBRICANTS: After installation, exposed cable and other surfaces must be cleaned free of lubricant residue.
5. PULL STRINGS: Provide pull strings in all new conduits, including all conduits with cable installed as part of this contract. Pull test is not to exceed 200 pounds. Where other cables (video, telephone, etc) are data are in the same conduit serving the same wall outlet, they shall be pulled together with pull strings.
6. CONDUIT FILL: Conduit fill shall not exceed 40%.
7. DAMAGE:
 - a. The Contractor shall replace or rework cables showing evidence of improper handling including stretches, kinks, short radius bends, over-tightened bindings, loosely twisted and over-twisted pairs at terminals and cable sheath removed too far (over 1½").
 - b. The Contractor shall replace any damaged ceiling tiles that are broken during cable installation.
8. CLEAN-UP: All clean up activity related to work performed will be the responsibility of the Contractor and must be completed daily before leaving the facility.

B. DOCUMENTATION

1. **LABELS:** The Contractor will label all outlets using permanent/legible machine generated, self laminating labels approved by the Owner. Label patch panels in the wiring closet to match those on the corresponding data outlets. The font shall be 10 point, at least one-eighth inch (1/8") in height, black block lettering on white field. All labels shall correspond to as-builts and to final test reports.
2. **FLOOR PLAN:** A floor plan clearly labeled with all outlet jack numbers shall be included in the as-built plans.
3. **LABELING SYSTEM:** Contractor shall label wiring and equipment based on the Owner's prescribed system to be provided to the Contractor prior to installation. Typically this is "D" for data, then closet designation and number. Example – A001D indicates data drop #1 in MDF closet "A".

C. EQUIPMENT RACK CONFIGURATION

1. **EQUIPMENT RACKS:** Equipment racks shall be assembled and mounted in locations shown on the drawings. Each rack shall be securely mounted to the floor and braced to the wall with cable tray in accordance with the manufacturer's instructions and recommendations. Racks shall be mounted such that the side rails are plumb. Racks shall be grounded in accordance with NEC requirements. Install racks such that future expansion can occur. Equipment and wiring panels shall be installed so that the top 40% of the rack is available for future wiring and equipment.
2. **WIRE MANAGEMENT COMPONENTS:** Horizontal cable management panels shall be installed directly above and below each patch panel. Vertical cable management panels shall be installed on each side of the rack. In instances where more than one rack is installed in a single location, vertical cable management shall be installed between the racks.
3. **CABLE PLACEMENT:** Cable installation in the Wiring Closet must conform to the Project Drawings. All cabling shall be routed so as to avoid interference with any other service or system, operation or maintenance location. Avoid crossing areas horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser without difficulty at a later time by maintaining a working distance from these openings.
4. **CABLE ROUTING:** Cable shall be routes as close as possible to the ceiling, floor or corners to ensure that adequate wall or backboard space is available for current and future equipment. All cable runs within the Wiring closet shall be horizontal or vertical within the constraints of minimum cable bending radii. Minimum bend radius shall be observed. Cables shall not be tie-wrapped to electrical conduit or other equipment.
5. **INSTALLATION:** All incoming cables shall be routed on the cable tray and neatly dressed down to the patch panels.
6. **HARDWARE:** Provide rack and jack panel hardware as required for all data station wiring.

D. STATION WIRING INSTALLATION

1. **GENERAL**
 - a. Cabling between wiring closet and workstation locations shall be made as individual home runs. No intermediate punch down blocks or splices may be installed or utilized between the wiring closet and the communications outlet at the workstation location.

- b. All cable must be handles with care during installation so as not to change performance specifications. Factory twists of each individual pair must be maintained up to the connection points at both ends of the cable. There shall never be more than one and one-half inches of unsheathed Category 6 UTP cable at either the wiring closet or the workstation termination locations.

2. EXPOSED CABLE:

- a. All cabling shall be installed inside walls or ceiling spaces whenever possible.
- b. Exposed cable runs will require Owner approval, and will only be allowed when no other options exist.

3. PLACEMENT: All cabling and associated hardware shall be placed so as to make efficient use of available space. All cabling and associated hardware shall be placed so as not to impair the Owner's efficient use of their full capacity.

4. CABLE ROUTES: All cabling placed in ceiling areas must be in conduit, cable tray or J-hooks. Cable supports shall be permanently anchored to building structure or substrates. Provide attachment hardware and anchors designed for the structure to which attached and that are suitable sized to carry the weight of the cables to be supported. Attaching cable to pipes or other mechanical items is not permitted. Use J-hooks for up to 15 cables (Caddy CAT 21 or CAT 32 hooks with appropriate brackets). All runs of sixteen (16) or more cables, provide cable rings on 36-inch maximum centers to hang cable. Communications cable shall be rerouted so as to provide a minimum of 18 inches spacing from light fixtures, sources of heat, power feeder conduits and EMI sources. Cabling shall not be attached to ceiling grid support wires. Cable runs shall be parallel or perpendicular to building structure. Multiple cables to be bonded together every six feet.

E. STATION HARDWARE

1. FLUSH MOUNT JACKS: Flush mount jacks shall be mounted in a faceplate with backbox. Backbox will be provided by General Contractor.
2. RJ-45 JACK PIN ASSIGNMENTS:
 - a. Pin connections for data station cable outlets and patch panels shall match EIA/TIA 568 modular jack wiring recommendation T568B.
 - b. Pin connections at data jack panels shall match pin connections at outlets (straight through wiring).

F. FIBER OPTIC CABLE INSTALLATION

1. PLACEMENT: Fiber Optic Cable shall be installed in innerduct from fiber patch panels to plenum entrances. Innerduct shall not be installed in plenum ceilings unless it is U. L. approved plenum rated. Plenum rated Fiber Optic Cable shall be installed in conduit or U. L. approved plenum rated innerduct in all plenum ceilings.
2. TERMINATIONS: Terminations shall be performed by manufacturer-trained and certified technicians. Terminations shall be made in a controlled environment. The contractor may choose to have the cables assembled off-site, although testing must be completed with the cable in its final installed condition.

3. **WARNING TAGS:** At each location where fiber cable is exposed to human intrusion, it shall be marked with warning tags. These tags shall be yellow or orange in color, and shall contain the warning: "CAUTION FIBER OPTIC CABLE". The text shall be permanent, black, block characters, and at least 3/16" high. A warning tag shall be permanently affixed to each exposed cable or bundle of cables, at intervals of not less than five (5) feet. Any section of exposed cable that is less than five (5) feet in length shall have at least one warning tag affixed to it.

G. CABLE TESTING

1. **NOTIFICATION:** The Owner/Designer shall be notified one week prior to any testing so that the testing may be witnessed.
2. **INSPECTION:** Before requesting a final inspection, the Contractor shall perform a series of end-to-end installation performance tests. The Contractor shall submit for approval describing the test procedures, test result forms and timetable for all copper and fiber optic cabling.
3. **TESTS:** Trained personnel shall perform all testing. Acceptance of the test procedures discussed below is predicated on the Contractor's use of the recommended products and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation will be evaluated in the context of each of these factors.
4. **ERRORS:** When errors are found, the source of each error shall be determined, corrected and the cable retested. All defective components shall be replaced and retested. Retest results must be provided on Owner approved forms and witnessed by Owner.
5. **TWISTED PAIR CABLE TESTING:**
 - a. At a minimum, the Contractor shall test all station drop cable pairs from Data Closet termination patch panels to outlet device RJ45 jacks. Category 6 products shall be tested for compliance to ANSI/TIA/EIA 568A and ISO/IEC 11801 for a Category 6 rated installation. Test equipment used shall meet TIA/EIA TSB-67, Level II accuracy. Further, the Contractor shall have a copy of TSB-67 in its possession and be familiar with its contents.
 - b. Each wire/pair shall be tested at both ends for the following:
 - 1) Wire map (pin to pin connectivity)
 - 2) Length (in feet)
 - 3) Attenuation
 - 4) Near End Cross Talk (NEXT)
 - 5) Power sum
 - c. Test equipment shall provide an electronic and printed record of these tests. Test results for each Category 6 four-pair UTP cable must be submitted with identification to match labels on all patch panel ports and RJ45 jacks and must match as-builts associated with that cable.
6. **FIBER OPTIC CABLE TESTING**
 - a. Testing device for fiber optic cables shall be a high quality OTDR (Optical Time-Domain Reflectometer) equipped with a printer. The printed data shall show, in addition to any summary information, the complete test trace and all relevant scale settings. The OTDR must have the capability to take measurements from bare fiber strands as well as ST or SC connector terminations.

- b. All fiber optic cable shall be tested on the reel before installation to insure that it meets the specifications outlined herein.
 - c. After installation, the Contractor shall test each fiber strand in accordance with the EIA 455-171 Method D procedures (bi-directional testing) at both 850 and 1300 nm. A form shall be completed for each cable showing data recorded for each strand including length, total segment (end-to-end) loss (dB) and connector losses (dB) at each end. In addition, the printed data strip for each strand shall be attached to the form. Patch cables shall also be tested.
 - d. Acceptable fiber optic cable and connector loss shall not exceed 1.5 dB. The Contractor is responsible for obtaining minimum loss in fiber connections and polishing per manufacturer specifications.
- H. INSPECTION: Conformance to the installation practices covered above are to be verified when completed. In some cases, the Owner may inspect before acceptance.

END OF SECTION

SECTION 17760 - VIDEO DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

The General Provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section.

1.02 WORK INCLUDED

- A. There is an existing analog video distribution network (AVDN) in the school. The new video outlets in the new classrooms shall be connected to this system. All wiring shall be color coded per Owner's Standards. This includes Black wiring for video cable. Refer to Section 15450 2.10.
- B. The AVDN is a 'Star Distribution Network' with headend located in the MDF with additional distribution hubs in each IDF. Contractor shall provide individual RG-6 home runs from each wall plate to IDF/MDF and terminated to appropriate splitter for proper signal. The ADVN drops are to be home run to nearest MDF or IDF without splices, splitters, or any other components between the wall plate and the attachment to the distribution network. Prior to installation, representative existing outlets in the remodeled area shall be tested for signal strength and quality. Each of the new RG-6 drops, with associated connectors and wall plates, are to be installed, tested, and documented for operation consistent with the existing devices. Once the new outlets are installed, the existing outlets shall be tested to insure their signal has not been significantly degraded. The final test shall be a subjective viewing of the TV served by these outlets.

1.03 QUALITY ASSURANCE

- A. **INSTALLER QUALIFICATIONS:** The AVDN Installer shall be licensed and shall meet all applicable regulations of the State of Texas and Department of Labor insofar as they apply to this type of system. The Proposer shall be a firm normally employed to install CATV cable networks and shall provide a reference list of five projects of similar size and contact names confirming successful AVDN installations.
- B. **STANDARDS:**

All work shall be performed in accordance with the following standards and codes -
International Building Code with City of Houston Amendments, 1994 Edition
Local Building Code
National Electric Code, latest Edition
FCC Rules and Regulations
ANSI/TIA/EIA-569-A (Cable Routing)

1.04 ABBREVIATIONS

AVDN	Analog Video Distribution Network
District	Cypress Fairbanks ISD
MDF	Main Distribution Frame
IDF	Intermediate Distribution Frame

1.05 WARRANTY

Provide a 5-year warranty on parts and workmanship from the Date of Substantial Completion.

1.06 SUBMITTALS

- A. GENERAL: Comply with Sections 01300 and 16050.
- B. PRODUCT DATA: Complete product data for all cable, connectors, splitters, amplifiers, taps, wall plates and other products to be used in the installation.
- C. SHOP DRAWINGS: Show proposed cable routing and grouping.
- D. TESTING: A test plan indicating types of tests and associated test equipment to be used to insure compliance with the test requirements.
- E. PROJECT CLOSE-OUT: At completion of the project, include the following in the Closeout Documents.
 - 1. Complete manufacturer's product literature and samples for all approved substitutions to the products made during the course of the Project.
 - 2. Inspection and Test Reports - During the course of the Project, the Contractor shall maintain an adequate inspection system to insure that the materials supplied and the work performed conform to Contract requirements. The Contractor shall provide written documentation that indicated that materials acceptance testing was conducted as specified. The Contractor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
 - 3. Operating and Maintenance Instructions - Submit four copies Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be in a three-ring binder labeled with the project name and description.
 - 4. As-Built Drawings - As-built drawings will include cable pathways, outlet locations with correct labeling and MDF/IDF locations. The as-built drawings will be prepared using AutoCAD 2002. Provide the Owner with one mylar plot of each drawing, two blue-line prints of each drawing, and electronic versions of the as-builts on CDs.
 - 5. See Paragraph 3.02 B for additional documentation requirements.

PART 2 - PRODUCTS

2.01 GENERAL

All products shall be new and brought to site in the original packaging. Electrical components shall bear the U. L. underwriters laboratories label. All cable shall bear flammability testing plenum ratings.

2.02 MDF AND IDF EQUIPMENT AND MATERIALS

- A. RG6 COAX CABLE: Each drop from the respective IDFs to the wall plate in each designated area shall be Standard Plenum rated RG6 cable. Cable shall be of known quality manufacture conforming to all applicable industry standards.

1. SPECIFICATION

NEC Type	CATV CL2
AWG	18 (solid)
Shield	100% Aluminum Braid over Foil
Nominal OD	.226
Nominal Imp.	75 Ohms
Nom Cap.	16.5 pF/ft.

2. APPROVED PRODUCTS:

Belden Part #82248 or approved equal.

- B. "F" TYPE SPLITTERS (5 MHZ TO 900 MHZ): In each of the MDF/IDF, it will be necessary to build drop cable distribution networks to support each of the drop cables specified. These distribution networks shall be constructed of 2-way, 3-way, 4-way, and 8-way splitters to meet the requirements of signal distribution to compensate for cable run losses in the individual drops.

1. SPECIFICATIONS

Bandwidth	5 - 900 Mhz
Input Return Loss	14 - 18 dB
Insertion Loss	
2-way	3.5/4.0 dB
3-way	5.2/5.5 dB
4-way	7.2/8.0 dB
8-way	12.0/13.5 dB
RF Shield	80 dB min.

2. APPROVED PRODUCTS:

Blonder-Toungue ZS Series
Antronix HS Series
TVC GHS Series

2.03 STATION TERMINATION

- A. At each location, provide a flush wall mount wall plate. Mounting box shall be provided by the General Contractor. This Station Termination will consist of a standard CATV wall outlet with a bulkhead adapter installed for the attachment of the Drop cable. The drop cable will have an F type connector on the end which will screw attach to the wall mounting plate. All connectors are to be tightened and secured to meet or exceed FCC specified leakage limits.

- B. FACEPLATES: Stainless steel, the same as those used for data outlets.

C. APPROVED PRODUCTS:

TVC WPI 8T
Cable Com I8A

2.04 FIREWALL SEALANT

Any penetration through firewalls (including those in sleeves) will be resealed with a U. L. approved sealant. Flameseal or approved equal.

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS

- A. The Contractor shall familiarize himself/herself with the site before bidding. Congested building areas shall be inspected by the Contractor to ensure coordination with the other trades during construction. **NO EXTRAS SHALL BE PERMITTED BECAUSE OF THE CONTRACTOR'S FAILURE TO PROPERLY INVESTIGATE EXISTING CONDITIONS OR BUILDING DESIGN AT THE TIME OF THE BID.**

3.02 INSTALLATION

A. GENERAL

1. **CABLE INSTALLATIONS:** System wiring shall be accordance with good engineering practices conforming to all applicable codes and regulations as established by the EIA, NEC, FCC, ad Local Building Regulatory agencies. Cable shall be secured in such a manner as to prevent damage to the cable by kinking, stretching, or pinching of the cable and to prevent the cable from resting on ceiling tiles of suspended ceilings. No splices shall exist in any length of an individual cable run, unless specifically shown on the contract drawings at a designated junction enclosure. All cables shall originate and terminate at active or passive devices. Where several devices are in close proximity, approved housing-to-housing connectors and adapters may be utilized. In pulling cable, do not bend to less than the manufacture's recommended radius. Employ temporary guides, sheaves, rollers, or other tools to prevent excessive tension or abrasion to the cable(s). Pull cable with tensions, tools and lubricants recommended by the manufacturer.
2. **FIREWALL PENETRATIONS:** The contractor shall avoid penetration of fire-rated walls and floors whenever possible. Where penetrations are necessary, they shall be sleeved with metallic conduit and resealed with an UL approved sealant. Contractor shall also seal all floors, ceilings and wall penetrations in fire or smoke barriers in the wiring closets.
3. **CABLE PLACEMENTS:** Cable Placements are to follow the same procedures used for the placement of the Data Enhanced Category 5e wiring. All AVDN cabling to be located such that it does not parallel AC wiring or pass in close proximity of EMI producing devices.
4. **CABLE ROUTING:** AVDN cable routing should be placed coincide with data cabling conduit. The system has been designed to be cabled similar to that of the MDF, IDF and drop cable of the data system. The General Contractor will provide a conduit and box at each outlet location. Where limited clearance prevents the manufacturer's recommended minimum bend radius from being observed, such as in junction boxes, provide a right angle or similar connector.

B. DOCUMENTATION

1. **CABLE LABELS:** Label all cables at both ends with indelible labels with a unique identifier for each cable. Use the labeling code consistent with the existing installed system. Locate labels within 2" of the connectors consistent with regard to orientation, dress and distance

from the connector. All drop cables will be labeled 1 through X and the schematics will be updated to show which cable is connected to which classroom. It is required that the cable number be present on each end of the drop cable.

2. **EQUIPMENT SPECIFICATIONS:** Utilize a three ring binder, not to exceed 3" spine size, with clear vinyl pockets on cover and spine. Provide title sheets for cover and spine identifying the project, printed in ink (pen plotter or laser printer) on heavy paper sized to fill the entire pocket. In section one, provide a complete list, in specification order, of all products and materials to be utilized in the system. "Minor" equipment items are specifically included. In section two, provide the manufacturer's product literature for all products, organized in alphabetical order separated by alphabet letter tabular dividers. Full-line user manuals, catalogs, short-form catalogs, product pictures with little or no technical data, and unreadable photocopies will not be acceptable.
3. **DRAWINGS:** Provide drawings at an appropriate scale, but not smaller than 1/8" = 1'-0". title number and note the scale on each drawing. Minimum drawing sheet size: 17" x 22". Submitted drawings shall contain enough detail information to trouble-shoot the system. Drawings shall include, but not necessarily be limited to, a Plan View detailing all Drop Locations numbered, Trunk Paths, and location of MDF/IDFs.
4. **TEST DATA:** At conclusion of the installation, a section shall be provided including:
 - a. Loss calculations for all drops
 - b. Tabulated Test data for all drops (signal levels and slope)
 - c. Tabulated Test data for system noise

C. STATION HARDWARE

1. **SURFACE MOUNT JACKS:** Any jacks that are required to be surface mounted shall be of the same type as flush mounted jacks. A low clearance, no to exceed 1" in depth, and properly flashed mounting box will be fastened to the wall with customary fasteners. (e.g. Anchors and screws for drywall, drive pins or equal for concrete walls.) Cable shall be terminated with a right angle connector if necessary to prevent exceeding the cable's minimum radius bend. Excess cable within the wall boxes shall be pulled back above the ceiling and secured to prevent kinking the cable.
2. **FLUSH MOUNT JACKS:** Wall jacks will be flush mounted in the wall boxes provided by the General Contractor. Excess cable within the wall boxes shall be pulled back above the ceiling and secured to prevent kinking the cable.
3. **CONNECTORS:** Standard RG6 crimp on CATV coax connectors designed for the specific cable utilized shall be used on all drop lead connections. Conventional non-ratchet crimping tools are not acceptable for the application of connectors. The presence of such tools on the job site shall be interpreted as evidence of mechanical connections incorrectly made, and provide sufficient ground for rejection of all connections in the system.

D. TESTING

1. **CABLING**
 - a. **CONTINUITY:** 100% continuity testing is required and will be tested from the input of the .500 Coax backbone to each classroom drop. A checklist of each cable number and test performed will be submitted once the testing has been completed.

- b. SHORTS: No cable shorts will be permitted on the system. If a short is detected, the connector or cable will be repaired or replaced.
- c. GROUNDS: No direct grounds on the center conductor of the AVDN network are permitted.

2. SYSTEM

- a. CONTINUITY: As tested in the Above Testing Requirements.
- b. POWER READINGS: A power reading will be required at each drop of each of the cabling systems. A +3 dB to a +7dB is required at each drop with a common feed signal of +15 dB into the headend amplifier. These measurements to be taken with an approved field strength meter of known calibration. Test measurements to be performed at low channel, mid-band channel, and high channel to determine cable slope.
- c. SIGNAL QUALITY: A standard receiver, typical of those used in the system, shall randomly be connected to 10% of the outlets across the system and tuned to a reference channel of known quality. No visible indication of co-channel interference, noise, ghosting or beat interference may be observed.
- d. CARRIER TO NOISE: Carrier to Noise shall be measured at random outlets representing an average cross section of the drops with an approved field strength meter by the following process. With normal operating levels, the field set shall be tuned to each channels visual carrier and the level recorded. The input signal to the headend amplifier shall be removed and the input of the amplifier terminated with a short. Each channel shall be re-measured and the noise levels recorded. The Carrier to Noise measurement is the difference of the two figures.
- e. DOCUMENTATION OF RESULTS: All recorded measurements are to be tabulated and included in the systems documentation manual for reference during maintenance of the system.

3.03 TRAINING

- A. Provide two hours of instruction in proper operation and routine maintenance for the system. Instruction shall cover all materials indicated in the Owner's and operator's manuals.
- B. Operational guidelines shall be given in written form in sufficient numbers so that all key personnel have a copy.

END OF SECTION