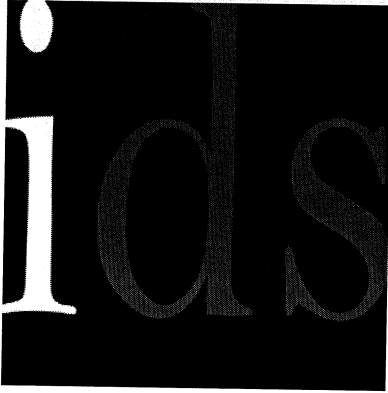

architecture interiors & engineering technology



Integrated Design Solutions

Project Manual

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343

IDS Project No. 03234-1000 BP 18

August 3, 2006
Bids

Project Manual

**Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan**

for

**Troy School District
Technology Resource Center
4420 Livernois Road
Troy, Mi 48098**

Integrated Design Solutions LLC
Architecture, Engineering, Interiors & Technology
888 W Big Beaver, Suite 200
Troy, Michigan 48084
248.823.2100
Fax 248.823.2200
www.ids-troy.com

IDS Project No. 03234-1000 BP 18

SECTION 00010 - TABLE OF CONTENTS

SECTION	TITLE	PAGES
BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT		
00001	Title Page	1 only
00010	Table of Contents	1 only
00100	Advertisement for Bids.....	1 thru 2
00200	Instructions to Bidders	1 thru 5
00410	Bid Forms.....	1 thru 5
00450	Supplement to Bid Form – Familial Disclosure Statement	1 only
DIVISION 1 - GENERAL REQUIREMENTS		
01000	General Requirements.....	1 thru 18
DIVISION 2 THROUGH DIVISION 6		
Not Applicable		
DIVISION 7 - THERMAL AND MOISTURE PROTECTION		
07841	Through-Penetration Firestop Systems.....	1 thru 6
DIVISION 8 THROUGH DIVISION 15		
Not Applicable		
DIVISION 16 - ELECTRICAL		
16740	LAN/WAN Network Equipment.....	1 thru 8
	LAN/WAN Network Equipment appendix 1	1 only
16790	Voice, Video Communication Systems	1 thru 47
16795	Telephone and Data Communication Systems	1 thru 16
16830	Audio/Visual Systems.....	1 thru 23

END OF TABLE OF CONTENTS

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

IDS Project No. 03234-1000 BP18

SECTION 00100 - ADVERTISEMENT FOR BIDS

DATE: July 12, 2006

PROJECT: Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

OWNER: Troy School District
4400 Livernois
Troy, Michigan 48098

**ENGINEERING/
TECHNOLOGY
DESIGNER:** Integrated Design Solutions, LLC
Architecture, Engineering, Interiors & Technology
888 W. Big Beaver, Suite 200
Troy, MI 48084
(248) 823-2100
(248) 823-2200 fax

BIDS RECEIVED: Until 3:00 pm local time on August 24, 2006, the Owner will receive sealed Bids for the work as set forth in the Bidding Documents at:

Troy School District
Purchasing Department
1140 Rankin
Troy, Michigan 48083

ATTN: Frank Lams
Purchasing Supervisor

at which time and place all Bids will be publicly opened and read aloud. A bid tabulation summary will be available.

The Bidding Documents will be on file on and after August 3, 2006 and may be examined at the following locations during regular business hours, Monday through Friday.

World Wide Web:

Troy School District http://www.troy.k12.mi.us/purchasing/items_out_for_bid.htm

The offices of:

Integrated Design Solutions, LLC, 888 W. Big Beaver, Suite 200, Troy, Michigan 48084, (248) 823-2100.

Construction Association of Michigan, 43636 Woodward Ave., Bloomfield Hills, Michigan 48302, (248) 972-1000.

F. W. Dodge Corporation, 21415 Civic Center Drive, Suite 115, Southfield, Michigan, 48034, (248) 799-3300.

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

IDS Project No. 03234-1000 BP18

The Technology Designer will furnish one (1) sets of documents to the bidders at a \$50 refundable deposit.

A mandatory pre-bid conference is scheduled for August 10, 2006 at 10:00 AM local time. All Bidders are required to attend. Bidders shall meet at Troy School District Services Building, 4420 Livernois, Troy, Michigan, 48098. Bids will not be accepted from Bidders who do not attend the pre-bid conference.

Each Bid shall be accompanied by a Bid Security in the form of a certified check, cashier's check, money order or bid bond made payable to Troy School District in an amount not less than five percent (5%) of the base bid as a Bid guarantee.

The successful Bidder shall provide a Performance Bond and a Labor and Material Payment Bond covering the faithful performance of the Contract and payment of all obligations arising there under, each in the amount of one hundred percent (100%) of the contract amount. The cost of such bonds shall be included in the Bid.

The bid security of Bidders under consideration will be returned immediately after execution of the Contract by the Owner. The amount of the bid security shall be forfeited to the Owner if the successful Bidder fails to enter into a contract and furnish required bonds and insurance certificates within ten (10) days after award of Contract.

Withdrawal of any Bid is prohibited for a period of sixty (60) days after the actual date of the opening thereof.

Each Bidder agrees to waive any claim it has or may have with the Owner, the Engineering/Technology Designer, Technology Consultant, and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any bid.

The Owner reserves the right to reject any or all Bids, either in whole or in part, to reject a Bid not accompanied by the required bid security or by other data required by the Bidding Documents or to reject a Bid which is any way incomplete or irregular and to waive informality and irregularity in the bids and in the bidding.

The Owner reserves the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the base bid and the Alternates accepted.

END OF ADVERTISEMENT FOR BIDS

SECTION 00200 - INSTRUCTIONS TO BIDDERS

1. DEFINITIONS

- A. Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement for Bids, Instruction to Bidders, the Bid Form and other bidding and contract forms. The proposed Contract Documents consist of the form of an Agreement between Owner and Contractor, General Conditions of the Contract for Construction, Supplementary and other Conditions, Specifications, Drawings and Addenda issued prior to execution of the Contract.
- B. Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract, which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.
- C. A Bidder is a person or entity who submits a Bid.
- D. A Bid is a complete and properly signed proposal to do the work for the sums stipulated there in submitted in accordance with the Bidding Documents.
- E. The Base Bid is the amount stated in the Bid for which the Bidder offers to perform the work as described in the Bidding Documents as the base, to which work may be added to or deleted from, for the amounts stated in the Alternates.
- F. An Alternate is an amount stated in the Bid Form to be added to or deducted from the amount of the Base Bid if the described Alternate is accepted.
- G. A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the work as described in the Bidding Documents.

2. SECURING BIDDING DOCUMENTS

- A. Copies of the Bidding Documents may be obtained from Integrated Design Solutions, LLC, upon conditions set forth in the Advertisement for Bids.
- B. Only complete sets of Bidding Documents will be furnished. The Owner or Architect assumes no responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.
- C. All copies of the Bidding Documents received for bidding purposes shall be returned in usable condition within ten (10) days of receipt of bids.
- D. Bidding Documents remain the property of the Architect.
- E. Bid documents can be found on the Troy School District web site as follows:
www.troy.k12.mi.us/purchasing/items_out_for_bid.htm

3. PREPARATION AND SUBMISSION OF BIDS

- A. Copies of the Bidding Documents may be obtained from Integrated Design Solutions, LLC, upon conditions set forth in the Advertisement for Bids.
- B. Bids shall be submitted on forms bound in the Project Manual of the Bidding Documents.
- C. All blanks on the Bid Form must be filled in by typewriter or by hand in ink.
- D. Amounts shall be expressed in both words and figures. In case of a discrepancy the amount stated in words shall govern.
- E. Alterations by erasure or interlineations must be initialed by the Bidder.
- F. All Alternates must be bid. If no change in the Base Bid is required, enter "No Change."
- G. Submit the Bid, along with the bid security and any other documents required to be submitted with the Bid, to the Owner, and deliver to the address given in the Advertisement for Bids on or before the day and hour set for receipt of the Bids.
 - 1. Enclose each Bid in a sealed opaque envelope bearing the title of the work SCHOOL TECHNOLOGY SYSTEMS, NEW BAKER MIDDLE SCHOOL, TSD Bid No. 9343, the name of the Bidder, and the date and hour of the Bid opening, with the notation "SEALED BID ENCLOSED".
 - 2. Do not change the wording of the Bid Form, and do not add words to, or delete words from the Bid Form.
 - 3. Unauthorized conditions, limitations, or provisions attached to the Bid will be cause for rejection of the Bid.
 - 4. Submit only duplicate signed copies of the Bid.
 - 5. It is the sole responsibility of the Bidder to see that his bid is received on time.
 - 6. Telephonic, telegraphic, facsimile (fax), or e-mail Bids or telephonic, telegraphic, facsimile (fax) or e-mail modification of a Bid will not be considered.
 - 7. Bids received after the time fixed for receiving them will not be considered and will be returned to the Bidder unopened.
 - 8. Properly identified Bids received on time will be publicly opened and read aloud. A bid tabulation summary will be available.
 - 9. The "AFFIDAVIT OF BIDDER" found in the bid form must be completed.
- H. The Bidder in submitting a Bid represents that:
 - 1. The Bidder has read and understands the Bidding Documents, including the Drawings, Specifications and other proposed Contract Documents.
 - 2. The Bid is made in compliance with the Bidding Documents.
 - 3. The Bidder has visited the site of the Work and become informed as to existing conditions and limitations under which the Work is to be performed and included in their Bid a sum to cover the cost necessary to perform the Work as set forth in the Bidding Documents. No allowance will be made to a Bidder because of a lack of such examination or knowledge.
 - 4. The Bid is based upon materials, equipment and systems required by the Bidding Documents without exception and without substitutions.

4. BID SECURITY AND BONDS

- A. Each bid shall be accompanied by a certified check, cashier's check, money order or bid bond made payable to Troy School District in an amount not less than five percent (5%) of the Base Bid as a proposal guarantee. Bid Bond shall be provided by a company licensed to do business in the State of Michigan.
- B. The successful Bidder shall provide a Performance Bond and a Labor and Material Payment Bond, covering the faithful performance of the Contract and payment of all obligations arising there under, each in the amount of one hundred percent (100%) of the contract amount. Bonds shall be provided by a company licensed to do business in the State of Michigan. The cost of such bonds shall be included in the Bid.
- C. The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this paragraph.
- D. Should the Bidder refuse to enter into a Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.
- E. The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either the Contract has been executed and bonds have been furnished or the specified time has elapsed so that the Bid may be withdrawn or all Bids have been rejected.

5. MODIFICATIONS AND WITHDRAWAL OF BIDS

- A. A Bidder may not modify, withdraw or cancel a Bid, for a period of sixty (60) days following the time and date designated for receipt of Bids, and by submitting a Bid each Bidder shall so agree.
- B. A Bidder may withdraw their Bid, either personally or by written request, at any time prior to the scheduled time for receipt of bids. A withdrawn Bid may be resubmitted up to the date and time designated for receipt of Bids.
- C. Prior to the time and date for receipt of Bids, a Bidder may modify a Bid by notice to the party receiving Bids, at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date and time stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be worded as not to reveal the amount of the original Bid.

6. CONSIDERATION OF BIDS

- A. The Owner reserves the right to reject any or all Bids submitted either in whole or part, to reject a bid not accompanied by the required Bid security or by other data required by the Bidding Documents or to reject a Bid which is any way incomplete or irregular and to waive informality and irregularity in the Bids and in the Bidding.
- B. The Owner reserves the right to accept alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and the alternates accepted.

- C. The Owner reserves the right to negotiate with any Bidder without rebidding the project in whole or in part.
- D. The Owner reserves the right to award the Contract to whom ever it may elect.

7. EXECUTION OF AGREEMENT

- A. The successful Bidder will be required to execute AIA Standard Form of Agreement between Owner and Contractor, AIA Document A101-1997 in conjunction with the General Conditions of the Contract for Construction, AIA Document A201-1997. The owner will issue an owner's Purchase Order for the owner's accounting purposes only.
- B. The Bidder to whom the Contract is awarded shall, within five (5) calendar days after notice of award and receipt of Agreement forms from the Owner, sign and deliver required copies to the Owner.
- C. At or prior to delivery of the signed Agreement, the Bidder to whom the Contract is awarded shall deliver to the Owner those Certificates of Insurance required by the Owner.
- D. The Owner shall approve Bonds and Certificates of Insurance before the successful Bidder may proceed with the Work. Failure or refusal to provide Bonds or Certificates of Insurance in a form satisfactory to the Owner shall subject the successful Bidder to loss of time from the allowable construction period equal to the time of delay in furnishing the required material.

8. INTERPRETATION OF CONTRACT DOCUMENTS PRIOR TO BIDDING

- A. Bidders shall study and compare the Bidding Documents with each other, shall examine the site and local conditions and if in doubt as to the true meaning of any part of the Bidding Documents, or finds discrepancies, inconsistencies, ambiguities or errors in or omissions from any part of the Bidding Documents, the Bidder may submit to the Architect a written request for interpretation thereof not later than seven days before bids will be opened. The person submitting the request shall be responsible for its prompt delivery.
- B. Interpretation, connection or changes to the proposed Contract Documents will be made only by Addendum. Explanations, interpretations, corrections or changes of the Bidding Documents by any other method will not be binding.

9. ADDENDA

- A. Addenda will be transmitted to all who are known by the Architect to have received a complete set of Bidding Documents.
- B. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file.
- C. Addenda will be issued no later than four (4) days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which postpones the date for receipt of Bids.
- D. Each Bidder shall ascertain prior to submitting his bid that he has received all Addenda issued and shall acknowledge their receipt on the Bid Form.

10. SUBSTITUTIONS

- A. No substitutions will be considered prior to receipt of Bids, unless a written request for approval has been received by the Architect at least ten (10) days prior to the date for receipt of Bids. Such request for substitutions shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, samples and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.
- B. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum.
- C. No substitutions will be considered after Contract award unless specifically provided for in the Contract Documents.

11. TAXES

- A. For the purposes of this bid, the Troy School District is tax exempt. Do not include Federal, State or local taxes in the Bid. The Owner's federal and state tax exempt number is B38.600.3099. Usage taxes shall be included in the base bid price.

12. PERMITS AND FEES

- A. All Bids shall include costs of all applicable permits and fees.

13. TIME OF COMPLETION

- A. The Bidder, if awarded the Contract, agrees to complete the Work on or before the Contract Completion Date stated in the Bid Form.

14. EQUAL OPPORTUNITY

- A. The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.
- B. The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

END OF SECTION 00200

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

IDS Project No. 03234-1000 BP 18

SECTION 00410 - BID FORM

OWNER: Troy School District
4400 Livernois
Troy, Michigan 48098

PROJECT: Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

ARCHITECT: Integrated Design Solutions, LLC
Architecture, Engineering, Interiors & Technology
888 W. Big Beaver Road, Suite 200
Troy, Michigan 48084
(248) 823-2100
(248) 823-2200 fax

NAME OF BIDDER: _____

ADDRESS: _____

TELEPHONE: _____

BID

Pursuant to and in compliance with your Advertisement for Bids Instructions to Bidders and other documents relating thereto, the undersigned proposes and agrees to furnish equipment, materials, and labor and perform all work necessary to complete the School Technology Systems, New Baker Middle School for the TSD Bid No. 9343 Project in accordance with the Drawings and Specifications prepared by Integrated Design Solutions, LLC dated Aug 3, 2006, and agrees to accept payment as herein provided.

BASE BID - SECTION 16740 & 16795

Lump sum bid for all work specified and shown on the Drawings as indicated in bid specifications sections 16740 and 16795.

Dollars (\$_____).

NOTE:

The amount shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern. Bid amount shall include cost of the Performance and Material Bonds.

BASE BID - SECTION 16790

Lump sum bid for all work specified and shown on the Drawings as indicated for base bid

_____ Dollars (\$_____).

NOTE: The amount shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern. Bid amount shall include cost of the Performance and Material Bonds.

BASE BID - SECTION 16830

Lump sum bid for all work specified and shown on the Drawings as indicated for base bid

_____ Dollars (\$_____).

NOTE: The amount shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern. Bid amount shall include cost of the Performance and Material Bonds.

UNIT PRICES

The Bidder proposes unit prices in accordance with the following schedule. Said unit prices shall include all charges for labor, materials and equipment, overhead and profit, general conditions, supervision, insurance, taxes and incidental expenses.

Said unit prices shall be applicable to the pricing of additions to, or deletions from, the work indicated in the Contract Documents.

Section 16740

- | | | | |
|----|---|--------------|-----------------|
| 1. | Cost to provide and install a Cisco 3750 24-port PoE switch including labor, configuration and testing. | Add: \$_____ | Deduct: \$_____ |
| 2. | Cost to provide and install a Cisco 2960G 48-port switch including labor, configuration and testing. | Add: \$_____ | Deduct: \$_____ |
| 3. | Cost to provide and install a SX multi-mode fiber SFP including labor, configuration and testing. | Add: \$_____ | Deduct: \$_____ |
| 4. | Cost to provide and install a TX SFP including labor, configuration and testing. | Add: \$_____ | Deduct: \$_____ |

Section 16790

- | | | | |
|----|--|--------------|-----------------|
| 1. | Cost to install a 37" LCD and 37" LCD bracket, patch cables, set top box complete. | Add: \$_____ | Deduct: \$_____ |
|----|--|--------------|-----------------|

- | | | | |
|----|--|---------------|------------------|
| 2. | Cost to provide and install a ceiling mounted digital video projector including a Mitsubishi XD490 digital projector, mounting bracket, down pipe, wiring, two (2) faceplates, labor and material, OH & P. | Add: \$ _____ | Deduct: \$ _____ |
| | | | |
| 3. | Cost to provide a classroom control panel including back box. Include cabling to two (2) speakers (no speakers) audio cabling to an LCD, video cabling to LCD, RF cabling from the corridor to the classroom control panel (38'-0" max), telephone cable to the IDF (280' max), music # 1 and music # 2, PA wiring (300' max, 50' max) and set-top box RS422 cable (300' max). | Add: \$ _____ | Deduct: \$ _____ |

Section 16795

- | | | | |
|----|---|---------------|------------------|
| 1. | Cost to provide and install a Cat. 6 data outlet including labor, wire, jacks, terminations, connectors, testing and tagging. | Add: \$ _____ | Deduct: \$ _____ |
| | | | |
| 2. | Cost to provide a 48 port Cat 6 patch panel | Add: \$ _____ | Deduct: \$ _____ |
| | | | |
| 3. | Cost to provide an IDF cabinet | Add: \$ _____ | Deduct: \$ _____ |
| | | | |
| 4. | Cost to provide an MDF cabinet | Add: \$ _____ | Deduct: \$ _____ |

MANDATORY ALTERNATES

The Base Bid may be increased or decreased by the amounts herein quoted for the Alternates specified below. The following alternate prices shall include all charges for labor, material and equipment, overhead and profit, taxes, insurance and incidental expenses.

All alternates must be priced. Failure to indicate alternate prices shall be cause for the Owner to consider the bid nonresponsive.

The Owner reserves the right to accept alternates in any order or combination and to determine the low bidder on the basis of the sum of the base bid and the alternates accepted.

Alternate No. 1: The cost to provide and install Category 6e system in lieu of the Category 6 cable specified. Include category 6e cable, category 6e connectors, category 6e patch panels, and category 6e testing.

Add/Deduct/No Change _____

\$ (_____)

Alternate No. 2: The cost substitute Sampo LME 42X8 42" LCD's and Premier mount AM-3 in lieu of the 37" LCD's identified on the drawings.

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

IDS Project No. 03234-1000 BP 18

Add/Deduct/No Change _____
_____. \$(_____)

VOLUNTARY ALTERNATES

Voluntary Alternate No. 1:

Add/Deduct _____
_____. Dollars (\$_____).

Voluntary Alternate No. 2:

Add/Deduct _____
_____. Dollars (\$_____).

TAXES

For the purposes of this bid, the Troy School District is tax exempt. Do not include Federal, State or local taxes in the Bid. The Owner's federal and state tax-exempt number is B38.600.3099. Usage taxes shall be included in the base bid price.

BID SECURITY

Accompanying this Bid is a certified check, cashier's check, money order or bid bond (cross out those not applicable) made payable to Troy School District in the amount of five percent (5%), of Base Bid, which shall be retained by the Owner as liquidated damages, if the undersigned fails to execute the contract within ten (10) days of award of the Contract.

ADDENDA

The undersigned acknowledges the receipt of the following addenda:

Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____

TIME OF COMPLETION

The undersigned agrees to substantially complete the Project by the following:

	School	Substantial Completion
1.	New Baker Middle School	4/1/07

WITHDRAWAL OF BIDS

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

IDS Project No. 03234-1000 BP 18

The undersigned agrees that his Bid shall not be withdrawn for a period of sixty (60) days after the date set for receipt of Bids.

NON-COLLUSION

The undersigned certifies that the bid has not been prepared in collusion with any other bidder and that the prices, discounts, terms and conditions thereof have not been directly or indirectly communicated by or on behalf of the Bidder to any such person other than the recipient of such bid, and will not be communicated to any such person prior to the official opening of said bid. The undersigned fully understands that no premiums, rebates, or gratuities are permitted either with, prior to or after signing the Contract. This certification may be treated as if it were a sworn statement made under oath, and is made subject to the provisions of 18 U. S. C., 1001, relating to the making of false statements.

SIGNATURE AND LEGAL STATUS OF BIDDER

Signed and sealed this _____ day of _____, 20____.

(Individual, Partnership, Corporation)

State of Incorporation

Affix Corporate Seal

By:

(Authorized Signature of Bidder)

(Print or Type Name of Bidder)

Title

Business Address

Instructions: Submit three (3) copies to Owner and retain one (1) copy.

END OF BID FORM

SECTION 00450 -

FAMILIAL DISCLOSURE STATEMENT

The undersigned, the owner or authorized officer of _____ (the "Bidder"), pursuant to the familial disclosure requirement provided in the _____ (the "School District") advertisement for construction bids, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of _____ and any member of the Board of Education of the School District or the Superintendent of the School District.

List any Familial Relationships:

BIDDER:

By: _____

Its: _____

STATE OF MICHIGAN)
)ss.
COUNTY OF _____)

This instrument was acknowledged before me on the ____ day of _____, 2006, by
_____.

_____, Notary Public

_____ County, Michigan

My Commission Expires: _____

Acting in the County of : _____

END OF SECTION

SECTION 01000 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Summary of the Work.
 - 2. Work Schedule
 - 3. Work Restrictions.
 - 4. Contract Modification Procedures.
 - 5. Payment Procedures.
 - 6. Project Management and Coordination.
 - 7. Submittal Procedures.
 - 8. Quality Requirements.
 - 9. References.
 - 10. Temporary Facilities and Controls.
 - 11. Product Requirements.
 - 12. Execution Requirements.
 - 13. Closeout Procedures.

1.3 SUMMARY OF THE WORK

- A. Summary of the Work:
 - 1. Section 16740 - : LAN/WAN Network Equipment
 - a. Provide the services necessary furnish and install new, in accordance with the drawings and specifications all product required to support the LAN/WAN Network Equipment to acceptable industry standards.
 - b. The LAN/WAN Network Equipment includes labor and material to provide, integrate the following principal systems:
 - 1) Network Equipment etc.
 - 2) Switches.
 - 3) Software.
 - 4) Licensing.
 - 5) Installation of new equipment.
 - 6) Provide and install cat 6 patch cables and fiber patch cables.
 - 7) Training
 - 2. Section 16790 - : Voice, Video Communications Systems
 - a. Provide the services necessary furnish and install new, in accordance with the drawings and specifications all product required to support the Voice, Video Communications Systems to acceptable industry standards.

- b. The Voice, Video Communications Systems includes labor and material to provide, integrate the following principal systems:
 - 1) Video Distribution System
 - 2) LCD Set Top Boxes to operate with new Dukane media retrieval system
 - 3) LCD Video Displays
 - 4) Classroom Control Panels (CCP's) with amplifier, audio source selector switches, video outlets and audio outlets.
 - 5) Dukane Public Address System
 - 6) Dukane Clock System (Interconnect Headend Clock to existing Master Clock)
 - 7) Supplemental Dukane Digital Clocks
 - 8) Data Projectors
- 3. Section 16795-: Telephone and Data Communication Systems
 - a. Provide the services necessary to furnish and install new, in accordance with the drawings and specifications all product required to support the Telephone and Data Communications Systems to acceptable industry standards.
 - b. The Telephone and Data Communications Systems includes providing and integrating the following principal systems:
 - 1) Telephone Wiring
 - 2) Telephone Termination Equipment
 - 3) Data Wiring
 - 4) Data Termination Equipment
 - 5) Telephone and Data Communications cabinets
 - 6) Training
- 4. Section 16830 - : Audio Systems
 - a. Provide the services necessary to furnish and install new, in accordance with the drawings and specifications all product required to support the Audio Systems to acceptable industry standards.
 - b. The Audio Systems includes providing and integrating the following principal systems:
 - 1) Sound/Mic/Line Wiring
 - 2) Speaker/Mic installation
 - 3) Equipment cabinets
 - 4) Control Systems
 - 5) Audio termination equipment
 - 6) Audio amplifiers and processors
 - 7) Training
- B. Ordinances and Fees:
 - 1. All work shall be executed and inspected in accordance with the rules and regulations of the State and/or local authorities governing the installation of the work involved.
 - 2. The General Building Permit and all other required permits, inspections, certificates, etc., shall be secured and paid for by the Contractor.
 - 3. The State of Michigan, Department of Labor and Economic Growth, Office of Fire Safety will review Drawings and Specifications and conduct inspections for fire safety. The Architect will submit Drawings and Specifications for such Electrical permits and for fire safety and pay plan review fees, the Contractor shall pay all permit fees.

4. The Owner shall file Notice of Commencement and all other related documents as required by the Michigan Construction Lien Act No. 497 as amended.

1.4 WORK SCHEDULE

- A. Coordinate with the owner the installation schedule and determine a cutover schedule.

1.5 WORK RESTRICTIONS

- A. Use of Premises: Limit the use of the premises to work in areas indicated. Do not disturb portions of the site beyond areas in which the Work is indicated. Allow for Owner occupancy and use by the public
 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
- B. Use of Existing Building: Maintain the existing building in a weather-tight and secure condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.
 1. The Contractor and each Subcontractor will be expected to have visited the site and appraise the existing situation and circumstances of operation.
 2. Consult with the Owner as to the availability of space for storage of materials and places of access to the work, etc. Materials and equipment must be placed to avoid interferences with the Owner's operations and shall be moved when so required.
 3. Comply with the Owner's requirements with regard to entrance, movement within and exit of all trucks, equipment, and personnel.
 4. The Owner reserves the right to perform construction work similar in nature to the work included under this Contract, in the same area concurrently with the Contractor, with his own forces, or with other Contractors, without conflict of any nature.
- C. Full Owner Occupancy: The Owner will occupy the site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner operations.
- D. Owner's Right to Place Equipment: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
- E. Owner-Furnished Equipment: The Owner will provide equipment as indicated. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.
 1. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.
 2. If Owner-furnished items are damaged, defective or missing, the Owner will arrange for replacement. The Owner will also arrange for manufacturer's field services.
 3. The Contractor is responsible for designating the delivery dates of Owner-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations.

- F. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- G. Utility Tie-Ins for Data, RF, PA or Telephone: All utility connections, disconnections, tie-ins, shut-downs, and similar work to existing services which would interfere with Owner's operations, must be performed on premium or overtime (Owner's non-standard work hours) basis with all costs included in the proposal lump sum price. All required connections, disconnections, tie-ins and shut-downs of system shall be scheduled in advance, prearranged and approved by the Owner's Representative.
- H. No welding, flame cutting or other operations involving the use of flame, arcs or sparking devices will be allowed, unless prior approval is obtained from the Owner's Representative and all precautions are taken, including temporary fire resistant barriers and stand-by fire extinguishers.
- I. Damage to Other Work: The Contractor shall repair, replace, or touch-up all finished surfaces in the existing building which may be damaged as a result of his work or operations.
- J. Utilities or other services encountered or otherwise found shall be protected from any damage, unless or until they are abandoned. If the utilities or services are not abandoned, immediately repair any damage from work and operations of this Contract. Immediately repair any damage from the Work or operations and restore the utilities and services to an equal or better condition than that which existing prior to the damage or disruption.
- K. Enforce strict discipline and good order among the Contractor's employees and subcontractor's.
 - 1. Foul or abusive language or demeanor will not be tolerated.
 - 2. Contractor's employees and subcontractor's shall dress in a neat workmanlike manner.
- L. Smoking is prohibited anywhere.
- M. Possession, sale or consumption of alcoholic beverages on Owner's property is strictly prohibited.
- N. The manufacturing, distribution, dispensing, possession or use of unlawful drugs on Owner's property is strictly prohibited and may result in criminal prosecution.

1.6 CONTRACT MODIFICATION PROCEDURES

- A. Bulletins: After award of Contract, the Contractor as required shall quote changes in the work described in Bulletins or otherwise.
- B. Except as otherwise specifically mentioned, the general character of the work covered by these Bulletins shall be the same as originally specified for the project and all incidental items required in connection with the work hereinafter described shall be included even though not specifically mentioned. Where an item is mentioned with no additional specifications given, reference is to be made to the original specifications. All applicable parts of the original specifications shall apply.

C. Submit detailed itemized quotations for each item of work described, stating fully the amounts for additions and deductions.

D. Following are sample guidelines for use in preparing detailed cost breakdown for each item in the Bulletin being quoted:

1. Material Cost:

List material giving unit cost

x number of units = cost

Add sales tax if applicable

Add applicable shipping costs

Subtotal Material Cost

\$_____

2. Labor Cost - List for each trade the:

Hourly rate x number of hours =

Labor cost

Add Labor Fringes as applicable:

F.I.C.A.

M.E.S.C.

Pension Contribution

Vacation Contribution

H.E.W. Insurance

Subtotal Labor Cost

\$_____

3. Equipment (heavy, i.e. cranes, earth moving, hoists, etc.):

Rental Charge or equivalent per day or week (including operating costs except labor)

Subtotal Equipment Cost

\$_____

4. Overhead & Profit

a. Work performed by prime contractor
15% overhead and profit.

b. On work performed by subcontractor,
The prime contractor is allowed 7-1/2%
handling charge unless otherwise stated in
Contract Documents.

c. Work performed by subcontractor
15% overhead and profit

Subtotal Overhead & Profit

\$_____

TOTAL COST ITEM

\$_____

E. Quotations should be received by the Architect within two (2) weeks of issuance of the Bulletin.

1.7 PAYMENT PROCEDURES

- A. Schedule of Values: Submit a separate Schedule of Values for each building fourteen (14) days after award of Contract. Submit the Schedule of Values, as a preliminary Application for Payment, to the Architect at least 7 days before submittal of the initial Application for Payment.
1. Format and Content: Use AIA Documents G702 and G703. Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.
- a. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
 - b. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
 - c. Where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - d. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
 - 1) At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
- B. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
1. The Application for Payment at time of Substantial Completion and the final Application for Payment involve additional requirements.
- C. Payment Application Times: The date for each progress payment is the 15th day of each month. The period of construction Work covered by each Application for Payment is the period ending 15 days prior to the date for each progress payment and starting the day following the end of the preceding period.
- D. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment.
- E. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.
1. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- F. Transmittal: Submit 3 executed copies of each Application for Payment to the Architect. One copy shall be complete, including waivers of lien and similar attachments, when required.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.
- G. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
 2. Where an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
- H. Application for Payment at Substantial Completion: Actions and submittals that shall proceed or coincide with this application include:
- Occupancy permits and similar approvals.
 - Warranties (guarantees) and maintenance agreements.
 - Test/adjust reports.
 - Maintenance instructions.
 - Start-up performance reports.
 - Change-over information related to Owner's occupancy, use, operation and maintenance.
 - Final cleaning.
 - Application for reduction of retainage, and consent of surety.
 - Punch list of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- I. Final Payment Application: Actions and submittals that shall precede or coincide with this application include:
- Completion of Project closeout requirements.
 - Completion of items specified for completion after Substantial Completion.
 - Transmittal of required Project construction records to Owner.
 - Proof that taxes, fees and similar obligations have been paid.
 - Removal of temporary facilities and services.
 - Removal of surplus materials, rubbish and similar elements.

1.8 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection and operation.
- B. Pre-Construction Conference:
1. Architect will schedule a pre-construction conference at the Project site after execution of the Agreement and prior to commencement of construction to review responsibilities and personnel assignments.
 2. Attendees: The Owner, Architect, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference.

3. Agenda: Discuss items of significance that could affect progress including such topics as:

- Tentative construction schedule.
- Critical Work sequencing.
- Designation of responsible personnel.
- Procedures for processing field decisions and Change Orders.
- Procedures for processing Applications for Payment.
- Distribution of Contract Documents.
- Submittal of Shop Drawings, Product Data and Samples.
- Preparation of record documents.
- Use of the premises.
- Office, Work and storage areas.
- Equipment deliveries and priorities.
- Safety procedures.
- First aid.
- Security.
- Housekeeping.
- Working hours.

C. Coordination Meetings:

1. Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to regular progress meetings and special pre-installation meetings.
 - a. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
2. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. Progress Meeting:

1. Progress meetings, with the representatives of the various trades and the Contractor in attendance, will be held by the Architect and Owner at regular intervals as directed. The Minutes of these meetings will be recorded by the Architect and copies sent to all interested parties. The dates of progress will be coordinated with preparation of payment request.
2. Agenda: Review and correct or approve minutes of the previous progress meeting. Include topics for discussion as appropriate to the current status of the Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review including such items as:
 - Interface requirements.
 - Time.
 - Updated schedule.
 - Past two (2) week completed tasks.

Past two (2) week incompleting tasks.
Two (2) week look ahead list of tasks to occur in the next two (2) weeks.
Sequences.
Deliveries.
Off-site fabrication problems.
Access.
Site utilization.
Temporary facilities and services.
Hours of Work.
Hazards and risks.
Housekeeping.
Quality and Work standards.
Change Orders.
Documentation of information for payment requests.

1.9 CONSTRUCTION PROGRESS DOCUMENTATION

- A. Construction Schedule: Submit a comprehensive, fully developed, horizontal bar chart, construction schedule.
1. Submit schedule within two (2) weeks after award of Contract. Base schedule on the Times of Completion specified for the Project.
 2. Update construction schedule monthly after construction progress meetings, to reflect actual construction progress and activities.
 3. Indicate each significant construction activity separately.
 4. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
 5. Activities: Treat each story or separate area as a separate activity for each principal element of the Work. Comply with the following:
 - a. Procurement Activities: Include procurement activities for long lead items. Procurement activities include, but are not limited to, submittals, approvals, purchasing, fabrication and delivery.
 - b. Start-Up and Testing Time: Include time for start-up and testing.
 - c. Substantial Completion: Indicate completion in advance of date of substantial completion, allow two (2) weeks time for Architect's inspection and punch list.
 6. Constraints: Include constraints and work restrictions.
 - a. Phasing: Arrange list of activities on schedule by phase.
 - b. Work by Owner: Indicate a separate activity for each portion of Work performed by Owner.
 - c. Work Restrictions: Show effect on the schedule of limitations of continued occupancies, uninterruptible services, use of premises restrictions, and provisions for future construction.
 - d. Work Stages: Indicate important stages of construction for each major portion of the Work.
 7. Milestones: Include milestones such as Notice to Proceed, Substantial Completion and Final Completion.

- B. Daily Construction Reports: Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Architect at weekly intervals:

- List of subcontractors at the site.
- Approximate count of personnel at the site.
- Accidents and unusual events.
- Meetings and significant decisions.
- Stoppages, delays, shortages, losses.
- Emergency procedures.
- Orders and requests of governing authorities.
- Change Orders received, implemented.
- Services connected, disconnected.
- Equipment or system tests and start-ups.
- Partial Completions, occupancies.
- Substantial Completions authorized.

1.10 SUBMITTAL PROCEDURES (01330)

- A. Shop Drawings, Product Data and Samples: Submit Shop Drawings, Product Data and Samples to the Architect for review. Architect will provide to the Contractor the submittal forms that Must be filled out and accompany each submittal.

1. Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities such as testing, purchasing, fabrication, delivery and similar activities and require sequential activity.
 - a. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Architect's need to review a related submittal. The Architect reserves the right to withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.
2. Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for resubmittal, if necessary.
 - a. Allow ten (10) working days for the Architect's review of each submittal. Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The Architect will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
 - b. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.
3. The Contractor shall review Shop Drawings, product Data and Samples prior to submission. Notify the Architect in writing of any deviations in the submittals from requirements of the Contract Documents.
 - a. Information required on shop drawings includes, dimensions, identification of specific products and materials which are included in the work, compliance with specified standards and notations of coordination requirements with other work. Provide special notation of dimensions that have been established by field measurement. Highlight, encircle or otherwise indicate deviations from the contract documents on the shop drawings.

- b. Submit samples for the Architect's visual review of general generic kind, color, pattern, and texture, and for a final check of the coordination of these characteristics with other related elements of the work. Samples are also submitted for quality control comparison of these characteristics between the final sample submittal and the actual work as it is delivered and installed.
4. Architect's acceptance shall not relieve the Contractor from responsibility for errors in submittals.
5. Do not use Shop Drawings, Product Data or Samples without an appropriate stamp indicating Architect/Engineer's action taken.
6. Submit the following:
 - a. Shop Drawings: One reproducible sepia print and two blue or black line prints.
 - b. Product Data: Submit three (3) copies.
 - c. Samples: Submit three (3) sets of samples.
7. Fire Performance Affidavits: Submit in triplicate, notarized affidavits for the products required as specified in the various technical sections of the specifications. Affidavit shall be signed and notarized, and in the following format:

AFFIDAVIT

This is to certify that, (Name of Product) which was or will be furnished to (Company making Application of Product) for (Job or Project Name and Address) is the same in all respects in content, and specifications for mixing and/or application as the specimen tested by (Name of Laboratory) or their project or test number (Test Number) dated (Date of Test).

Flame Spread _____
Fuel Contributed _____
Smoke Developed _____

1.11 QUALITY REQUIREMENTS (01400)

- A. The Owner may employ the services of a testing agency. This will be for the Owner's purpose. Any information or assistance furnished by this agency will not relieve the Contractor of his responsibility for the work and the removal and replacement of any faulty work done which is not in accordance with plans and specifications without additional cost to the Owner.

1.12 REFERENCES (01420)

- A. Specifications & Drawings To be Cooperative:
 1. These Specifications and accompanying Drawings are intended to describe and provide for finished work. They are intended to be cooperative and what is called for by either shall be as binding as if called for by both. The Drawings accompanying the Specifications are intended to show the general design and arrangement of the installation and in some cases are more or less diagrammatic. They are not intended to serve as shop drawings nor are they to be scaled for dimensions or exact locations of equipment.
 2. It is the intent of the Drawings and Specifications to provide for a complete and satisfactory installation. The Contractor shall furnish Labor and/or materials neither shown nor specified but obviously necessary for the completion of the proper functioning of the systems.

B. Specification Format and Content Explanation:

1. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTER FORMAT numbering system.
2. Words, which have well known technical or construction industry meanings are used in the Contract Documents in accordance with such, recognized meanings.
3. Abbreviated Language: In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an" but the fact that a modifier or an article is absent from a statement and appears in another is not intended to affect the interpretation of either statement.
4. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

C. Definitions:

1. Indicated: Refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.
2. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Architect", "requested by the Architect", and similar phrases. However, no implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
3. Approve: The term "approved", where used in conjunction with the Architect's action on the contractor's applications and requests, is limited to the duties and responsibilities of the Architect as stated in General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
4. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
5. Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
6. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
7. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
8. Installer: An "Installer" is the Contractor engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
9. Project Site: Is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other construction activities as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land upon which the Project is to be built.

10. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
- D. Standards of Industry: Reference to standards, codes, and recommendations shall be the latest edition of such publications adopted and published at date of bids. Work shall be installed according to the following industry standards when applicable:
 1. UL Underwriter's Laboratories, Inc.
 2. ASA American Standard Association
 3. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers
 4. ASME American Society of Mechanical Engineers
 5. ASTM American Society for Testing and Materials
 6. ANSI American National Standards Institute
 7. BICSI Building Industry Consulting Service International
 8. EIA Electronics Industries Association
 9. FCC Federal Communications Commission
 10. ICEA Insulated Cable Engineers Association
 11. IEEE Institute of Electrical and Electronics Engineers
 12. ISO International Organization for Standardization
 13. NEC National Electrical Code
 14. NEMA National Electrical Manufacturer's Association
 15. NFPA National Fire Protection Association.
 16. TIA Telecommunications Industry Association
 17. Any local state or national plumbing and building codes having jurisdiction.

1.13 TEMPORARY FACILITIES AND CONTROLS (01500)

A. Temporary Water, Power and Lighting:

1. The Owner will furnish at no cost to the Contractor water and electricity for construction purposes. All such water and electricity shall be obtained from existing outlets designated by the Owner's Representative. If the Contractor's requirements exceed the characteristics at the designated outlets, the Contractor shall provide and pay for additional facilities as he may require.
 - a. Water shall not be taken from Fire Protection System.

B. Temporary Toilets:

1. The Owner's will allow the use of designated toilet facilities for use by all workers employed on the project. Keep the facilities clean and in sanitary condition at all times.

C. Temporary Field Office:

1. The Owner will make space available for the Contractor's temporary field office Provide telephone service and all furniture and supplies as required for the temporary field office.

D. Temporary Parking: Park in designated spaces only.

1. Do not park vehicles on sidewalks or lawn areas surrounding the building unless written approval is received from the Owner.

2. Loading and unloading shall be done only at the loading dock. Coordinate use of loading dock with Owner.
 - a. No vehicles shall be left unattended for more than 30 minutes and no vehicle will be permitted to be left in the loading dock overnight.
- E. Temporary Storage: Storage space within the building is limited. Each trade shall arrange for storage sheds and/or trailers on site for storage of materials, equipment, supplies and tools as required. The Owner accepts no responsibility for security of such storage sheds or trailers.
 1. Storage of materials will not be allowed on roofs.
- F. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- G. Contractor Employee Identification: All persons working on-site are required to have and wear an identification badge at all times.
- H. Project Identification and Temporary Signs:
 1. No advertising, contractor's sign or project sign will be permitted on the site.
- I. Waste Material Removal and Cleaning: Remove and properly dispose of, on a daily basis all waste materials and debris resulting from the Work. The Project and adjacent grounds shall be kept free of accumulations of rubbish.
 1. Construction debris shall not be stored overnight, nor shall it be left in common corridors. Keep debris confined to work areas only until such time as it is being removed.
 2. No burning of waste materials will be permitted on the premises.
 3. In addition to the general "broom cleaning" stipulated in the General Conditions, the Contractor shall be responsible for the following special cleaning for all trades just prior to the final completion of the Project.
 - a. Remove sealant and paint from all glass and polish same.
 - b. Clean and polish all finish hardware.
 - c. Remove all spots, soil and paint from all walls.
- J. Use of Owner's Cafeteria: Contractor will not be allowed the use of Owner's cafeteria.

1.14 PRODUCT REQUIREMENTS (01600)

- A. Product Substitutions: Contractor's request for substitution will be received and considered when extensive revisions to the Contract Documents are not required, when the proposed changes are in keeping with the general intent of the contract documents, when the request are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Architect; otherwise the request will be returned without action except to record non-compliance with these requirements.
- B. The Architect will consider a request for substitution for the following reasons only:
 1. Where the request is directly related to an "or equal" clause in the contract documents.

2. Where the specified product cannot be provided within the Contract Time. However, the request will not be considered if the product cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.
3. Where the specified product cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
4. Where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Architect for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
5. When the specified product cannot be provided in a manner which is compatible with other materials of the work, and where the Contractor certifies that the substitution will overcome the incompatibility.
6. When the specified product cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.
7. When the specified product cannot receive a warranty as required by the contract documents and where the contractor certifies that the proposed substitution receive the required warranty.

C. Substitution Requests:

1. Requests for Substitutions: Do not submit substitution request as a shop drawing submittal. Submit a separate request for each request for substitution. In each request identify the product to be replaced by the substitution, include related specification section and drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include the following information, as appropriate, with each request:
 - a. Provide complete product data, drawings and descriptions of products, and fabrication and installation procedures.
 - b. Provide samples if requested.
 - c. Provide a detailed comparison of the significant qualities of the proposed substitution with those of the work originally specified. Significant qualities include elements such as size, weight, durability, performance and visual effect.
 - d. Provide complete coordination information. Include all changes required in other elements of the work to accommodate the substitution.
 - e. Provide a statement indicating the effect the substitution will have on the work schedule in comparison to the schedule without approval of the proposed substitution. Include information regarding the effect of the proposed substitution on the Contract Time.
 - f. Provide complete cost information, including a proposal of the net change in the Contract Sum.
 - g. Include in this certification, the Contractor's waiver of rights to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.

D. Sample Substitution Request Form:

1. The following is a Sample Substitution Request Form, which must be completed and submitted with any request for substitutions.

SAMPLE SUBSTITUTION REQUEST FORM

Re: Project Name and Architects Project Number

1) SPECIFICATION REFERENCE

Indicate specific pages and paragraphs of the Specifications for which a substitution is proposed.

2) PRODUCT TO BE SUBSTITUTED

Indicate specific product name, model number and manufacturer for proposed substitution.

3) REASON FOR SUBSTITUTION

Provide reason for proposed substitution and reason why specified product is not considered.

4) COMPARISON OF SPECIFIED PRODUCT AND SUBSTITUTION

Provide detailed comparison of specified product with proposed substitution.

5) COST INFORMATION

Indicate what effect (add, deduct, no change) the proposed substitution has on Project cost.

6) EFFECT ON CONSTRUCTION SCHEDULE

Indicate what effect the proposed substitution has on the construction schedule.

7) LICENSE FEES OR ROYALTIES

Indicate if there are license or royalties.

8) AVAILABILITY OF MAINTENANCE SERVICE/SOURCE OF REPLACEMENT MATERIALS

Indicate availability of maintenance service and source of replacement parts or material for proposed substitution.

1.15 EXECUTION REQUIREMENT (01700)

- A. Establish benchmarks and markers to set lines and levels as needed to properly locate each element of the Work. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1.16 CUTTING AND PATCHING (01731)

- A. Cutting of holes and openings through existing slabs, walls, ceilings, partitions, etc., of existing building required for the installation of new piping conduits, ducts, etc., (including patching and repairing) shall be performed by the trade requiring such openings without additional cost to the Owner.
- B. The cutting of holes through the existing building construction shall only be done by the use of abrasive saw and rotary coring machines. The use of hammer and drill points will not be permitted. The openings shall not be cut larger than necessary for the installation of the work. Where existing piping, etc., is removed, the unused openings shall be grouted in.
- C. The drilling or punching of structural members, such as holes through beams or column, shall not be done without the specific permission of the Architect.
- D. Do not cut and patch work exposed in the building's exterior or in its occupied spaces in a manner that would, in the Architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by Architect to be cut and patched in a visually unsatisfactory manner.
- E. Restore exposed finishes of patched areas and extend finish restoration into retained adjacent construction in a manner that will eliminate evidence of patching and refinishing.
- F. Where removal of walls extends one finished area into another, patch and repair floor, wall and ceiling surfaces, to provide an even surface of uniform color and appearance.
- G. Where patching occurs in a painted surface, extend final paint coat over entire unbroken surface containing the patch.

1.17 CLOSEOUT PROCEDURES (01770)

- A. At time of substantial completion, submit record drawings, maintenance manuals and warranties.
- B. Record Drawings: Maintain a clean, undamaged set of blue line prints of Contract Drawings. Mark the set to show the actual installation where the installation varies with the Work as originally shown. Give particular attention to concealed elements that would be difficult to locate at a later date. Mark record sets with red erasable pencil. Transfer all marks from blues lines into electronic format and provide Owner record drawings in AutoCAD LT2002 version and two (2) blacklines of the final record drawings.
- C. Record Shop Drawings and Product Data: Maintain one copy of shop drawings and product data. Mark these documents to show variations in actual Work performed from work shown on the Contract Documents.

- D. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in heavy-duty, 2-inch, 3-ring loose-leaf binders with pocket folders for folded sheet information. Include the following types of information:
1. Emergency instructions.
 2. Spare parts list.
 3. Copies of warranties.
 4. Inspection procedures.
 5. Shop drawings and product data.
- E. Guarantee: Furnish the Owner with a written guarantee to remedy any defects due to faulty materials or workmanship, which appear in the work within one year from date of final acceptance by the Owner.
1. Provide written guarantees from prime subcontractors.
- F. Submit written warranties to Architect to coincide with date of substantial completion.
1. Bind warranties and bonds in heavy-duty, commercial quality, durable, 3-ring loose-leaf binder.
 - a. Provide dividers with celluloid tabs for each separate warranty.
 - b. Provide types description of product or installation including name of product, name, address and telephone number of the installer.

END OF SECTION 01000

ENGINEERS - CLASSES OF EQUIPMENT LIST

UNDERGROUND ENGINEERS	
CLASS I	Backfiller Tamper, Backhoe, Batch Plant Operator, Clam-Shell, Concrete Paver (2 drums or larger), Conveyor Loader (Euclid type), Crane (crawler, truck type or pile driving), Dozer, Dragline, Elevating Grader, End Loader, Gradall (and similar type machine), Grader, Power Shovel, Roller (asphalt), Scraper (self propelled or tractor drawn), Side Broom Tractor (type D-4 or larger), Slope Paver, Trencher (over 8' digging capacity), Well Drilling Rig, Mechanic, Slip Form Paver.
CLASS II	Boom Truck (power swing type boom), Crusher, Hoist, Pump (1 or more 6" discharge or larger gas or diesel powered by generator of 300 amps or more, inclusive of generator), Side Boom Tractor (smaller than type D-4 or equivalent), Sweeper (Wayne type and similar equipment), Tractor (pneu-tired, other than backhoe or front end loader), Trencher (8' digging capacity and smaller).
CLASS III	Air Compressors (600 cfm or larger), Air Compressors (2 or more less than 600 cfm), Boom Truck (non-swinging, non-powered type boom), Concrete Breaker (self-propelled or truck mounted, includes compressor), Concrete Paver (1 drum, ½ yard or larger), Elevator (other than passenger), Maintenance Man, Mechanic Helper, Pump (2 or more 4" up to 6" discharge, gas or diesel powered, excluding submersible pump), Pumpcrete Machine (and similar equipment), Wagon Drill Machine, Welding Machine or Generator (2 or more 300 amp or larger, gas or diesel powered).
CLASS IV	Boiler, Concrete Saw (40HP or over), Curing Machine (self-propelled), Farm Tractor (w/attachment), Finishing Machine (concrete), Firemen, Hydraulic Pipe Pushing Machine, Mulching Equipment, Oiler (2 or more up to 4", exclude submersible), Pumps (2 or more up to 4" discharge if used 3 hrs or more a day-gas or diesel powered, excluding submersible pumps), Roller (other than asphalt), Stump Remover, Vibrating Compaction Equipment (6' wide or over), Trencher (service).

HAZARDOUS WASTE ABATEMENT ENGINEERS	
CLASS I	Backhoe, Batch Plant Operator, Clamshell, Concrete Breaker when attached to hoe, Concrete Cleaning Decontamination Machine Operator, Concrete Pump, Concrete Paver, Crane Crusher, Dozer, Elevating Grader, Endloader, Farm Tractor (90 h.p. and higher), Gradall, Grader, Heavy Equipment Robotics Operator, Loader, Pug Mill, Pumpcrete Machines, Pump Trucks, Roller, Scraper (self-propelled or tractor drawn), Side Boom Tractor, Slip Form Paver, Slop Paver, Trencher, Ultra High Pressure Waterjet Cutting Tool System Operator, Vactors, Vacuum Blasting Machine Operator, Vertical Lifting Hoist, Vibrating Compaction Equipment (self-propelled), and Well Drilling Rig.
CLASS II	Air Compressor, Concrete Breaker when not attached to hoe, Elevator, End Dumps, Equipment Decontamination Operator, Farm Tractor (less than 90 h.p.), Forklift, Generator, Heater, Mulcher, Pigs (Portable Reagent Storage Tanks), Power Screens, Pumps (water), Stationary Compressed Air Plant, Sweeper, and Welding Machine.



MICHIGAN DEPARTMENT OF LABOR & ECONOMIC GROWTH
WAGE & HOUR DIVISION

OVERTIME PROVISIONS for MICHIGAN PREVAILING WAGE RATE SCHEDULE

1. Overtime is represented as a nine character code. Each character represents a certain period of time after the first 8 hours Monday thru Friday.

	Monday thru Friday	Saturday	Sunday & Holidays
First 8 Hours		4	8
9th Hour	1	5	
10th Hour	2	6	
Over 10 hours	3	7	

Overtime for Monday thru Friday after 8 hours:

the 1st character is for time worked in the 9th hour (8.1 - 9 hours)

the 2nd character is for time worked in the 10th hour (9.1 - 10 hours)

the 3rd character is for time worked beyond the 10th hour (10.1 and beyond)

Overtime on Saturday:

the 4th character is for time worked in the first 8 hours on Saturday (0 - 8 hours)

the 5th character is for time worked in the 9th hour on Saturday (8.1 - 9 hours)

the 6th character is for time worked in the 10th hour (9.1 - 10 hours)

the 7th character is for time worked beyond the 10th hour (10.01 and beyond)

Overtime on Sundays & Holidays

The 8th character is for time worked on Sunday or on a holiday

The last character indicates if an optional 4-day 10-hour per day workweek can be worked without paying overtime after 8 hours worked.

2. Overtime Indicators Used in the Overtime Provision:

H - means TIME AND ONE-HALF due

X - means TIME AND ONE-HALF due after 40 HOURS worked

D - means DOUBLE PAY due

Y - means YES an optional 4-day 10-hour per day workweek can be worked without paying overtime after 8 hours worked

N - means NO an optional 4-day 10-hour per day workweek *can not* be worked without paying overtime after 8 hours worked

3. EXAMPLES:

HHHHHHHDN - This example shows that the 1½ rate must be used for time worked after 8 hours Monday thru Friday (*characters 1 - 3*); for all hours worked on Saturday, 1½ rate is due (*characters 4 - 7*). Work done on Sundays or holidays must be paid double time (*character 8*). The N (*character 9*) indicates that 4 ten-hour days is not an acceptable workweek at regular pay.

XXXHHHHDY - This example shows that the 1½ rate must be used for time worked after 40 hours are worked Monday thru Friday (*characters 1-3*); for hours worked on Saturday, 1½ rate is due (*characters 4 - 7*). Work done on Sundays or holidays must be paid double time (*character 8*). The Y (*character 9*) indicates that 4 ten-hour days is an acceptable alternative workweek.

State of Michigan
Department of Labor and Economic Growth

Wage and Hour Division

7150 Harris Drive
 PO Box 30476
 Lansing, MI 48909-7976
 Telephone: 517-322-1825
 Fax: 517-322-6352
 www.michigan.gov/wagehour

Official Request 880
Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS
Project Number: BID 9343 BAKER MIDDLE SCHOOL

Oakland County
Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006
Contract must be awarded by 10/22/2006
Page 1 of 20

<u>Classification</u>						
Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Asbestos & Lead Abatement Laborer						
Asbestos & Lead Abatement Laborer	MLDC		\$30.00	\$40.28	\$50.55	H H H X X X X D Y
Asbestos & Lead Abatement, Hazardous Material Handler						
Asbestos and Lead Abatement, Hazardous Material Handler	AS207		\$30.00	\$41.55	\$53.10	X X X X X X X D Y
Boilermaker						
Boilermaker	BO169		\$48.71	\$68.13	\$87.54	H H D H D D D D Y
Apprentice Rates:						
	1st 6 months		\$37.07	\$50.67	\$64.26	
	2nd 6 months		\$38.03	\$52.10	\$66.18	
	3rd 6 months		\$39.00	\$53.56	\$68.12	
	4th 6 months		\$39.97	\$55.02	\$70.06	
	5th 6 months		\$40.58	\$56.11	\$71.64	
	6th 6 months		\$42.88	\$59.38	\$75.88	
	7th 6 months		\$44.83	\$62.31	\$79.78	
	8th 6 months		\$46.77	\$65.21	\$83.66	
Bricklayer						
Bricklayer, stone mason, pointer, cleaner, caulker	BR1		\$46.06	\$69.09	\$92.12	H H D H D D D D N
Apprentice Rates:						
	First 6 months		\$29.18	\$43.77	\$58.36	
	2nd 6 months		\$31.01	\$46.51	\$62.02	
	3rd 6 months		\$32.82	\$49.23	\$65.64	
	4th 6 months		\$34.64	\$51.96	\$69.28	
	5th 6 months		\$36.47	\$54.71	\$72.94	
	6th 6 months		\$38.28	\$57.43	\$76.56	

Official Request #: 880
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Official Rate Schedule

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Page 2 of 20

<u>Classification</u>		Straight	Time and	Double		
Name	Description	Hourly	a Half	Time	Overtime	Provision
=====						
Carpenter						
Carpet and Resilient Floor Layer, (does not include installation of prefabricated formica & parquet flooring which is to be paid carpenter rate)	CA1045	\$40.22	\$56.42	\$72.61	H H H H D D D D	N
Apprentice Rates:						
1st 6 months		\$20.93	\$25.25	\$31.05		
2nd 6 months		\$24.02	\$31.26	\$39.07		
3rd 6 months		\$25.64	\$33.59	\$42.17		
4th 6 months		\$27.26	\$35.95	\$45.33		
5th 6 months		\$28.87	\$38.28	\$48.43		
6th 6 months		\$30.50	\$40.64	\$51.57		
7th 6 months		\$32.11	\$42.96	\$54.67		
8th 6 months		\$33.73	\$45.30	\$57.79		
Carpenter, piledriver	CA687Z1	\$44.37	\$62.97	\$81.56	H H D H D D D D	Y
Apprentice Rates:						
1st Year		\$27.63	\$37.85	\$48.08		
3rd 6 months		\$29.49	\$40.65	\$51.80		
4th 6 months		\$31.34	\$43.42	\$55.50		
5th 6 months		\$33.21	\$46.23	\$59.24		
6th 6 months		\$35.08	\$49.03	\$62.98		
7th 6 months		\$36.92	\$51.79	\$66.66		
8th 6 months		\$38.80	\$54.61	\$70.42		
Cement Mason						
Cement Mason	CE514	\$41.37	\$57.06	\$73.78	H H D H H H H D	N
Apprentice Rates:						
1st 6 months		\$23.90	\$31.75	\$40.11		
2nd 6 months		\$25.62	\$34.26	\$43.45		
3rd 6 months		\$29.06	\$39.27	\$50.13		
4th 6 months		\$32.52	\$44.30	\$56.83		
5th 6 months		\$34.24	\$46.80	\$60.17		
6th 6 months		\$37.68	\$51.81	\$66.85		
Drywall						
Drywall Taper	PT-22-D	\$37.30	\$49.70	\$62.10	H H D H D D D D	N
Apprentice Rates:						
First 3 months		\$24.90	\$31.10	\$37.30		
Second 3 months		\$27.38	\$34.82	\$42.26		
Second 6 months		\$29.86	\$38.54	\$47.22		
Third 6 months		\$32.34	\$42.26	\$52.18		
4th 6 months		\$33.58	\$44.12	\$54.66		

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Page 3 of 20

Classification			Straight	Time and	Double	Overtime Provision	
Name	Description		Hourly	a Half	Time		
=====							
Electrician, Inside wireman							
Electrician, Inside Wireman	EC-58-IW		\$46.88	\$64.00	\$81.13	H H H H H H D N	
	Apprentice Rates:						
	0-1000 hours		\$26.33	\$33.18	\$40.03		
	1000-2000 hours		\$28.04	\$35.75	\$43.45		
	2000-3500 hours		\$29.75	\$38.31	\$46.87		
	3500-5000 hours		\$31.47	\$40.90	\$50.31		
	5000-6500 hours		\$34.89	\$46.03	\$57.15		
	6500-8000 hours		\$38.32	\$51.17	\$64.01		
Elevator Constructor							
Elevator Constructor	EL 36		\$47.71		\$81.45	D D D D D D D Y	
Elevator Constructor							
	Apprentice Rates:						
	1st Year Apprentice		\$31.14		\$49.70		
	2nd Year Apprentice		\$34.82		\$56.75		
	3rd Year Apprentice		\$36.66		\$60.28		
	4th Year Apprentice		\$40.34		\$67.33		
Glazier							
Glazier	GL-357		\$41.56	\$55.41		H H H H H H H Y	
	Apprentice Rates:						
	1st 6 months		\$28.36	\$35.29			
	2nd 6 months		\$29.82	\$37.44			
	3rd 6 months		\$32.72	\$41.72			
	4th 6 months		\$34.18	\$43.87			
	5th 6 months		\$35.64	\$46.03			
	6th 6 months		\$37.09	\$48.17			
	7th 6 months		\$38.54	\$50.31			
	8th 6 months		\$41.46	\$54.62			
Heat and Frost Insulator and Asbestos Worker							
Heat and Frost Insulators and Asbestos Workers	AS25		\$42.80	\$56.56	\$70.32	H H H H H H D Y	
	Apprentice Rates:						
	1st Year		\$25.05	\$32.62	\$40.19		
	2nd Year		\$32.83	\$41.78	\$50.72		
	3rd Year		\$34.54	\$44.17	\$53.80		
	4th Year		\$37.30	\$48.31	\$59.32		
Industrial Door							
Industrial Door erection & construction	IR-25-STR-D		\$33.32	\$44.57	\$55.82	H H D H H H D Y	

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Page 4 of 20

Classification		Straight	Time and	Double							
Name	Description	Hourly	a Half	Time	Overtime Provision						
=====											
Ironworker											
Fence Erecting	IR-25-F	\$38.28	\$57.26	\$76.23	H	H	D	H	H	D	Y
Glazing	IR-25-GZ1	\$46.57	\$69.69	\$92.81	H	H	D	H	H	D	Y
Mesh Iron Work	IR-25-MR	\$41.22	\$59.07	\$76.92	H	H	D	H	D	D	N
Pre-engineered Metal Work	IR-25-PE-Z1&Z2	\$39.23	\$49.73	\$60.23	H	H	H	X	X	X	Y
Apprentice Rates:											
	1st Level	\$24.11	\$30.04	\$35.98							
	2nd Level	\$26.00	\$32.79	\$39.59							
	3rd Level	\$27.87	\$35.51	\$43.15							
	4th Level	\$29.74	\$38.23	\$46.71							
	5th Level	\$31.59	\$40.92	\$50.24							
	6th Level	\$33.48	\$43.66	\$53.84							
Reinforced Iron Work	IR-25-RF	\$46.45	\$66.75	\$87.05	H	H	D	H	D	D	N
Rigging Work	IR-25-RIG	\$50.42	\$75.53	\$100.64	H	H	H	H	H	H	N
Siding & Decking	IR-25-SD	\$43.31	\$64.80	\$86.29	H	H	D	H	H	D	Y
Structural, ornamental, conveyor, welder and pre-cast	IR-25-STR	\$50.55	\$75.66	\$100.77	H	H	D	H	H	D	Y
Apprentice rates apply to structural, conveyor, fence, glazing, reinforced, rigging, & siding decking											
Apprentice Rates:											
	Level 1	\$25.45	\$38.01	\$50.57							
	Level 2	\$27.96	\$41.78	\$55.59							
	Level 3	\$30.47	\$45.55	\$60.61							
	Level 4	\$32.98	\$49.31	\$65.63							
	Level 5	\$35.49	\$53.07	\$70.65							
	Level 6	\$38.01	\$56.85	\$75.69							
	Level 7	\$40.50	\$60.59	\$80.67							
	Level 8	\$43.02	\$64.37	\$85.71							

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Page 5 of 20

<u>Classification</u>		Straight	Time and	Double								
Name	Description	Hourly	a Half	Time	Overtime Provision							
=====												
Laborer												
Construction Laborer, Mason Tender, Carpenter Tender, Drywall Handler, Cement Finisher tender, concrete chute and concrete Bucket Handler, Concrete Laborer, Demolition Laborer	L1076-A-A	\$35.36	\$50.45	\$65.53	H	H	D	H	D	D	D	Y
Apprentice Rates:												
	0-1,000 work hours	\$29.86	\$42.20	\$54.53								
	1,001-2,000 work hours	\$30.96	\$43.85	\$56.73								
	2,001-3,000 work hours	\$32.06	\$45.50	\$58.93								
	3,001-4,000 work hours	\$34.26	\$48.80	\$63.33								
Signal man, air,electric or gasoline tool operator (including concrete vibrator operator),acetylene torch & air hammer operator, scaffold builder, caisson worker	L1076-A-B	\$35.62	\$50.84	\$66.05	H	H	D	H	D	D	D	Y
Apprentice Rates:												
	0-1,000 work hours	\$30.05	\$42.48	\$54.91								
	1,001-2,000 work hours	\$31.16	\$44.15	\$57.13								
	2,001-3,000 work hours	\$32.28	\$45.83	\$59.37								
	3,001-4,000 work hours	\$34.51	\$49.18	\$63.83								
Lansing Burner, Blaster & Powder Man	L1076-A-C	\$36.11	\$51.57	\$67.03	H	H	D	H	D	D	D	Y
Apprentice Rates:												
	0-1,000 work hours	\$30.42	\$43.04	\$55.65								
	1,001-2,000 work hours	\$31.56	\$44.75	\$57.93								
	2,001-3,000 work hours	\$32.69	\$46.44	\$60.19								
	3,001-4,000 work hours	\$34.97	\$49.86	\$64.75								
Furnance battery heater helper, burning bare & oxy- acetylene gun, expediter man, top man and/or Bottom Man (Blast Furnace Work)	L1076-A-D	\$35.86	\$51.20	\$66.53	H	H	D	H	D	D	D	Y
Apprentice Rates:												
	0-1,000 work hours	\$30.23	\$42.76	\$55.27								
	1,001-2,000 work hours	\$31.36	\$44.45	\$57.53								
	2,001-3,000 work hours	\$32.48	\$46.13	\$59.77								
	3,001-4,000 work hours	\$34.73	\$49.50	\$64.27								
Cleaner/ sweeper laborer, furniture laborer	L1076-A-E	\$29.91	\$42.27	\$54.63	H	H	D	H	D	D	D	Y
Plasterer Tender, Plastering Machine Operator	LPT-1	\$36.72	\$52.50	\$68.27	H	H	D	H	D	D	D	N
Apprentice Rates:												
	0 - 1,000 hours	\$30.87	\$43.72	\$56.57								
	1,001 - 2,000 hours	\$32.04	\$45.48	\$58.91								
	2,001 - 3,000 hours	\$33.21	\$47.24	\$61.25								
	3,001 - 4,000 hours	\$35.55	\$50.74	\$65.93								

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Page 6 of 20

Classification		Straight	Time and	Double	Overtime Provision	
Name	Description	Hourly	a Half	Time		

Laborer - Hazardous

Class A Laborer - performing work in conjunction with site preparation and other preliminary work prior to actual removal, handling, or containment of hazardous waste substances not requiring use of personal protective equipment required by state or federal regulations; or a laborer performing work in conjunction with the removal, handling, or containment of hazardous waste substances when used of personal protective equipment level "D" is required.

LHAZ-Z2-A

\$35.36	\$50.45	\$65.53	H	H	H	H	H	H	D	Y
---------	---------	---------	---	---	---	---	---	---	---	---

Apprentice Rates:

0-1,000 work hours	\$29.86	\$42.20	\$54.53
1,001-2,000 work hours	\$30.96	\$43.85	\$56.73
2,001-3,000 work hours	\$32.06	\$45.50	\$58.93
3,001-4,000 work hours	\$34.26	\$48.80	\$63.33

Class B Laborer - performing work in conjunction with the removal, handling, or containment of hazardous waste substances when the use of personal protective equipment levels "A", "B" or "C" is required.

LHAZ-Z2-B

\$36.36	\$51.95	\$67.53	H	H	H	H	H	H	D	Y
---------	---------	---------	---	---	---	---	---	---	---	---

Apprentice Rates:

0-1,000 work hours	\$30.60	\$43.31	\$56.01
1,001-2,000 work hours	\$31.76	\$45.05	\$58.33
2,001-3,000 work hours	\$32.91	\$46.78	\$60.63
3,001-4,000 work hours	\$35.21	\$50.22	\$65.23

Laborer Underground - Tunnel, Shaft & Caisson

Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.

LAUCT-Z1-1

\$31.54	\$42.13	\$52.71	H	H	H	H	H	H	D	Y
---------	---------	---------	---	---	---	---	---	---	---	---

Apprentice Rates:

0-1,000 work hours	\$26.75	\$34.94	\$43.13
1,001-2,000 work hours	\$27.71	\$36.38	\$45.05
2,001-3,000 work hours	\$28.66	\$37.81	\$46.95
3,001-4,000 work hours	\$30.58	\$40.69	\$50.79

Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder.

LAUCT-Z1-2

\$31.65	\$42.29	\$52.93	H	H	H	H	H	H	D	Y
---------	---------	---------	---	---	---	---	---	---	---	---

Apprentice Rates:

0-1,000 work hours	\$26.83	\$35.06	\$43.29
1,001-2,000 work hours	\$27.79	\$36.50	\$45.21
2,001-3,000 work hours	\$28.76	\$37.95	\$47.15
3,001-4,000 work hours	\$30.69	\$40.85	\$51.01

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Oakland

Official Rate Schedule

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

Contract must be awarded by 10/22/2006

Page 7 of 20

Classification		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description				
Class III - Air tool operator (jack hammer man, bush hammer man and grinding man), first bottom man, second bottom man, cage tender, car pusher, carrier man, concrete man, concrete form man, concrete repair man, cement invert laborer, cement finisher, concrete shoveler, conveyor man, floor man, gasoline and electric tool operator, gunnite man, grout operator, welder, heading dinky man, inside lock tender, pea gravel operator, pump man, outside lock tender, scaffold man, top signal man, switch man, track man, tugger man, utility man, vibrator man, winch operator, pipe jacking man, wagon drill and air track operator and concrete saw operator (under 40 h.p.).	LAUCT-Z1-3	\$31.71	\$42.38	\$53.05	H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		\$26.87	\$35.12	\$43.37	
1,001-2,000 work hours		\$27.84	\$36.57	\$45.31	
2,001-3,000 work hours		\$28.81	\$38.03	\$47.25	
3,001-4,000 work hours		\$30.74	\$40.93	\$51.11	
Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.	LAUCT-Z1-4	\$31.89	\$42.65	\$53.41	H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		\$27.01	\$35.33	\$43.65	
1,001-2,000 work hours		\$27.99	\$36.80	\$45.61	
2,001-3,000 work hours		\$28.96	\$38.25	\$47.55	
3,001-4,000 work hours		\$30.91	\$41.18	\$51.45	
Class V - Tunnel, shaft and caisson miner, drill runner, keyboard operator, power knife operator, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars)	LAUCT-Z1-5	\$32.14	\$43.03	\$53.91	H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		\$27.20	\$35.61	\$44.03	
1,001-2,000 work hours		\$28.19	\$37.10	\$46.01	
2,001-3,000 work hours		\$29.17	\$38.57	\$47.97	
3,001-4,000 work hours		\$31.15	\$41.54	\$51.93	
Class VI - Dynamite man and powder man.	LAUCT-Z1-6	\$32.47	\$43.52	\$54.57	H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		\$27.45	\$35.99	\$44.53	
1,001-2,000 work hours		\$28.45	\$37.49	\$46.53	
2,001-3,000 work hours		\$29.45	\$38.99	\$48.53	
3,001-4,000 work hours		\$31.47	\$42.02	\$52.57	

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Oakland

Official Rate Schedule

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

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Page 8 of 20

Classification		Straight	Time and	Double		
Name	Description	Hourly	a Half	Time	Overtime	Provision
=====						
Class VII - Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes and flagstones.		LAUCT-Z1-7	\$25.75	\$33.44	\$41.13	H H H H H H D Y
Apprentice Rates:						
0-1,000 work hours		\$22.41	\$28.43	\$34.45		
1,001-2,000 work hours		\$23.07	\$29.42	\$35.77		
2,001-3,000 work hours		\$23.74	\$30.43	\$37.11		
3,001-4,000 work hours		\$25.08	\$32.43	\$39.79		
Landscape Laborer						
Landscape specialist includes; air, gas, and diesel equipment operator, lawn sprinkler installer.		LLAN-Z1-A	\$22.38	\$31.04	\$39.69	X X H X X X H D Y
Landscape laborer; small power tool operator, lawn sprinkler installer helper, material mover, truck driver.		LLAN-Z1-B	\$18.16	\$24.71	\$31.25	X X H X X X H D Y
Marble Finisher						
Marble Finisher		TT32-MF	\$37.17	\$46.87	\$56.57	H H D H D D D D N
Apprentice Rates:						
Level 1		\$18.16	\$23.25	\$28.35		
Level 2		\$19.18	\$24.79	\$30.39		
Level 3		\$23.19	\$29.47	\$35.75		
Level 4		\$24.45	\$31.36	\$38.27		
Level 5		\$25.74	\$32.85	\$39.97		
Level 6		\$27.13	\$34.62	\$42.10		
Level 7		\$28.57	\$36.10	\$43.63		
Level 8		\$29.85	\$37.62	\$45.40		
Marble Mason						
Marble Mason		TT32-MM	\$42.76	\$55.51	\$68.25	H H D H D D D D N
Apprentice Rates:						
Level 1		\$23.56	\$30.36	\$37.16		
Level 2		\$26.21	\$33.74	\$41.28		
Level 3		\$28.90	\$36.71	\$44.51		
Level 4		\$31.20	\$39.83	\$48.46		
Level 5		\$33.26	\$42.19	\$51.12		
Level 6		\$36.52	\$47.03	\$57.53		
Level 7		\$37.33	\$48.11	\$58.89		
Level 8		\$38.14	\$49.33	\$60.51		
Operating Engineer						
Crane with boom & jib or leads 120' or longer		EN-324-A120	\$46.38	\$62.48	\$78.57	H H D H D D D D Y

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Oakland

Official Rate Schedule

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

Contract must be awarded by 10/22/2006

Page 9 of 20

Classification		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description				
Crane with boom & jib or leads 140' or longer	EN-324-A140	\$47.20	\$63.71	\$80.21	H H D H D D D D Y
Crane with boom & jib or leads 220' or longer	EN-324-A220	\$47.50	\$64.16	\$80.81	H H D H D D D D Y
Crane with boom & jib or leads 300' or longer	EN-324-A300	\$49.00	\$70.03	\$91.06	H H D H D D D D Y
Crane with boom & jib or leads 400' or longer	EN-324-A400	\$50.50	\$68.66	\$86.81	H H D H D D D D Y
Compressor or welding machine	EN-324-CW	\$35.53	\$46.20	\$56.87	H H D H D D D D Y
Forklift, lull, extend-a-boom forklift	EN-324-FL	\$42.84	\$57.17	\$71.49	H H D H D D D D Y
Fireman or oiler	EN-324-FO	\$34.50	\$44.66	\$54.81	H H D H D D D D Y
Regular crane, job mechanic, concrete pump	EN-324-RC	\$45.52	\$61.19	\$76.85	H H D H D D D D Y
Regular engineer	EN-324-RE	\$44.55	\$59.73	\$74.91	H H D H D D D D Y
Apprentice Rates:					
	Period 1	\$34.99	\$45.62	\$56.24	
	Period 2	\$36.51	\$47.90	\$59.28	
	Period 3	\$38.03	\$50.18	\$62.32	
	Period 4	\$39.55	\$52.46	\$65.36	
	Period 5	\$41.06	\$54.72	\$68.38	
	Period 6	\$42.58	\$57.00	\$71.42	

Operating Engineer - Marine Construction

Diver/Wet Tender, Engineer (hydraulic dredge)	GLF-1	\$47.11	\$61.89	\$76.66	X X H H H H H D Y
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Holidays paid at \$91.44 per hour

Subdivision of county all Great Lakes, islands therein, & connecting & tributary waters

Crane/Backhoe Operator, Mechanic/Welder, Assistant Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender	GLF-2	\$45.61	\$59.64	\$73.66	X X H H H H H D Y
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Holidays paid \$87.69 per hour

Subdivision of county All Great Lakes, islands therein, & connecting & tributary waters

Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more), Tug/Launch Operator, Loader, Dozer and like equipment on Barge, Breakwater Wall, Slip/Doc or Scow, Deck Machinery	GLF-3	\$42.56	\$55.06	\$67.56	X X H H H H H D Y
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Holidays paid at \$80.06 per hour

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Statewide

Official Rate Schedule

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

Contract must be awarded by 10/22/2006

Page 10 of 20

Classification		Straight	Time and	Double		
Name	Description	Hourly	a Half	Time	Overtime Provision	
=====						
<u>Subdivision of county</u>		All Great Lakes, islands therein, & connecting & tributary waters				
Deck Equipment Operator, (Machineryman/Fireman), (4 equipment units or more), Deck Hand, Deck Engineer, & Crane Maintenance 50 ton capacity and under or Backhoe weighing 115,000 lbs or less, Assistant Tug Operator		GLF-4	\$38.36	\$48.76	\$59.16	X X H H H H H D Y
Holidays paid at \$69.56 per hour						
<u>Subdivision of county</u>		All Great Lakes, islands therein, & connecting & tributary waters				
Operating Engineer Hazardous Waste Class I						
Level A - Fully encapsulating chemical resistant suit w/ pressure demand, full face piece SCBA or pressure demand supplied air respirator w/ escape SCBA. The highest available level of respiratory, skin and eye protection.		EN-324-HWCI-Z1A	\$44.87	\$60.16	\$75.50	H H H H H H H D Y
Apprentice Rates:						
1st 6 months			\$35.20	\$45.96	\$56.71	
2nd 6 months			\$36.74	\$48.27	\$59.79	
3rd 6 months			\$38.28	\$50.58	\$62.87	
4th 6 months			\$39.81	\$52.87	\$65.93	
5th 6 months			\$41.35	\$55.19	\$69.01	
6th 6 months			\$42.88	\$57.48	\$72.07	
Level B & C protection. B - Pressure demand, full face SCBA or pressure demand supplied air respirator w/ escape SCBA w/chemical resistant clothing. C - Full face piece, air purifying canister-equipped respirator w/chemical resistant clothing.		EN-324-HWCI-Z1B	\$43.91	\$58.80	\$73.69	H H H H H H H D Y
Apprentice Rates:						
1st 6 months			\$34.53	\$44.95	\$55.37	
2nd 6 months			\$36.02	\$47.19	\$58.35	
3rd 6 months			\$37.51	\$49.42	\$61.33	
4th 6 months			\$39.00	\$51.66	\$64.31	
5th 6 months			\$40.49	\$53.89	\$67.29	
6th 6 months			\$41.98	\$56.13	\$70.27	
Level D - Coveralls, safety boots, glasses or chemical splash goggles and hard hats.		EN-324-HWCI-Z1D	\$42.61	\$56.85	\$71.09	H H H H H H H D Y
Apprentice Rates:						
1st 6 months			\$33.62	\$43.59	\$53.55	
2nd 6 months			\$35.05	\$45.74	\$56.41	
3rd 6 months			\$36.47	\$47.87	\$59.25	
4th 6 months			\$37.90	\$50.01	\$62.11	
5th 6 months			\$39.31	\$52.12	\$64.93	
6th 6 months			\$40.74	\$54.27	\$67.79	

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Oakland

Official Rate Schedule

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

Contract must be awarded by 10/22/2006

Page 11 of 20

Classification		Straight	Time and	Double		
Name	Description	Hourly	a Half	Time	Overtime	Provision
=====						
Level D When Capping Landfill Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWCII-Z1DCL	\$42.36	\$56.47	\$70.58	H H H H H H D Y	
Apprentice Rates:						
	1st 6 months	\$33.45	\$43.33	\$53.21		
	2nd 6 months	\$34.85	\$45.43	\$56.01		
	3rd 6 months	\$36.26	\$47.54	\$58.83		
	4th 6 months	\$37.68	\$49.68	\$61.67		
	5th 6 months	\$39.09	\$51.80	\$64.49		
	6th 6 months	\$40.50	\$53.90	\$67.31		
Operating Engineer Hazardous Waste Class II						
Level A - Fully encapsulating chemical resistant suit w/ pressure demand, full face piece SCBA or pressure demand supplied air respirator w/ escape SCBA. The highest available level of respiratory, skin and eye protection.	EN-324-HWCII-Z1A	\$40.64	\$53.88	\$67.13	H H H H H H D Y	
Level B & C protection. B - Pressure demand, full face SCBA or pressure demand supplied air respirator w/ escape SCBA w/chemical resistant clothing. C - Full face piece, air purifying canister-equipped respirator w/chemical resistant clothing.	EN-324-HWCII-Z1B	\$39.68	\$52.45	\$65.22	H H H H H H D Y	
Level D - Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWCII-Z1D	\$38.38	\$50.50	\$62.62	H H H H H H D Y	
Level D When Capping Landfill Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWCII-Z1DCL	\$38.14	\$50.13	\$62.12	H H H H H H D Y	
Operating Engineer Hazardous Waste Crane w/ Boom & Jib leads 140' or longer						
Level A - Fully encapsulating chemical resistant suit w/ pressure demand, full face piece SCBA or pressure demand supplied air respirator w/ escape SCBA. The highest available level of respiratory, skin and eye protection.	EN-324-HW140-Z1A	\$47.51	\$64.14	\$80.80	H H H H H H D Y	
Level B & C protection. B - Pressure demand, full face SCBA or pressure demand supplied air respirator w/ escape SCBA w/chemical resistant clothing. C - Full face piece, air purifying canister-equipped respirator w/chemical resistant clothing.	EN-324-HW140-Z1B	\$46.57	\$62.79	\$79.00	H H H H H H D Y	
Level D Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HW140-Z1D	\$45.27	\$60.84	\$76.40	H H H H H H D Y	
Level D When Capping Landfill Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HW140-Z1DCL	\$45.02	\$59.71	\$75.15	H H H H H H D Y	

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Oakland

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Official 2006 Prevailing Wage Rates for State Funded Projects

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Page 12 of 20

Classification		Straight	Time and	Double							
Name	Description	Hourly	a Half	Time	Overtime Provision						
=====											
Operating Engineer Hazardous Waste Crane w/ Boom & Jib leads 220' or longer											
Level A - Fully encapsulating chemical resistant suit w/ pressure demand, full face piece SCBA or pressure demand supplied air respirator w/ escape SCBA. The highest available level of respiratory, skin and eye protection.	EN-324-HW220-Z1A	\$47.81	\$64.65	\$81.48	H	H	H	H	H	H	D Y
Level B & C protection. B - Pressure demand, full face SCBA or pressure demand supplied air respirator w/ escape SCBA w/chemical resistant clothing. C - Full face piece, air purifying canister-equipped respirator w/chemical resistant clothing.	EN-324-HW220-Z1B	\$46.87	\$63.23	\$79.60	H	H	H	H	H	H	D Y
Level D Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HW220-Z1D	\$45.57	\$61.28	\$77.00	H	H	H	H	H	H	D Y
Level D When Capping Landfill Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HW220-Z1DCL	\$45.32	\$60.90	\$76.49	H	H	H	H	H	H	D Y
Operating Engineer Hazardous Waste Regular Crane, Job Mechanic, Dragline Operator, Boom Truck Operator, and Concrete Pump with Boom Operator											
Level D - Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWRC-Z1D	\$43.58	\$58.30	\$73.02	H	H	H	H	H	H	D Y
Operating Engineer Hazardous Waste Regular Crane, Job Mechanic, Dragline Operator, Boom Truck Operator, Power Shovel Operator and Concrete Pump with boom											
Level D When Capping Landfill Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWRC-Z1DCL	\$42.72	\$57.01	\$71.30	H	H	H	H	H	H	D Y
Operating Engineer Hazardous Waste Regular Crane, Job Mechanic, Dragline Operator, Boom Truck Operator, Power Shovel Operator and Concrete Pump with booms											
Level B & C protection. B - Pressure demand, full face SCBA or pressure demand supplied air respirator w/ escape SCBA w/chemical resistant clothing. C - Full face piece, air purifying canister-equipped respirator w/chemical resistant clothing.	EN-324-HWRC-Z1B	\$44.88	\$60.25	\$75.62	H	H	H	H	H	H	D Y
Operating Engineer Hazardous Waste Regular Crane, Job Mechanic, Dragline Operator, Boom Truck Operator, Power Shovel Operators and Concrete Pump with booms											
Level A - Fully encapsulating chemical resistant suit w/ pressure demand, full face piece SCBA or pressure demand supplied air respirator w/ escape SCBA. The highest available level of respiratory, skin and eye protection.	EN-324-HWRC-Z1A	\$45.83	\$61.68	\$77.53	H	H	H	H	H	H	D Y
Operating Engineer Steel Work											
Crane w/ 120' boom or longer	EN-324-SW120	\$49.38	\$66.98	\$84.57	H	H	D	H	H	H	D Y

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

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Page 13 of 20

Classification		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description				
Crane w/ 120' boom or longer w/ Oiler	EN-324-SW120-O	\$50.38	\$68.48	\$86.57	H H D H H D D Y
Crane w/ 140' boom or longer	EN-324-SW140	\$50.56	\$68.75	\$86.93	H H D H H D D Y
Crane w/ 140' boom or longer W/ Oiler	EN-324-SW140-O	\$51.56	\$70.25	\$88.93	H H D H H D D Y
Boom & Jib 220' or longer	EN-324-SW220	\$50.83	\$69.15	\$87.47	H H D H H D D Y
Crane w/ 220' boom or longer w/ Oiler	EN-324-SW220-O	\$51.83	\$70.65	\$89.47	H H D H H D D Y
Boom & Jib 300' or longer	EN-324-SW300	\$52.33	\$71.40	\$90.47	H H D H H D D Y
Crane w/ 300' boom or longer w/ Oiler	EN-324-SW300-O	\$53.33	\$72.90	\$92.47	H H D H H D D Y
Boom & Jib 400' or longer	EN-324-SW400	\$53.83	\$73.65	\$93.47	H H D H H D D Y
Crane w/ 400' boom or longer w/ Oiler	EN-324-SW400-O	\$54.83	\$75.15	\$95.47	H H D H H D D Y
Crane Operator & Job Mechanic	EN-324-SWCO	\$49.02	\$66.44	\$83.85	H H D H H D D Y
Apprentice Rates:					
0-999 hours		\$38.12	\$50.31	\$62.50	
1,000-1,999 hours		\$39.87	\$56.14	\$72.40	
2,000-2,999 hours		\$41.60	\$55.53	\$69.46	
3,000-3,999 hours		\$43.35	\$58.15	\$72.96	
4,000-4,999 hours		\$45.09	\$60.77	\$76.44	
5,000 hours		\$46.84	\$63.39	\$79.94	
Crane w/ Oiler	EN-324-SWCO-O	\$50.02	\$67.94	\$85.85	H H D H H D D Y
Compressor or Welder Operator	EN-324-SWCW	\$41.57	\$55.26	\$68.95	H H D H H D D Y
Hoisting Operator	EN-324-SWHO	\$48.38	\$65.48	\$82.57	H H D H H D D Y
Oiler	EN-324-SWO	\$40.16	\$53.15	\$66.13	H H D H H D D Y
Tower Crane & Derrick where work is 50' or more above first level	EN-324-SWTD50	\$50.11	\$68.07	\$86.03	H H D H H D D Y
Tower Crane & Derrick 50' or more w/ Oiler where work station is 50' or more above first level	EN-324-SWTD50-O	\$51.11	\$69.57	\$88.03	H H D H H D D Y

Official Request #: 880

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Page 14 of 20

Classification			Straight	Time and	Double		
Name	Description		Hourly	a Half	Time	Overtime	Provision
=====							
Operating Engineer Underground							
Class I Equipment	EN-324A1-UC1		\$42.37	\$56.45	\$70.54	H H H H H H H D	Y
	Apprentice Rates:						
	0-999 hours		\$33.46	\$43.32	\$53.18		
	1,000-1,999 hours		\$34.88	\$45.45	\$56.02		
	2,000-2,999 hours		\$36.28	\$47.55	\$58.82		
	3,000-3,999 hours		\$37.68	\$49.65	\$61.62		
	4,000-4,999 hours		\$39.10	\$51.79	\$64.46		
	5,000-5,999 hours		\$40.51	\$53.90	\$67.28		
Class II Equipment	EN-324A1-UC2		\$37.89	\$49.74	\$61.59	H H H H H H H D	Y
Class III Equipment	EN-324A1-UC3		\$37.16	\$48.64	\$60.12	H H H H H H H D	Y
Class IV Equipment	EN-324A1-UC4		\$36.59	\$47.79	\$58.99	H H H H H H H D	Y
Master Mechanic	EN-324A1-UMM		\$42.62	\$56.83	\$71.05	H H H H H H H D	Y
Painter							
Painter (8 hours of repaint work performed on Sunday shall be paid time & one half rate)	PT-22-P		\$38.01	\$50.24	\$62.47	H H D H D D D D	N
	Apprentice Rates:						
	First 6 months		\$25.78	\$31.89	\$38.01		
	Second 6 months		\$29.45	\$37.40	\$45.35		
	Third 6 months		\$30.67	\$39.23	\$47.79		
	Fourth 6 months		\$31.89	\$41.06	\$50.23		
	Fifth 6 months		\$33.12	\$42.91	\$52.69		
	Final 6 months		\$34.34	\$44.73	\$55.13		
Sandblasting & spraywork performed, on highway bridges, overpasses, tanks or steel, OR spraywork & sandblasting done with a scaffold height of 40' above the floor level	PT-22-S		\$38.81	\$51.44	\$64.07	H H D H D D D D	N

Official Request #: 880

Requestor: TROY SCHOOL DISTRICT

Project Description: SCHOOL TECHNOLOGY SYSTEMS

Project Number: BID 9343 BAKER MIDDLE SCHOOL

County: Oakland

Official Rate Schedule

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

Contract must be awarded by 10/22/2006

Page 15 of 20

Classification		Straight		Time and		Double		Overtime Provision	
Name	Description	Hourly		a Half		Time			
Pipefitter									
Pipefitter	PF-636	\$51.46		\$66.44		\$81.41	H H D H D D D D N		
	Apprentice Rates:								
	1st & 2nd periods	\$26.23		\$33.23		\$40.23			
	3rd period	\$28.23		\$36.23		\$44.23			
	4th period	\$29.48		\$38.11		\$46.73			
	5th period	\$30.73		\$39.98		\$49.23			
	6th period	\$31.98		\$41.85		\$51.73			
	7th period	\$33.23		\$43.73		\$54.23			
	8th period	\$34.23		\$45.23		\$56.23			
	9th period	\$35.23		\$46.73		\$58.23			
	10th period	\$36.66		\$48.87		\$61.09			
Plasterer									
Plasterer	BR1P	\$40.97		\$61.46		\$81.94	H H H H H H H D N		
	Apprentice Rates:								
	1st 6 months	\$20.77		\$31.16		\$41.54			
	2nd 6 months	\$24.16		\$36.24		\$48.32			
	3rd 6 months	\$27.52		\$41.28		\$55.04			
	4th 6 months	\$30.88		\$46.32		\$61.76			
	5th 6 months	\$34.25		\$49.58		\$66.10			
	6th 6 months	\$37.61		\$56.42		\$75.22			
Plasterer	PL67	\$38.32		\$52.78		\$67.24	H H H X D D D D N		
	Apprentice Rates:								
	1st 6 months	\$20.97		\$26.76		\$32.54			
	2nd 6 months	\$23.86		\$31.09		\$38.32			
	3rd 6 months	\$26.75		\$35.42		\$44.10			
	4th 6 months	\$29.64		\$39.76		\$49.88			
	5th 6 months	\$32.54		\$44.11		\$55.68			
	6th 6 months	\$35.43		\$48.44		\$61.46			

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Issue Date: 7/24/2006

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Page 16 of 20

Classification		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description				
=====					
Plumber					
Plumber	PL-98	\$49.58	\$67.10	\$82.61	H H D H D D D D Y
Apprentice Rates:					
	Period 1	\$18.11	\$25.11	\$32.11	
	Period 2	\$20.30	\$28.39	\$36.49	
	Period 3	\$30.47	\$40.85	\$50.13	
	Period 4	\$31.16	\$41.89	\$51.51	
	Period 5	\$32.45	\$43.83	\$54.09	
	Period 6	\$33.73	\$45.75	\$56.65	
	Period 7	\$35.01	\$47.67	\$59.21	
	Period 8	\$36.31	\$49.61	\$61.81	
	Period 9	\$37.59	\$51.53	\$64.37	
	Period 10	\$38.87	\$53.45	\$66.93	
Roofer					
Commercial Roofer	RO-149-WOM	\$43.36	\$56.74	\$70.12	H H D H H H D D N
Apprentice Rates:					
	Apprentice 1	\$32.12	\$39.88	\$47.64	
	Apprentice 2	\$32.56	\$40.54	\$48.52	
	Apprentice 3	\$33.87	\$42.50	\$51.14	
	Apprentice 4	\$34.83	\$43.94	\$53.06	
	Apprentice 5	\$35.96	\$45.64	\$55.32	
	Apprentice 6	\$37.25	\$47.58	\$57.90	
Sheet Metal Worker					
Sheet Metal Worker	SHM-80	\$51.82	\$69.04	\$86.25	H H D H D D D D Y
Apprentice Rates:					
	First Year	\$34.61	\$43.22	\$51.83	
	Second Year	\$35.98	\$45.27	\$54.57	
	Third Year	\$37.36	\$47.34	\$57.33	
	Fourth Year	\$40.11	\$51.47	\$62.83	
	Fifth Year	\$42.86	\$55.59	\$68.33	
Siding & Decking					
	SHM-80-SD	\$34.58	\$46.03	\$57.48	H H H H H H H D Y

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

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Page 17 of 20

Classification		Straight		Time and		Double		Overtime Provision	
Name	Description	Hourly		a Half		Time			
Sound & Communication									
Installer/Technician	EC-58-SC	\$29.33		\$41.30		\$53.26	H H H H H H H D N		
	Apprentice Rates:								
	Period 1	\$17.16		\$23.04		\$28.93			
	Period 2	\$18.38		\$24.88		\$31.37			
	Period 3	\$19.59		\$26.69		\$33.79			
	Period 4	\$20.81		\$28.53		\$36.23			
	Period 5	\$22.02		\$30.33		\$38.65			
	Period 6	\$23.24		\$32.17		\$41.09			
Sprinkler Fitter									
Sprinkler Fitter	SP 704	\$52.17		\$70.51		\$88.85	H H D H D D D D Y		
	Apprentice Rates:								
	1st Period	\$21.82		\$29.16		\$36.50			
	2nd Period	\$32.00		\$40.25		\$48.51			
	3rd Period	\$33.83		\$43.00		\$52.17			
	4th Period	\$35.67		\$45.76		\$55.85			
	5th Period	\$37.50		\$48.51		\$59.51			
	6th Period	\$39.34		\$51.27		\$63.19			
	7th Period	\$41.17		\$54.01		\$66.85			
	8th Period	\$43.00		\$56.75		\$70.51			
	9th Period	\$44.84		\$59.51		\$74.19			
	10th Period	\$46.67		\$62.26		\$77.85			
Terrazzo									
Terrazzo Finisher	TT32-TRF	\$37.57		\$47.47		\$57.37	H H D H D D D D N		
	Apprentice Rates:								
	Level 1	\$19.15		\$24.74		\$30.33			
	Level 2	\$19.78		\$25.69		\$31.59			
	Level 3	\$12.49		\$18.74		\$24.98			
	Level 4	\$24.38		\$31.25		\$38.13			
	Level 5	\$25.67		\$32.75		\$39.83			
	Level 6	\$27.56		\$35.09		\$42.62			
	Level 7	\$28.50		\$36.12		\$43.74			
	Level 8	\$29.78		\$37.65		\$45.51			

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Official 2006 Prevailing Wage Rates for State Funded Projects

Issue Date: 7/24/2006

Contract must be awarded by 10/22/2006

Page 18 of 20

Classification			Straight	Time and	Double	Overtime Provision	
Name	Description		Hourly	a Half	Time		
=====							
Terrazzo Worker	TT32-TRW		\$42.29	\$54.80	\$67.31	H H D H D D D D N	
	Apprentice Rates:						
	Level 1		\$23.46	\$30.21	\$36.96		
	Level 2		\$26.11	\$33.60	\$41.08		
	Level 3		\$28.80	\$36.55	\$44.31		
	Level 4		\$31.10	\$39.68	\$48.26		
	Level 5		\$33.16	\$42.17	\$51.17		
	Level 6		\$36.34	\$46.75	\$57.17		
	Level 7		\$37.40	\$48.21	\$59.03		
	Level 8		\$38.21	\$49.43	\$60.65		
Tile							
Tile Finisher	TT32-TF		\$37.19	\$46.90	\$56.61	H H D H D D D D N	
	Apprentice Rates:						
	Level 1		\$18.06	\$23.11	\$28.15		
	Level 2		\$19.08	\$24.63	\$30.19		
	Level 3		\$23.09	\$29.32	\$35.55		
	Level 4		\$24.35	\$31.21	\$38.07		
	Level 5		\$25.64	\$32.71	\$39.77		
	Level 6		\$27.03	\$34.46	\$41.90		
	Level 7		\$28.47	\$35.95	\$43.43		
	Level 8		\$29.75	\$37.48	\$45.20		
Tile Layer	TT32-TL		\$42.19	\$54.65	\$67.11	H H D H D D D D N	
	Apprentice Rates:						
	Level 1		\$23.46	\$30.21	\$36.96		
	Level 2		\$26.11	\$33.60	\$41.08		
	Level 3		\$28.80	\$36.55	\$44.31		
	Level 4		\$31.10	\$39.68	\$48.26		
	Level 5		\$33.11	\$41.96	\$50.82		
	Level 6		\$36.29	\$46.68	\$57.07		
	Level 7		\$36.85	\$47.39	\$57.93		
	Level 8		\$37.66	\$48.61	\$59.55		
Truck Driver							
on all trucks of 8 cubic yard capacity or less	TM-RB1		\$32.62	\$35.55		H H H H H H H Y	
of all trucks of 8 cubic yard capacity or over	TM-RB1A		\$32.72	\$35.70		H H H H H H H Y	
on euclid type equipment	TM-RB1B		\$32.87	\$35.93		H H H H H H H Y	

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Page 19 of 20

Classification		Straight	Time and	Double	Overtime Provision	
Name	Description	Hourly	a Half	Time		
=====						
Underground Laborer Open Cut, Class I						
Construction Laborer	LAUC-Z1-1	\$31.39	\$41.90	\$52.41	H H H H H H D Y	
Apprentice Rates:						
	0-1,000 work hours	\$26.63	\$34.76	\$42.89		
	1,001-2,000 work hours	\$27.59	\$36.20	\$44.81		
	2,001-3,000 work hours	\$28.54	\$37.63	\$46.71		
	3,001-4,000 work hours	\$30.44	\$40.47	\$50.51		
Underground Laborer Open Cut, Class II						
Mortar and material mixer, concrete form man, signal man, well point man, manhole, headwall and catch basin builder, guard rail builders, headwall, seawall, breakwall, dock builder and fence erector.	LAUC-Z1-2	\$31.50	\$42.07	\$52.63	H H H H H H D Y	
Apprentice Rates:						
	0-1,000 work hours	\$26.72	\$34.89	\$43.07		
	1,001-2,000 work hours	\$27.67	\$36.32	\$44.97		
	2,001-3,000 work hours	\$28.63	\$37.76	\$46.89		
	3,001-4,000 work hours	\$30.54	\$40.63	\$50.71		
Underground Laborer Open Cut, Class III						
Air, gasoline and electric tool operator, vibrator operator, drillers, pump man, tar kettle operator, bracers, rodder, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars, etc.), cement finisher, welder, pipe jacking and boring man, wagon drill and air track operator and concrete saw operator (under 40 h.p.), windlass and tugger man, and directional boring man.	LAUC-Z1-3	\$31.55	\$42.14	\$52.73	H H H H H H D Y	
Apprentice Rates:						
	0-1,000 work hours	\$26.75	\$34.94	\$43.13		
	1,001-2,000 work hours	\$27.71	\$36.38	\$45.05		
	2,001-3,000 work hours	\$28.67	\$37.82	\$46.97		
	3,001-4,000 work hours	\$30.59	\$40.70	\$50.81		
Underground Laborer Open Cut, Class IV						
Trench or excavating grade man.	LAUC-Z1-4	\$31.63	\$42.26	\$52.89	H H H H H H D Y	
Apprentice Rates:						
	0-1,000 work hours	\$26.81	\$35.03	\$43.25		
	1,001-2,000 work hours	\$27.78	\$36.49	\$45.19		
	2,001-3,000 work hours	\$28.74	\$37.93	\$47.11		
	3,001-4,000 work hours	\$30.67	\$40.82	\$50.97		

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Page 20 of 20

<u>Classification</u>		Straight	Time and	Double		
Name	Description	Hourly	a Half	Time	Overtime Provision	
=====						
Underground Laborer Open Cut, Class V						
Pipe Layer	LAUC-Z1-5	\$31.69	\$42.35	\$53.01	H H H H H H D Y	
Apprentice Rates:						
0-1,000 work hours		\$26.86	\$35.11	\$43.35		
1,001-2,000 work hours		\$27.83	\$36.56	\$45.29		
2,001-3,000 work hours		\$28.79	\$38.00	\$47.21		
3,001-4,000 work hours		\$30.72	\$40.89	\$51.07		
Underground Laborer Open Cut, Class VI						
Grouting man, top man assistant, audio visual television operations and all other operations in connection with closed circuit television inspection, pipe cleaning and pipe relining work.	LAUC-Z1-6	\$29.14	\$38.53	\$47.91	H H H H H H D Y	
Apprentice Rates:						
0-1,000 work hours		\$24.95	\$32.24	\$39.53		
1,001-2,000 work hours		\$25.79	\$33.50	\$41.21		
2,001-3,000 work hours		\$26.62	\$34.75	\$42.87		
3,001-4,000 work hours		\$28.30	\$37.27	\$46.23		
Underground Laborer Open Cut, Class VII						
Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.	LAUC-Z1-7	\$25.76	\$33.46	\$41.15	H H H H H H D Y	
Apprentice Rates:						
0-1,000 work hours		\$22.41	\$28.43	\$34.45		
1,001-2,000 work hours		\$23.08	\$29.43	\$35.79		
2,001-3,000 work hours		\$23.75	\$30.44	\$37.13		
3,001-4,000 work hours		\$25.09	\$32.45	\$39.81		

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SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - 1. Floors.
 - 2. Walls and partitions.
 - 3. Construction enclosing compartmentalized areas.
- B. Related Sections include the following:
 - 1. Division 15 Sections specifying duct and piping penetrations.
 - 2. Division 16 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated floor assemblies.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located in construction containing fire-protection-rated openings.
 - 2. Penetrating items larger than 4-inch- diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL ITS or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in "Fire Resistance Directory."
 - 2) ITS in "Directory of Listed Products."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by firestop system manufacturers or when substrates are wet.
- B. Ventilate firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hilti Construction Chemicals, Inc.
 - 2. Nelson Firestop Products.
 - 3. RectorSeal Corporation (The).
 - 4. Specified Technologies Inc.
 - 5. 3M Fire Protection Products.
 - 6. Tremco.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

- I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07841

SECTION 16740 - LAN/WAN NETWORK EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes computer equipment, software and associated peripherals, installation, certification, training including, but not limited, to the following:
 - 1. Network Equipment, Firewalls, IDS, etc.
 - 2. Switches.
 - 3. Software.
 - 4. Licensing.
 - 5. Installation of new equipment.
 - 6. Provide and install cat 6 patch cables.
 - 7. Create database of equipment utilizing district supplied asset tags
 - 8. Apply asset tags to equipment
 - 9. Work with district personnel and configure new network switches.
 - 10. Program, configure and test all equipment.
 - 11. Provide record drawings and documented configuration.
 - 12. Provide on-site project management, training, and support for equipment and software when ultimately installed in the Troy School District location.
 - 13. Providing stackable 10/100/1000 Mb data switches.
 - 14. Providing a 1000 Base-SX building LAN backbone over multi-mode fiber cable.
 - 15. Training of personnel on use of the system.
 - 16. The file servers will be purchased and installed under separate contract and installed in the headend.
- B. The equipment under this contract shall be provided and configured with all net hardware and software to permit seamless integration into the School District WAN with no additional cost to the owner. The existing WAN fiber is a star topology design and consists of six (6) strands of fiber (2 strands for data, 2 strands for video and 2 strands dark) from the Service Building to each elementary school and ancillary building and 12 strands of fiber (2 strands for data, 2 strands for video and 8 strands dark) for each secondary school.

1.3 SYSTEM DESCRIPTION

- A. This contract consists of installing new LAN/WAN network equipment with new network equipment that will provide a minimum of 1 Gb on the backbone with immediate capabilities of 10 Gb. The edge network equipment shall have the capabilities of 10/100/1000 Mb (tri-speed) performance. At least one switch in each data closet shall have power over Ethernet (PoE) to accommodate future projects.
- B. All miscellaneous equipment required for a complete, professional installation shall be included in the base bid. No allowances for any additional equipment, hardware, cabling, or miscellaneous will be considered unless specifically excluded from the base bid.

- C. The District has organized their network utilizing a private IP scheme. Typically each building has at least one IP subnet.
- D. The District also utilizes VLANs in their network structure. There exists approximately 24 VLANs at this time in the District. The District will be adding VLANs for management of the network equipment and wireless LANs. The contractor shall work with the District personnel to develop a configuration and program the equipment.
- E. Time shall be allocated in the job for the purpose of training school personnel in the proper use and maintenance of the provided equipment.
- F. Install cable in a professional manor. No exposed cabling shall be permitted in the wiring of any functions of the provided system. All cable shall be housed in appropriate raceways suitable and designed for such purposes.
- G. All work materials shall be removed at the end of the work day and the work area left in the same condition as found.
- H. The communication bidder supplying the equipment shall show satisfactory evidence, upon request, that they maintain a fully equipped service organization capable of furnishing adequate inspection and service to the system, including replacement parts. The vendor shall be prepared to offer a service contract for the maintenance of the system after the warranty period. The bidder shall produce evidence that they have a fully experienced and established service organization for at least five years and proven satisfactory installations during that time.

Adherence to a schedule of working hours which is agreeable with the Owner will be required.

- I. All work shall be in accordance with the true intent of these Specifications, and as required to leave the core network equipment complete and in satisfactory operating condition, excluding those items listed under "Related Work Provided by Others."
 - 1. The Owner reserves the right to reject any or all alternate equipment bids and to select the bid that is considered to serve "THE BEST INTEREST OF THE OWNER."

1.4 SUBMITTALS

- A. Provide the following information with the Bid:
 - 1. A complete itemization of manufacturers' products and equipment with catalog cuts.
 - 2. Manufacturers' product specifications and installation instructions.
 - 3. A complete itemization of software products with catalog cuts
 - 4. Software product specifications and installation instructions.
 - 5. Provide recent customer references for similar work performed during the last twelve months and provide documentation on installation staff training and certification.

1.5 QUALITY ASSURANCE

- A. Equipment Manufacturer Qualifications: The network equipment shall be built and tested by a manufacturer who has regularly engaged in the production of core network systems for a minimum of five years to assure one source of supply and responsibility.

- B. **Equipment Supplier Qualifications:** The supplier of the network equipment shall maintain permanent service facilities in the ultimate area of the installation (Troy School District). The facilities shall include a permanent source of factory-trained service technicians on 24-hour call experienced in servicing this type of equipment and shall provide warranty and routine maintenance service to afford the Owner maximum coverage. He shall also provide a central source of support to warranty immediate answers to Owner's problems resulting from misunderstanding of the operation of the equipment
- C. **Equipment Installer Qualifications:** The installation of the server shall be performed by fully qualified personnel, having had experience on the installation of this type and able to certify that they have had no less than five years of continuous experience in this area and have made installation similar to this and of this size or larger.
1. Contractor (Vendor) shall be qualified and normally engaged in the business of providing and installing network equipment, local area networks and shall possess a thorough knowledge of and conformance with all applicable standards.
 2. Contractor (Vendor) shall provide a qualified project leader who is skilled in network systems programming and installation, certified for the specific manufacturer's equipment that is to be installed. The name and qualifications of the project leader shall be part of the bid documents. The Troy School District reserves the right to reject if experience or qualifications are not deemed sufficient.
 3. Contractor (Vendor) shall provide, with this bid response, a detailed list of other vendor projects and their size/scope scheduled for implementation during the same time periods as this project.
 4. Contractor (Vendor) shall provide, with this bid response, a company profile detailing the size of the company, installation and technical resources the vendor has on staff and the number of installers that will be assigned to this project.
 5. Contractor (Vendor) shall provide, with this bid response, the names of subcontractors for any portion of the work. Vendor must satisfy the district with the reliability and responsibility of proposed subcontractors to furnish and perform work. The final responsibility for the installation and performance rests with the vendor.
- D. **Regulatory Requirements:** The computer equipment shall be registered under the most current applicable rulings of the Federal Communications Commission (FCC). Provide the FCC registration number with the equipment submittal. All components and installations shall bear an Underwriters' Laboratories (UL) listing and shall conform with the latest edition or revision of the following codes and standards:
1. ANSI American National Standards Institute
 2. FCC Federal Communications Commission
 3. ISO International Organization for Standardization
 4. UL Underwriters Laboratories, Inc.
- E. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and Specifications.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store network equipment, at vendor's location, as recommended in manufacturer's written instructions and in manufacturer's protective packages until time of installation.
- B. Protect network equipment from damage and theft.

1.7 PROJECT/SITE CONDITIONS

- A. Verify conditions at the job site prior to installation at the Troy School District.

1.8 WARRANTY

- A. Warranty: All products shall be warranted to be free from defects in material and workmanship upon installation.
- B. Warranty period shall commence after all the systems have been placed in working operation and accepted by the Owner by formal written acceptance.
- C. All systems and components shall be warranted free of defects in materials and workmanship for a period of one (1) year or manufacturer warranty, which ever is longer, from the date of acceptance. Systems and components shall be repaired or replaced within twenty-four (24) hours following report of defects by the Owner. Service for the first year will be provided on-site at the Troy School District. The date of acceptance shall be defined as the date the Certificate of Substantial Completion is signed by the Architect/Engineer and the Owner.

1.9 TRAINING/SUPPORT

- A. The equipment Contractor (Vendor) shall have a technical support personnel in the District the first two (2) consecutive days after the cut-over at each school from 7:00 a.m. to 3:00 p.m. to assure proper operation of the network systems.
- B. Training:
 - 1. The network equipment supplier shall provide a minimum of four (4) hours of instruction and training on the operation of the system and its maintenance to the Troy School District technical maintenance staff.
 - 2. All training will be coordinated with the Technology Director and training shall take place at the Troy School District's Services Building.
- C. Support
 - 1. The network equipment supplier shall provide eight (8) hours of on-site support to be used at the schools discretion within the first year of installation.

1.10 SERVICE

- A. The network equipment Contractor (Vendor) shall be available and shall respond on-site within four (4) hours' notice and without cost to the Owner during the first twelve (12) months of full-scale operation, following acceptance of the system.

1.11 MAINTENANCE

- A. The Vendor shall submit a maintenance and service contract with service rates covering all labor and materials necessary to repair damages to the systems after expiration of the warranty period. The contract shall include a differentiation between and definitions of "emergency" and "non-emergency" service with applicable rates for each.

1.12 SPARE PARTS

- A. Guarantee the availability of all spare parts and maintain locally an adequate compliment of components that are applicable to the network equipment for seven (7) years.
- B. Provide one (1) set of system hardware and software manuals.
- C. Provide the following spare parts:
 - 1. Three (3) 2960G48TCL
 - 2. One (1) 3560G24PS
 - 3. One (1) 3750G12S
 - 4. One (1) GLC-T
 - 5. One (1) GLC-SX
 - 6. One (1) GLC-LX/LH
 - 7. Twenty (20) Category 6 Patch Cables
 - 8. Two (2) Fiber patch cables

PART 2 - PRODUCT

2.1 PATCH CABLES

- A. Patch cables shall be of lengths necessary, minimum three feet (3'), to provide neat and organized patches to equipment. The contractor is required to review site conditions to ensure the proper cable lengths are installed in all District buildings. For bidding purposes, include the following lengths as the base bid response.
 - 1.

Type	Color
Cross-Over	White, Gray
Uplink (switches)	Orange
Server	Green
Administration VLAN	Red
Instructional VLAN	Yellow
Wireless VLAN	Black

2.2 LABELING

- A. The contractor shall install District supplied asset tags on all switches and equipment provided under this bid. The contractor shall create a database in Microsoft Excel format with the following information:
 - 1. District asset tag number
 - 2. IP address
 - 3. MAC address
 - 4. Switch identification number
- B. The contractor shall provide and apply the asset tag and network switch identification label. The label shall follow the following District standard:

Building Name – Closet No. – Switch No. (ie; BMS.IDF2.1)

The District will review and approve the label and the three-letter building name abbreviations.

2.3 APPROVED MANUFACTURERS

- A. Subject to compliance with requirements, provide core network equipment as manufactured by one of the following:
1. Cisco Systems

2.4 NETWORK EQUIPMENT

- A. General: The network equipment shall be new, of modern design, and the current standard production of the manufacturer.
- B. Network Equipment:
1. The following sections specifically list the acceptable equipment types and items for this project.
 2. All miscellaneous equipment (including fiber and copper patch cables) required for a complete, professional installation shall be included in the base bid. No allowances for any additional equipment, hardware, cabling, or miscellaneous will be considered unless specifically excluded from the base bid.
 3. All hardware and software shall have direct manufacturer support through the year 2012.
- C. Baker Middle School Configuration:
1. The MDF: Provide, configure and install the following:
 - a. One (1) Cisco 3750G-12S, 12 port Gb switches with two (2) GLC-T 1000 TX GBICs, six (6) GLC-SX 1000 SX GBICs, two (2) GLC-LX/LH 1000 LX GBICs, two (2) 3560G24PS 24 port 10/100/1000 MB PoE Switch and three (3) 2960G48TCL 48 port 10/100/1000 Mb switches.
 2. IDF-2: Provide, configure and install the following:
 - a. Two (2) 3560G24PS 24-port 10/100/1000 MB PoE Switch, three (3) 2960G48TCL 48 port 10/100/1000 Mb switches and two (2) GLC-SX 1000 SX GBICs.
 3. IDF-3: Provide, configure and install the following:
 - a. One (1) 3560G24PS 24-port 10/100/1000 MB PoE Switch, two (2) 2960G48TCL 48 port 10/100/1000 Mb switches and two (2) GLC-SX 1000 SX GBICs.
 4. IDF-4: Provide, configure and install the following:
 - a. One (1) 3560G24PS 24-port 10/100/1000 MB PoE Switch, two (2) 2960G48TCL 48 port 10/100/1000 Mb switches and one (1) GLC-SX 1000 SX GBICs.
 5. IDF-5: Provide, configure and install the following:
 - a. One (1) 3560G24PS 24-port 10/100/1000 MB PoE Switch, one (1) 2960G48TCL 48 port 10/100/1000 Mb switches and one (1) GLC-SX 1000 SX GBICs.
- D. Service Center Configuration:
1. The District Network Core Configuration shall be as follows:

<u>Part Number</u>	<u>Description</u>	<u>Qty</u>
--------------------	--------------------	------------

GLC-LH-SM

GE SFP, LC connector LX/LH transceiver
(1 to core)

1

2.5 UNINTERRUPTIBLE POWER SUPPLY

- A. Each closet must be equipped with a UPS that supports network management, software and SNMP, from a centralized server.
- B. Each UPS must, at a minimum, provide thirty (30) minutes of auxiliary runtime for all network devices during power failures.
- C. UPS must be rack mounted in a location to support all network devices.
- D. Management software must be included in the base bid and installed on the same workstation that has switch management software.
- E. Management software must be setup to be able to page more than one of the Owner's support personnel.
- F. The MDF must be equipped with an APC Symmetra, 2000VA 120V or equivalent. If the equipment in the Contractor's response requires an additional UPS to meet specifications it must be included in the base bid.
- G. Each IDF must be equipped with APC Smart-UPS RT, 1500VA 120V or equivalent. If the equipment in the Contractor's response requires an additional UPS to meet specifications it must be included in the base bid.
- H. The Contractor shall include with each UPS a copper patch cable for connectivity to the network.

PART 3 - EXECUTION

3.1 INSTALLATION-GENERAL

- A. Unpack and assemble and program equipment.
- B. Install, configure, program and test the system.
- C. Support the final installation at the Troy School District location to insure defect free installation.
- D. Provide all new category 6 patch cables. All patch cables are to be numbered sequentially on both ends of the cable. Numbering shall be done at the factory.

3.2 INSTALLATION-TIMELINE

- A. The edge switches shall be complete by May 1, 2007.

END OF SECTION 16740

Troy School District
School Technology Systems
New Baker Middle School
TSD Bid No. 9343
Troy, Michigan

IDS Project No. 03234-1000 BP18

Appendix 1 New Baker Middle School -

		Total # of Data Switch Ports	Total # of Voice Switch Ports	Core Switch:	Edge Switch:	Edge Switch: WS- C3750G- 48PS-S 10/100/1000 PoE	Edge Switch: WS-C2960G- 48TC-L 10/100/1000	Edge PoE Switch: WS- C3560- 24PS-S 10/100 PoE	GLC- SX- MM= SFP 62.5 1000 50 SMF	GLC- LH- SM= SFP 1000 50 SMF
# Building & Closet				WS- C3750G- 12S-S 1000-SFP	WS-C3560G- 24PS-S 10/100/1000 PoE					
1 MDF	139	26		1	2		3		2	2
2 DF-2	139	25			2		3			2
3 DF-3	106	12			1		2			2
4 DF-4	64	11			1		2			1
5 DF-5	29	19			1		1			1

SECTION 16790 - VOICE, VIDEO COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY OF WORK

- A. This Specification, in conjunction with the Drawings, establishes the requirements necessary to achieve the intended performance and function of the Voice, Video Communications Systems (VVCS)
- B. The VVCS shall consist of a new Dukane multimedia retrieval system with voice, video information storage, information processing, and/or information delivery and distribution equipment integrated together to form a cohesive integrated communication system. This project shall include the installation of a new headend.
- C. Provide as part of the bid proposal a complete bill of materials, including catalog cuts and equipment configuration for each of the systems, i.e. voice and video systems.
- D. Provide the services necessary to install a new VVCS, in accordance with the drawings and conforming to acceptable industry standards. All work shall be in accordance with the true intent of these Drawings and Specifications excluding those items listed under "Work by Others."
- E. Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these Specifications, Manufacturers recommendations and the latest edition or revision of all applicable codes and standards.
- F. The VVCS includes providing and integrating the following principal systems:
 - 1. Provide new LCD's and new LCD mounting hardware.
 - 2. Provide new paging system speakers throughout facility complete including backboxes, cables, speakers, and grilles.
 - 3. Provide new local sound systems as indicated on drawings.
 - 4. Provide new supplemental Dukane digital clocks as indicated on drawings.
 - 5. Provide new 1/2 inch RF hardline, new combiners, new splitters, new taps, new RG6U cables, drop cables, amplifiers, and connectors.
 - 6. Provide new Dukane set top boxes.
 - 7. Provide new Dukane CCP's.
 - 8. Provide CCP backboxes to the electrical contractor for all new CCP's. Refer to Drawings to determine mounting type for CCP's.

9. Work with the CM and other trades to coordinate the installation of the projects in phases as defined by the CM.
 10. Provide and install new ceiling mounted projectors, mounts and cabling.
- G. Furnish and install, in accordance with the drawings and specifications, all equipment necessary for a new VVCS system incorporating the CPU, software, digital displays, clock/calendar/messaging, video all-call, media retrieval, emergency messaging, local sound systems, RF distribution, local video origination, electronic bulletin board, manual override panel, background music center, diagnostic analyzer circuit with inputs for local and remote annunciation, enhanced sound and audio retrieval, classroom control panels, LCD AC controller, fan cooling controller for terminal equipment, and appropriate testing equipment to perform testing as hereinafter described.
- H. Ceiling Removal and Replacement:
1. For construction work during times that school is in session, the removal and reinstallation of the acoustical ceiling panels on a daily basis shall be the work of the trades requiring same.
 2. For construction work during times that school is not in session (summer) this trade shall remove and reinstall acoustical ceiling panels.
 3. This trade shall be responsible for the replacement of all damaged or soiled acoustical panel and cleaning the metal grid upon completion of all trades work.
- I. Furnish to the electrical contractor all system specialty back boxes. Standard electrical back boxes will be furnished by the Electrical Contractor.
- J. Deliver to the job site as directed by the Electrical Contractor, all back boxes which are to be installed under Division 16 of the electrical specifications.
- K. Provide any additional items, not specifically mentioned herein, necessary to meet system requirements as specified, without claim for additional payment. Such items may include hardware, transformers, line/distribution amplifiers and other devices for proper installation, interface, isolation or gain.

1.3 APPROVED EQUIPMENT MANUFACTURERS

- A. Equipment is manufactured by Dukane and hence the equipment model numbers listed are those of the Dukane Corporation and are intended to describe the features and functions of the overall system. Contractors will submit their proposals on a Dukane Smart System. Contractors electing to substitute materials or manufacturers other than those specified, shall do so as a voluntary add or deduct to the base bid after obtaining the written approval of the Electrical Engineer and only then in conformance with the "substitutions and submittals" section and the "bid proposal" section of this specification.
1. The Dukane Smart System is distributed locally by Sound Engineering of Livonia, Michigan 48150, (734) 522-2910.
- B. The functions and features specified are vital to the operation of this facility, therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

- C. The system shall be Dukane Smart System.

1.4 CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS

- A. It is intended that any contractor furnishing materials or labor necessary for the completion of this specification shall furnish it in compliance with this specification. Where conflict exists with other specifications concerning such materials and labor, this specification takes precedence unless otherwise approved in writing by the Engineer.
- B. Drawings pertaining to this specification shall be considered as a part of said specification and shall be a part of the bid documents.

1.5 RELATED WORK PROVIDED BY OTHERS

- A. The conduit system, wireways, cable trays, outlet boxes, and 120-volt and higher power systems are provided and installed by the Electrical contractor.

1.6 BILL OF MATERIALS - BID PROPOSAL REQUIREMENTS

- A. Provide a complete bill of materials depicting quantities, model numbers and footage, catalog cuts, operating characteristics, physical characteristics, and equipment configuration for each of the systems.
- B. The information shall be assembled in three ring binders complete with Table of Contents. All pages shall have page numbers which shall be included in Table of Contents.
- C. The Table of Contents shall be as follows:
- | | | |
|-----|------------|--|
| 1. | Tab No. 1 | Cover Letter |
| 2. | Tab No. 2 | Bid Proposal Form |
| 3. | Tab No. 3 | Voluntary Alternates |
| 4. | Tab No. 4 | Organizational Chart / Schedule / Manpower |
| 5. | Tab No. 5 | PA System, Local Sound Systems |
| 6. | Tab No. 6 | Video Distribution Equipment including video retrieval components |
| 7. | Tab No. 7 | Loose Video Equipment |
| 8. | Tab No. 8 | Maintenance Agreements and Service Agreements and Warranties |
| 9. | Tab No. 9 | Company Profiles for Prime Contractors , Major Sub-contractors and Major Suppliers |
| 10. | Tab No. 10 | Miscellaneous (Optional) |
- D. Description of Contents:
1. Tab No. 1, Cover Letter, shall include an executive overview of the project and depicting this contractor's complete understanding of the project.

2. Tab No. 2, Bid Proposal Form shall include a completed bid proposal as found in Section 00410, and the bid bond as a requirement to submit a qualified bid, warranties, and service agreements.
3. Tab No. 3, Voluntary Alternates, in a section which is optional and made available to permit all bidders to submit alternates to the bid documents. These voluntary alternates shall clearly define the intent of the alternate, cost impact to implement the alternates, and a description of the deviation in functions and features between the alternates and the base bid documents. Include catalog cuts in this section for each alternate product required. The catalog cuts shall be keyed to the description of the alternate. Each alternate shall be independent of any alternate and shall be uniquely identified i.e. VAL -1 (Voluntary Alternate No. 1) VAL-2, VAL-3, etc.
4. Tab No. 4, Organizational Chart, shall depict the prime contractor, the subcontractors, major suppliers, trainers, project managers, superintendents, executive staff of each firm, service staff, the names of the individuals occupying those positions, telephone numbers, facsimile numbers, and E-mail addresses of all individuals on the organizational chart.
 - a. Provide a schedule that depicts major milestones required to achieve the completion dates previous specified. Typical milestone events are as follows:
 - 1) Completion date of rough-in wiring.
 - 2) System start up for VVCS.
 - 3) Start-up/debug time for video system.
 - 4) Substantial completion date.
 - 5) Closeout documents.
 - 6) Provide an estimate of anticipated manpower required at each building to meet the specified completion dates.
5. Tab No. 5, Public Address Equipment/Local Sound Systems shall include the following information:
 - a. Manufacturer's Name.
 - b. Number of years providing similar equipment in schools.
 - c. Installation company's name.
 - d. Number of years installing similar equipment in schools.
 - e. List of Michigan Schools that utilize equipment.
 - f. Description of system operation.
 - g. Equipment model numbers.

- ## 1.7 REQUIREMENTS OF REGULATORY AGENCIES

- 16790-5

3. BICSI Building Industry Consulting Service International
4. EIA Electronics Industries Association
5. FCC Federal Communications Commission
6. ICEA Insulated Cable Engineers Association
7. IEEE Institute of Electrical and Electronics Engineers
8. ISO International Organization for Standardization
9. NEC National Electrical Code
10. NEMA National Electrical Manufacturer's Association
11. NFPA National Fire Protection Association.
12. TIA Telecommunications Industry Association
13. UL Underwriters Laboratories, Inc.
14. VESA Video Electronics Standards Association

- B. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and Drawings and Specifications.

1.8 EQUIPMENT MANUFACTURER AND EQUIPMENT INSTALLER

- A. The system shall be built and tested by a manufacturer who has regularly engaged in the production of the components of similar VVCS systems for a minimum of five years to assure one source of supply and responsibility.
- B. The supplier of the VVCS system shall maintain permanent service facilities in the area of the installation. The facilities shall include a permanent source of factory trained service technicians on 24-hour call experienced in servicing this type of equipment and shall provide warranty and routine maintenance service to afford the Owner maximum coverage. He shall also provide a central source of support to guarantee immediate answers to Owner's problems resulting from misunderstanding of the operation of the equipment.

1.9 EQUIPMENT INSTALLER QUALIFICATIONS

- A. The installation of the VVDS system shall be performed by fully qualified personnel having had experience on the installation of this type of system and able to certify that they have had no less than five years of continuous experience in this area and have made installation similar to this and of this size or larger. Installation of Dukane equipment shall be performed by a Dukane factory certified integrator.

1.10 SUBMITTALS

- A. Shop Drawings: Within twenty-eight (28) calendar days after award of contract, submit detailed shop drawings to the Engineer for approval. Do not begin installation or fabrication without such

approval. All shop drawings shall be marked with the pertaining specification paragraph or drawing number when submitted.

- B. Shop drawings shall be provided for all custom assemblies including distribution racks, video distribution equipment under distribution equipment, mobile carts headend equipment, classroom set top boxes, LCD video displays, racks, etc. Submit samples of lettering/label size and typeface to be employed on custom panels and other equipment.
- C. Shop drawings shall be provided clearly depicting any proposed modification to the project drawings. Any modifications shall be highlighted on the shop drawings.
- D. Shop drawings shall be provided indicating proposed mounting arrangements and details of all loudspeakers, including positioning devices, framework supports and interface with adjacent architecture.
- E. Shop drawings shall be provided indicating equipment racks, equipment rack elevations, punch down blocks, layouts, wire management cable labeling schemes, outlet labeling schemes, punch down and rack outlet labeling scheme, cable routes and the location of ancillary items such as RF splitters, RF taps, transformers, terminal blocks and power distribution.
- F. Specification schematic drawings depict functional, and require additional detail according to specific components used. Shop drawing shall be provided indicating the addition of any components, such as transformers, line/distribution amplifiers or other devices, not detailed in this specification but necessary to provide a properly functioning and complete system.
- G. Shop drawings shall be submitted on the following equipment and systems:
 - 1. Classroom control panel (CCP) including all components.
 - 2. LCD Set Top Box.
 - 3. Speakers and backboxes.
 - 4. RF Distribution and cabling plan.
 - 5. Supplemental digital clock system.
 - 6. RF distribution equipment taps, splitters, telephone distribution cabling plan.
 - 7. Cable types for RF and controls.
 - 8. RF distribution dB levels.
 - 9. LCD video displays.
 - 10. Video/Data Projectors
 - 11. Video/Data Projectors Mounting Hardware
- H. Shop drawings of the intended grounding system shall be provided showing ground paths for audio signal grounds, shields, chassis, equipment AC grounds, equipment racks, clean power within racks and patch panels. This includes plug-in equipment such as mixing consoles.

1.11 MOCK-UP/SAMPLES

- A. The Contractor will furnish and install an LCD, LCD mounting bracket, communications outlets as well as a CCP in a mock up room eight (8) weeks after award of contract. The system will not be functional.
- B. Modifications made and/or approvals obtained as a result of this mock up will be considered the final approval of shop drawings. Associated equipment modification resulting from the mock up or mock up costs will be borne by this Contractor to the extent of his work. Any fabrication or delivery of similar equipment or components prior to final approval of the mock up will be at this Contractor's risk should modifications to the proposed equipment result.

1.12 EXISTING CONDITIONS

- A. This Contractor shall visit the site prior to submitting a bid. No subsequent allowance will be made due to failure to thus observe and verify conditions which may affect the work. Report to the Engineer any discrepancies between this specification and existing conditions and similarly report obvious omissions.

1.13 JOB CONDITIONS

- A. Keep the job adequately staffed at all times. Unless illness, loss of personnel or other circumstances beyond the control of the contractor, maintain the same individual in charge throughout.
- B. Cooperate with all appropriate parties in order to achieve well coordinated progress with the overall construction completion schedule and satisfactory final results.
- C. Watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or to preserve symmetry and aesthetically pleasing appearance.
- D. Immediately report to the Engineer any design or installation irregularities, particularly architectural elements that interfere with the intended coverage angles of loudspeakers, so that appropriate action may be taken.
- E. Do all cutting, patching and painting necessary for proper and finished installation of the system and repair any damage done as a result of such installation. Cleanup and dispose of trash from all work areas.

1.14 QUALITY ASSURANCE

- A. Parts listed shall be complete, type numbers accurate and equipment furnished shall conform to manufacturer's specifications.
- B. All materials shall be new and shall conform to applicable provisions of Underwriters Laboratories and the American Standards Association.
- C. Procure and pay for all necessary permits, licenses and inspections and observe any requirements stipulated therein. Conform in all trades with all local regulations and codes.
- D. Comply with federal, state and local labor regulations and applicable union regulations.

1.15 GUARANTEE, SERVICE AND TRAINING

- A. All systems and components shall be guaranteed free of defects in materials and workmanship for a period of one (1) year from the date of acceptance and shall be repaired or replaced within twenty-four (24) hours following report of such defects by the Owner. The date of acceptance shall be defined as the date the Certificate of Substantial Completion is signed by the Architect/Engineer and the Owner.
- B. The VVCS System Contractor shall be available on call and shall respond on site within four (4) hour notice, and without cost to the Owner, during the first twelve (12) months of full scale operation, following acceptance of the system, to assist the Owner and/or his representatives in any problems that may arise during the initial period of operation.
- C. Start-Up: The equipment suppliers (video and data) shall have start-up personnel at each school the first five (5) consecutive days of school from 7:00 a.m. to 3:00 p.m. to assure proper operation of the clocks, telephones, dismissal system (bell system), data, bulletin boards, and media retrieval system.
- D. The VVCS system contractor shall provide to the owner, as part of this project, factory training (component level service) for two (2) TSD technicians for each make/model of LCD installed.

1.16 MAINTENANCE CONTRACT

- A. Submit a maintenance and service contract with service rates for the voice and video systems covering all labor and materials necessary to repair damages to the system. The contract shall include a differentiation between and definitions of "emergency" and "non-emergency" service with applicable rates for each.
- B. Submit a second year extended warranty contract fee with proposal for each portion of the system (i.e. voice and video).

1.17 SPARE PARTS

- A. Guarantee the availability of all spare parts and maintain locally an adequate compliment of components that are applicable to the VVCS for five (5) years.
- B. Provide five (5) sets of system hardware and software manuals.
- C. Spare Projector lamps
 - 1. Furnish one (1) spare projector lamp per installed unit.
 - 2. Furnish one (1) 26" LCD.
 - 3. Furnish one (1) 32" LCD.
 - 4. Furnish three (3) 37" LCD.

PART 2 - PRODUCTS

2.1 MULTIMEDIA HEADEND EQUIPMENT

- A. The VVCS system headend contains the voice, video, and data source and control equipment located in 19-inch wide audio cabinets located in the main MDF room. The cabinets shall be manufactured all the same size (height, width and depth), with hinged and louvered rear doors.

- B. Where spare/space positions are indicated on the Drawings or result from relocation or rearrangement of components within the headend equipment rack provide blank cover plates on the front of the racks of the size required to accommodate the future equipment indicated. Where no equipment is indicated and space exists, provide blank cover plates in combination of units 1-3/4", 3-1/2", 5-1/4" and 7" high.
- C. Provide the maximum length, width and height of the head-end equipment with your proposal.
- D. All headend equipment shall be rack mountable. Shelf type mounting will not be permitted.
- E. The headend will consist of the following principal devices:
 - 1. Multimedia central processing unit for control of the following:
 - a. Bell Scheduler.
 - b. Bell Tones.
 - c. Clock functions.
 - d. Emergency alert annunciation.
 - e. AC power control for TV sets.
 - f. Media scheduling.
 - 2. Video central processing equipment for control of the following:
 - a. Video media retrieval.
 - b. Modulators.
 - c. Demodulators.
 - d. Combining networks.
 - e. VCR's
 - f. DVD's.
 - g. Electronic bulletin board.
 - h. Clock and message board.
 - i. C and KU satellite receiver (provisions only).
 - j. Residential cable network (R-NET) demodulators
 - k. Institutional cable network (I-NET) demodulators (Provisions only)
 - l. Distance learning (Provisions only)
 - m. CD-Rom Via wireless mouse/keyboard.

3. Voice central processing equipment for control of the following:

- a. Public Address System.
- b. Intercom.
- c. Audio Retrieval
- d. Background Music.

2.2 HEADEND CABINET UTILITY REQUIREMENTS

A. Fan Controller:

- 1. Shall be dual operating for reliability, energy conservation, and greater fan life.
- 2. One fan (minimum) with filter shall be provided at the top of each cabinet. Fan size and quantity shall meet or exceed the requirements of the cabinet manufacturer.
- 3. Each fan shall be operated by a solid state temperature sensor for long and short time set point accuracy.
- 4. The rear doors shall be provided with louvers top and bottom to exhaust the heat and shall be located to prevent blockage of airflow from the fans.

B. Input Power:

- 1. Input AC power shall be 120 AC. One (1) 20A, 120 volt circuit will be provided for each vertical section by the Electrical Trades.
- 2. Input AC power shall terminate at each "on-off" switch located at the bottom of each vertical section. The "on-off" switch shall be factory wired to the vertically-mounted plugmold. The plugmold shall be provided with receptacles 6" O.C. minimum of sufficient quantity to serve indicated equipment, proposed equipment, future equipment, and equipment which can be supported in the empty space sections. Provide two (2) vertically mounted plugmolds in each vertical section.
- 3. The receptacles in the plug strip shall be protected by a transient voltage surge suppresser that shall be UL 1449 listed and have a maximum let-through voltage under Category B test of 500V.

C. Cabinets:

- 1. The VVCS system headend cabinets shall contain the voice and video source and control equipment located in 19-inch wide audio cabinet located in the MDF. The cabinets shall be manufactured all the same size (height, width and depth) with lockable, hinged and louvered rear doors and painted so as to appear to be provided from one manufacturer. All doors shall be keyed alike throughout the School District. The racks shall have removable side panels. Verify existing lockset with Owner and match. Provide side panels on two ends only. The equipment shall be painted black.
- 2. The data cabinets shall be similar to the remainder of the headend cabinets except that each data racks shall have a lockable glass front cover.

3. All cabinets shall meet EIA/TIA standards.
4. Where spare and space positions are indicated on the Drawings or result from relocation or rearrangement of components within the headend equipment cabinet provide blank cover plates on the front of the cabinets of the size required to accommodate the future equipment indicated. Where no equipment is indicated and space exists, provide blank cover plates in combination of units 1-3/4", 3-1/2", 5-1/4" and 7" high.
5. All Headend equipment cabinets shall be manufactured by Mid-Atlantic MRK-4426.

2.3 VIDEO MEDIA RETRIEVAL SYSTEM

- A. The Video Retrieval System shall provide a television interface to allow the remote access and operation, infrared control of the quantity of VCR's, DVD's, RNET stations, INET stations, shown on the Drawings and located at the head-end equipment.
- B. The system shall have the minimum capacity of simultaneously accessing, controlling and distributing RF signals for one hundred twenty-five (125) media sources (1 GHz). The system shall be designed for adjacent channel operation.
- C. Various functions and features presently shall be programmed into the interface, using the system computer.
- D. The VCR functions that shall be controlled remotely via infrared and computer keyboard are:
 1. Play
 2. Pause
 3. Rewind
 4. Stop
 5. Fast Forward
 6. Scan Forward
 7. Scan Reverse
 8. ON-SCREEN Analog and Digital Reference Displays
 9. Tracking +/-
 10. Record (only for selected VCR's)
- E. Access and retrieval shall continue to be accomplished by infrared controller.
- F. The teacher shall have the ability of controlling all machine operating modes from their location, using the handheld infrared remote controller.
- G. All equipment shall be rack mountable. Under no circumstances will shelf type mounting or "reaching in" configuration be acceptable.

- H. System is shall be designed using acceptable CATV tapoff standards - "Home Run" or loop installations will not be acceptable. Where loop or homerun type installations are required by the approved manufacturers, it shall be so stated in the bid proposal.
- I. The system shall be fully capable of simultaneous bi-directional use utilizing the same sending cable (s) from any classroom or any location where an RF outlet is provided.
- J. The system shall be capable of receiving and transmitting any signal from a standard off-air antenna, satellite transponder, cable company input, local origination and in-house media retrieval.
- K. The installation shall meet all local cable television company and FCC requirements for signal leakage. (See System Testing Section for testing requirements and test equipment to be supplied by the successful Bidder). The system shall comply with FCC Radiation, Leakage and Aeronautical Standards. Test all locations in existing buildings in the scope of work including areas where this Contractor is not performing any work.
- L. Signal level at every outlet shall be five (+5 dB) plus or minus two (2) dB between adjacent channels. Test all outlets in the buildings where this Contractor is working.
- M. Submit an RF frequency map in compliance with all FCC regulations to the local cable company for their approval prior to installation of the RF distribution network.

2.4 MULTIMEDIA CENTRAL PROCESSING UNITS (MCPU) - GENERAL

- A. The MCPU shall be comprised of a number of computers all integrated to operate as one (1) multimedia central processing unit.
- B. The following computers shall be located in the main headend (MDF) and are designed to perform the following functions:
 - 1. Computer No. 1 (Scheduler):
 - a. Media Scheduling
 - b. Media Inventory List
 - c. Video Zone Paging Schedules
 - d. Video All Call
 - e. Video All Call with Audio All Call
 - f. Media and Source Equipment Usage (status reports)
 - g. AC control of classroom LCD sets, on/off functions for all alarms, and energy management functions for all CPCC equipment
 - 2. Computer No. 2 (Clock/Messaging):
 - a. Master clock programming
 - b. All clock functions

- c. All calendar functions
 - d. On screen messaging
 - e. All fire drill functions
 - f. All emergency weather alert functions
 - g. All video bell functions
 - h. Multi-zone bell functions
 - i. Bell ring duration's
 - j. Auxiliary bell schedules.
3. Computer No. 3 (Bulletin Board):
- a. Electronic bulletin board displays
 - b. Electronic bulletin board page sequences
 - c. Electronic bulletin board display intervals
 - d. Picture identification and recognition system
 - e. Bulletin board with still and full motion video displays
4. Computer No. 4 (Paging):
- a. P.A. zoning paging

- C. Computer No. 1, the media scheduling computer and computer No. 2 the clock/messaging computer shall be mounted in the headend rack and share a common keyboard and monitor. The keyboard and monitor are selectable via an "A/B" selector switch mounted in the rack.
- D. Computer No. 3, the bulletin board computer, shall be provided with its own keyboard and monitor and will be located on a desk in the headend room.

2.5 SCHEDULING COMPUTER (SC)

- A. Scheduling shall be performed at the Multimedia Central Processing Unit (MCPU) Scheduling Computer (SC) (Computer No. 1) or remotely programmed by an off-site compatible computer with a modem, or remotely programmed by a computer connected to the school LAN.
- B. The Scheduling Computer controls all programmable functions.
- C. The SC controls the turning on/off of power, to all LCD sets in the system
- D. The SC shall be capable of generating full alpha-numeric messages to each classroom. Messages appear at each classroom control module (set top box) or as video text data displayed on the classroom LCD/receiver. Messages can be tailored for each classroom, a group of classrooms, or all classrooms.

- E. The SC scheduling/control software shall be available to all classroom computers connected to a local area network (LAN) through proper password authorization. To prevent contention for media sources, any and all classroom scheduling shall be considered as a "request for use". Final acknowledgment and assignment shall be accomplished via the SC by the media specialist through proper password access at any PC. At this time, the SC shall transmit a "source ready" message to the appropriate instructor.
- F. The SC shall allow all or user selected media titles, broadcast channels sources to be assigned as "global sources" for access on demand. In this mode, scheduling shall not be required for classroom access. Global sources shall be retrieved on first-in first-out basis. The SC shall automatically prevent (via software) other classrooms from controlling a source "in use" but not prohibiting the viewing of a source in use. The SC shall automatically create a list of resources available on demand to be displayed as a video text display selected by classroom instructors.
- G. The SC shall allow scheduling of off-air recording sessions or secondary off-media sources of local origination for video and audio.
- H. The system shall allow the sharing of resources across multiple schools. All schools share a single database with multiple global sources across the system. Each school has its own communications router to handle its local clients, set top boxes, SCM's, and TAM's.
- I. The database server and network client software communicate using sockets on top of the TCP-IP protocol stack. The database server software provides graphical user interface (GUI) screens on the provided monitor.
- J. The SC and Scheduling Control Processor is a Dukane Model DSS2100 or engineer-approved equal.

2.6 CLOCK/CALENDAR/MESSAGING COMPUTER

- A. The clock, calendar, and messaging function are performed at the MCPU by the Clock/Calendar/Messaging computer (Computer No. 2).
- B. The clock/calendar is be controlled by an internal battery backed clock/calendar board internal to the computer.
- C. The output of the computer no. 2 is to be connected to a modulator in the headend for broadcast on the television program distribution system. The modulator is be connected to a music channel through a computer music #1, music #2 on/off selector switch to simultaneously broadcast audio and video on the clock channel.
- D. The music selector switch shall be mounted below the monitor and labeled "Clock/Calendar/Messaging Computer Channel Music Channel 1 or 2 Selector".

2.7 ELECTRONIC BULLETIN BOARD SYSTEM

- A. A separate Bulletin Board computer (Computer No. 3) and associated software shall be provided to generate video text announcements for the distribution of messages and announcements to video displays school wide via the video Program Distribution System.
- B. The output of the Bulletin Board computer shall be connected to a modulator in the head-end for broadcast on the Video Program Distribution System. The modulator is connected to a music channel through a computer Music #1/Music #2/off selector switch to simultaneously broadcast music and video on the Bulletin Board channel.

2.8 ALPHA NUMERIC DIGITAL CLOCK/FIRE/WEATHER (WTHR)/MESSAGE WAITING (MSG)/ BELL DISPLAY

- A. Provide Digital "Time/FIRE/WTHR/MSG/BELL" Display on the LCD set top boxes (classroom control modules) (CCM), and other selected areas (see plans).
- B. Each display function shall be powered from the MCPU, as well as be provided a serial data stream to continuously update its display.
- C. Each unit shall indicate both hours and minutes on a minimum of 2-1/2" LED fully populated displays in classrooms and 5-3/4" LED fully populated displays in all other areas.
- D. The CCM clock shall have a count-up countdown timer function operated by the infrared remote control or via pushbutton in the classroom control panel.
- E. The controlled time base for each unit shall originate from the Master Clock.
- F. As an adjunct to the Fire Alarm system, when the Fire Alarm System is activated or the fire "TEST" button is activated, it shall seize control of all TV channels and continuously flash the word "FIRE" on the alpha numeric displays as well as sound a prerecorded message over the Public Address and shall flash the word "FIRE" on the TV's.
- G. When the Weather Alert button is activated or the Weather "TEST" button is activated, the alpha numeric display will flash in capital letters the abbreviated word "WTHR" to alert personnel to an emergency and shall seize control of all TV channels and continuously flash the words "WEATHER ALERT" on the LCD's.
- H. When the All-Clear is sounded, the displays will revert to normal clock functions and all programming shall resume on video channels without the need for the classroom teacher or anyone else having to change channels back to their pre-empted channel.
- I. When the Bell Annunciator is activated or the bell "Test" button is activated, the alpha numeric display shall display the word "BELL" and shall seize control of all video channels and continuously flash the word "BELL" as well as sound a distinctive sound over the Public Address.
- J. When the Bell System is deactivated, the alpha-numeric display shall revert to the normal clock functions and all video programming shall resume on channel without the need for the classroom teacher or anyone else having to change channels back to their pre-empted channel.
- K. Approved Manufacturers or Engineer Approved Equal:

<u>Manufacturer</u>	<u>Model Number</u>	<u>Description</u>
Dukane	710-3092	2" LED Display with Speakers
Digital Display Systems	BSA41225 ACSW	2 1/2" LED Display-Single Face
Digital Display Systems	BSA41260 ACSW	5-3/4" LED Display-Single Face
Digital Display Systems	BSA41260-2 ACSW	5-3/4" LED Display-Double Face

2.9 BELLS

- A. The bells shall be controlled by the clock/calendar/messaging computer (Computer No. 2) from the set up menu.

- B. Bells take precedence over audio announcements and will be overridden by the emergency messages.
- C. Bells shall be capable of, but not limited to:
 - 1. Being operated locally at the head-end, via an external compatible computer operating on the school LAN, or by an external computer using a modem.
 - 2. Shall utilize the same Master Clock used by the Clock/Calendar.
 - 3. Include appropriate software and hardware to automatically or manually distribute class change signals to both the audio, on the clock channel, and the All-Call Video, and All-Call Public Address System.
 - 4. Bell scheduling shall require only a single time, zone and code entry, to the programming menu.
 - 5. The software will automatically accommodate for daylight savings time when the time and zone are entered.
 - 6. Provide buffer relays and connect bells to the new system.
 - 7. Connect the horns to the new bell system.
 - 8. Where LCD's are "on" the word "Bell" will be distributed to the LCD's for the duration of the audio signal via the all call function. Where LCD's are "off" the LCD shall remain off.
 - 9. The dismissal system uses the speaker/voice system.

2.10 LOCAL VIDEO ORIGATION

- A. The system is designed to allow broadcast of live video or prerecorded video from any source device that produces a NTSC video format connected to any RF outlet located throughout the facility to any and all other RF outlets. The originating video is broadcasted to the head-end via a subchannel reverse signal by inserting a frequency agile subchannel modulator between the source device and the RF outlet.

2.11 VIDEO ALL-CALL

- A. The Video All-Call shall permit "live" broadcasts to all video displays, connected to the system, by administrators, designated personnel and/or invited guest speakers.
- B. The video all-call function is initiated by dialing a predetermined telephone number or via an infrared paging transmitter that will activate the all call from any set top box or via computer command.
- C. When the video all-call is activated all source devices shall be automatically switched to the "pause" status for the duration of the all-call.
- D. The LCD's shall automatically switch to the predetermined channel for the video all-call or the modulators shall all switch to the predetermined channel for video all-calls. LCD's which were in the "off" mode shall be automatically turned "on" for the duration of the video all-call. At the conclusion of the video all-call, the LCD's which were originally "off" will be turned "off"

automatically and LCD's which were "on" will remain "on" and will return automatically to their pre-video all-call channel.

- E. At the conclusion of any broadcast, hanging up the telephone or entering a one-digit "concluded" code on the paging transmitter or via computer command shall automatically return all programming to pre-empted video channels without it being necessary for the teacher or any other person to readjust the LCD's. Reactivation of VCR's and DVD's shall be by instructor's command.

2.12 ADDRESSABLE TV SET TOP BOX

- A. The LCD set top boxes shall be located in all classrooms and shall be capable of controlling the classroom LCD or video monitor and all remote media sources, including bar code wand type readers.
- B. The set top box shall accept commands from the handheld infrared remote control unit of remote media source equipment. The set top box shall transmit those commands through the data port to the media control network.
- C. The set top box, through the media control network shall be capable of accessing and controlling CATV receivers, satellite receivers, VCR's, computers, DVD's, and CD-Rom's,
- D. The set top box shall provide infrared control of the local video monitor or LCD screen only, allow the user to turn it on and off and control volume/mute/stereo/mono left/mono right where applicable. The set top box shall be capable of either learning universal infrared commands or of having the infrared command set downloaded from the SC. All infrared command set information shall be stored in non-volatile memory. Systems which require additional firmware or modifications to learn different video display manufacturer's commands shall not be acceptable.
- E. The set top box shall be equipped with an RS-232 port for use with a local PC or intelligent keyboard. The RS-232 port shall allow the user to connect a personal computer or an intelligent keyboard to the set top box and control the classroom monitor as well as any scheduled or global media source. This port shall allow each instructor to generate lesson plans from any classroom computer. The set top box shall be capable of providing a TSR program which will emulate all infrared control functions from either an Apple or IBM computer. This shall allow each instructor to control and digitally record (on hard drive) individual lesson plans. The instructor shall be capable of presenting and controlling the lesson plan from the classroom computer.
- F. The set top box shall display visual confirmation of user commands on a 1-inch high, six character 5 x 7 LED dot-matrix display. The command confirmation shall be displayed on the set top box for no less than three seconds. The set top box shall also display the source identification of the media source currently displayed on the monitor. Display of user commands shall be displayed via video text on the LCD receiver in lieu of on the set top box. When the LCD is turned off, the set top box shall display the time of day unless a separate digital clock/timer/display unit is provided. The SC shall synchronize the set top box internal clock.
- G. The set top box shall be capable of allowing users to view and change (subject to SC permission) media sources which are either scheduled or global for that classroom. Users shall always be able to view the room menu generated by the SC either via the set top box or on screen video text.
- H. The set top box shall provide channel blocking (broadband only) of any or all channels to prevent the user from switching to a channel, which has not been scheduled for the classroom. The set top box shall unblock specific channels upon authorization from the SC.

- I. Systems that do not automatically change channels shall not be acceptable.
- J. The set top box shall provide a means of confirming that the set top box is aware of classroom television set or monitor power on/off status by sensing the electromagnetic field generated by the LCD.
- K. The set top box shall be capable of accepting a command from the SC to turn the video monitor on or off, mute or set the volume to a programmed level, and change the LCD channel before and during video paging.
- L. The set top box shall switch to a default channel (broadband) upon power up to display the room menu or for video paging. The room menu shall be accessible by the user at any time.
- M. The set top boxes shall contain a firmware application allowing a terminal to control its ability to learn the infrared command sets for the LCD installed in the classroom.
- N. The set top boxes shall recognize a sufficient quantity of push buttons to provide the commands necessary to control media source equipment.
- O. The set top boxes shall provide I/O matrix for interfacing to intercom, security and clock systems.
- P. The set top boxes shall provide an elapsed timer function for both count-down and count-up functions. The start and stop time shall be programmed via the infrared remote control unit.
- Q. All set top boxes shall display the correct time on a six (6) character LED matrix display even when the room LCD is off.
- R. The set top box shall be Dukane Model DSS2500 or engineer-approved equal or equal by previously listed and approved manufacturers.

2.13 HANDHELD INFRARED (IR) REMOTE CONTROL UNIT

- A. The handheld IR remote control unit shall allow the user to access all local and remote features herewithin specified.
- B. The handheld IR remote control unit shall have a range of at least 40 feet in all ambient lighting (100 foot candles) conditions suitable for media viewing. The unit shall be capable of transmitting IR signals at a frequency of at least 400khz to avoid interference by electronic ballasts operating in the 40-300 Khz band.
- C. The handheld IR remote control unit shall be capable of controlling up to eight different scheduled sources simultaneously, including LCD's, VCR/DVD combo units, receivers, compact disc players, CD-ROM, audio volume, music channel #1 Music Channel #2, count-up, count-down timer, etc. through the set top box.
- D. The handheld IR remote control unit shall contain a sufficient quantity of push buttons to provide all the commands provided by the manufacturer with his remote control IR unit for each type of source equipment. Shift key operated functions shall be deemed unacceptable.
- E. The handheld IR remote control shall provide additional push buttons for auxiliary functions.
- F. The hand held IR control unit shall be Dukane Model DSS2510 or engineer-approved equal or equal by previously listed and approved manufacturers.

2.14 MODULE CONCENTRATORS (DIGITAL CONTROL NETWORK)

- A. The system shall employ a digital control network for all system operation. The system operates via either of the following methods:
 - 1. A system microprocessor, M68340 or better, to manage data communications and event operations over an addressable LAN control network to communicate from classroom set top boxes and classroom computers to the headend controllers.
 - 2. A module concentrator consisting of a single unit containing 16 communication ports for classroom device control. Two additional RS-422 ports shall be provided for communication with a host adapter board installed in the Scheduling Control Computer (SC) and communication with other module concentrators. It shall be possible to group multiple concentrators to control set top boxes by connecting the concentrators in daisy-chain fashion. One of the concentrators in the group shall be connected to the host adapter board in the SC to provide control for the entire group. All connections between the host adapter boards and module concentrators shall be through RS-422 compliant cabling using two twisted pairs, terminated on an RJ45 connector. Each module concentrator shall include a processor to reduce CPU overhead for the 80486 processor on the host adapter card.
- B. In either approach, the processor shall manage events independently from the SC. If the SC is off, or disconnected, the events shall continue to function until control is re-established from the SC.
- C. The module concentrator shall be Dukane Model DSS2150 or engineer-approved equal.

2.15 INFRARED SOURCE CONTROLLERS (I-SC)

- A. The infrared source controllers (I-SC) provides the infrared emitter signals required for the remote control of the audio/video media sources that are located in the head-end room away from the classroom.
- B. Each I-SC is equipped with infrared emitter outputs for control of media sources and be programmable for control of up to the number of media sources connected to it. Each infrared output shall be capable of providing a full array of media source remote control, including key functions that require auto-repeat commands. The I-SC shall be capable of controlling various media source devices mixed among the infrared outputs so that one I-SC can control a VCR/DVD combo unit, a compact disc player, a stereo receiver, and/or any other infrared remote controlled device in any combination. The IR controller and hand held IR unit contains all functions found on the IR controllers provided by the source equipment suppliers. This is accomplished without any usage restrictions (i.e., blocking of sources).
- C. The I-SC is capable of learning its programming directly from the media source's handheld infrared remote control unit or the programming can be downloaded from the SC. The I-SC contains a firmware mode allowing a terminal to be connected to the I-SC serial port and control the I-SC's ability to learn infrared command sets.
- D. Where additional I-SC are required, the infrared source control module shall be Dukane Model DSS2400 or engineer-approved equal.

2.16 SERIAL SOURCE CONTROLLERS (S-SC)

- A. The serial source controllers (S-SC) provides the serial signals (RS232/422) required for the remote control of the audio/video media sources via personal computers and computer terminals that are located in a central media room away from the classroom but connected to the School LAN.
- B. The S-SC is equipped with four serial outputs for control of media sources and is programmable for control of up to four media sources. Each serial output is capable of providing a full array of media source remote control. The S-SC is capable of controlling various media source devices mixed among the serial outputs so that one S-SC can control a CD-ROM player, a computer, and/or any other serially-controlled device.
- C. The S-SC is capable of receiving its command set programming by downloading from the SC or laptop PC.
- D. Where additional S-SC are required, the serial source control module shall be Dukane Model DSS2410 or engineer-approved equal.

2.17 MANUAL OVERRIDE PANEL

- A. The system shall include a manual override of automated functions:
 - 1. Public Address.
 - 2. Zoning.
 - 3. Fire Monitoring Alarm Activation.
 - 4. Bells.
 - 5. Weather Alert (WTHR).
 - 6. Turn Power On/Off to TV.
 - 7. Background Music.
 - 8. All-Clear.

2.18 CLASSROOM CONTROL PANEL (CCP)

- A. Provide a CCP in each classroom as indicated on the drawings. The CCP houses the local audio broadcast system, video outlets, audio outlets, selector switches, storage compartment and other outlets as specified on the drawings.
- B. New CCP's shall be factory painted with silk screening as indicated on the drawings. After shop drawings are approved supply one sample CCP enclosure for final approval prior to manufacturer of the remaining order.
- C. To reinforce the audio portion of the retrieved program by providing an individual amplified sound system in the CCP at every classroom media center and multipurpose location, provide a classroom control panel to allow incoming telephone to be transferred to the amplifier for broadcast permitting guest lecturers to address the entire class. This Contractor shall determine the total quantity of new CCP's required.

- D. Provide a five (5) watt solid state amplifier with associated volume control, necessary control circuitry, and all hybrid interfaces as required to:
 - 1. Control the overall volume in the room by regulating the signal level within the amplifier.
 - 2. Permit the transfer of the audio portion of the retrieved video programs for "group" broadcast.
 - 3. Allow the telephone to be used as a microphone over the overhead speakers..
 - 4. Automatically suppress all retrieval function control tones to eliminate their interference with broadcasts.
 - 5. Permit the bi-directional duplex operation of the telephone without the "rise time" associated with speaker phones.
- E. Provide CCP back boxes to the electrical contractor for installation.
- F. CCP shall be designed to accommodate future free field amplification with redesign of main circuit board components.

2.19 VIDEO RF HEADEND EQUIPMENT

- A. Modulators:
 - 1. The system shall include audio/video modulators which meets all the following minimum specifications:
 - a. Plus sixty (60) dBmv of output level on picture carrier.
 - b. Spurious outputs down at least sixty (60) dB below picture carrier level.
 - c. Output frequency accuracy better than plus (+) or minus (-) five (5) kHz from specified output channel.
 - d. Vestigial sidebands minus (-) sixty (60) dB at minus (-) one (1) MHz, relative to picture carrier. Channels in aeronautical band must be offset to FCC STANDARDS.
 - e. Differential phase of plus (+) or minus (-) 0.5 degree.
 - f. Differential gain of plus (+) or minus (-) 0.5 dB.
 - g. Frequency agile (front mounted dip switches).
 - h. Display of audio and video over modulation.
 - i. Front panel features shall include:
 - 1) Video level control
 - 2) Audio level control
 - 3) RF sound level control

- 4) RF output level control
- 5) Minus (-) twenty (20) dB test point
- 6) Channel indicator
- j. A minimum signal strength of +10 dB at every outlet, plus or minus two (2) dB on adjacent channels.
- k. A minimum signal strength of +15 dB at every tap, plus or minus three (3) dB on adjacent channels.
- l. SAW filters using either SAWTEK or CTI SAW.
- m. Shall use heterodyne conversion.
- n. Shall be frequency synthesized for optimum crystal lock.
- o. Chip amplified using either Motorola or TRW high gain chips.
- p. Shall have IF loops.
- q. White sync buzz protection.
- r. Automatic clamping modulation circuit to prevent modulation distortion.
- 2. Modulators shall be Blonder Tongue or engineer approved equal.
- B. Demodulators:
 - 1. The system shall include demodulators meeting the following technical function and capability criteria.
 - 2. The unit shall have all the following features:
 - a. On/off switch.
 - b. Power "on" green LED.
 - c. Remote sensor.
 - d. Clock display window: CATV channel and VCR indicators, on/off timer setting/checking mode, quick timer setting/checking mode, program select button, channel + or - (minus) button, add and erase buttons, normal/CATV and channel call up/down buttons, clock setting buttons, input selector switch, and parental lockout feature.
 - e. Frequency agile (54-806 MHz) (front mounted dip switches).
 - f. Sub-board input channels.
 - 3. Demodulators shall be Blonder Tongue or engineer approved equal.

C. Combining Networks:

1. The combining network shall have the quantity of inputs shown on the Drawings with twelve (12) on each combiner, low insertion loss, high isolation, outstanding frequency range, excellent input return loss and must be double shielded. One (1) minimum combiner shall be provided for each vertical section of video rack. (Shall comply with FCC Radiation and Leakage Standards.)
2. Frequency range of from 5 to 1 GHz.
3. Insertion loss must be no greater than 14 dB, equal on all ports. (Active combiners are unacceptable because of the noise they introduce into the picture.)
4. The flatness of response must be + or - 1.5 dB from 10 to 1 GHz.
5. Return loss (inputs) must be 21 dB minimum. (Output) must be 20 dB minimum.
6. Isolation between ports must be 22 dB minimum.
7. Combiners shall be Blonder Tongue or engineer approved equal.

D. F Connectors/Terminators:

1. All "F" type connectors shall be provided with terminators or self terminating "F" type connectors as herein after specified.
2. At locations where LCD's are mounted, terminators are not required.
3. At locations where LCD's are indicated as future, self terminating "F" connectors shall be provided.
4. At all unused ports in the CPCC, screw on terminators shall be provided.
5. At all "F" connectors located in classrooms, office and auxiliary spaces not specifically mentioned above, the "F" connectors shall be self terminating.

- E. Modifications to the above system are not anticipated at this time. The specification is issued for reference and for connection purposes only.

2.20 LCD VIDEO DISPLAYS

- A. Provide the number of LCD video displays as indicated on the drawings and as hereinbefore specified. Unless otherwise noted on the drawings all LCD video displays will be 37".
- B. All LCD video displays will have the following jacks on the back: DVI input, RGB input, composite audio/video input, composite video input X2, S-Video input X2, RS-232 input, RJ-45, component video input X2, audio input (L/R) X6, RGB output, audio output, and subwoofer output. It shall be the vendor's responsibility to verify the model numbers provided have all the required features for a complete and satisfactory installation.
- C. Each LCD video display will be capable of remote control via an IR signal. The controllers shall be supplied with batteries installed.

- D. Furnish and install wall mount brackets Premier part number AM2 unless otherwise noted. The Contractor will also be responsible for the installation of any required VESA 200mm adapter plates necessary for a finished installation.
- E. LCD's will be installed in mounting brackets and secured with tamperproof hardware. A set of removal tools shall be furnished. After installation of brackets confirm (by letter) that all set screws and washers have been installed and all work has been performed per manufacturer's standards.
- F. Manufacturer and Model:
 - 1. Sampo LME-37X8 or engineer approved equal
 - 2. Sampo LME-32X8 or engineer approved equal
 - 3. Sampo LME-26X8 or engineer approved equal
 - 4. Premier AM2
 - 5. Premier CTM-VESA W/AST-2446 & Panelock Security System
- G. Provide patch cables between wall plate and each LCD Display for CATV, SVGA, Coax, and RCA Audio In/Out.

2.21 VCR'S

- A. The VCR's supplied with this bid shall be rack mountable. Shelf mounting, unless the shelves and external cover plate (trim plate) are specifically designed for mounting this equipment, is unacceptable.
- B. The VHS VCR's shall provide the following features:
 - 1. Four (4) head double Azimuth video system.
 - 2. HQ circuitry.
 - 3. Blue screen audio/video mute when no signal is present.
 - 4. Playback capability of SP, LP and EP recorded tapes.
 - 5. Maximum rewind time of less than three (3) minutes on a T-120 tape.
 - 6. Video output of 1.0 V p-p.
 - 7. Video signal to noise ratio of better than 43 dB (in SP mode).
 - 8. Audio signal to noise ratio of better than 40 dB (in SP mode).
 - 9. Slow motion playback at 1/6th the normal playback speed.
 - 10. Real Time (hours, minutes, seconds) counter.
 - 11. Quick start loading.

12. Picture search speed of up to twenty-one (21) times normal playback speed in EP mode.
13. Automatic "Power On" when a tape is loaded.
- C. In addition to all the features normally associated with VCRs, and the rack mount requirements mentioned previously, there are three (3) capabilities that are required:
 1. Include an IR remote control.
 2. Have automatic digital tracking.
 3. Have an on-screen operation feature.
- D. The on-screen feature shall simultaneously display all the following capabilities: channel, mode, tape remaining and counter display indicating time in hours and minutes.

2.22 DVD'S

- A. Provide the number of DVD's as indicated on the drawings.
- B. DVD's shall be rack mountable. Shelf mounting, unless the shelves and internal coverplates (trim) plates are specifically designed for mounting, is not acceptable.
- C. The DVD's shall be capable of IR control. The Contractor shall provide infrared controller with each DVD. The controllers shall be equipped with batteries.
- D. Five inch (5") playable disc for: DVD - video, CD- Digital Audio, CD video - Version 1.1, 2.0 VTSC and PAL.
- E. Signal Read Out: Dual pick-up optical laser reflection beam.
- F. Outputs: S-Video, Composite Video, Optical Digital Output, Coaxial Digital Output Audio (Left and Right) Outputs.
- G. Multi-language/subtitle capability.
- H. Dolby Digital Decoding.
- I. On Screen Display
- J. Front headphone jack.

2.23 DIGITAL VIDEO PROJECTORS

- A. Provide ceiling mounted digital video projectors with the following minimum specifications:
 1. Digital video projector
 - a. DLP
 - b. XGA (1024 x 768) native resolution
 - c. 2600 ANSI lumens

- d. 2500:1 contrast ratio
 - e. Vertical and horizontal digital keystone correction
 - f. Inputs: (2) RGB, (1) DVI, (1) S-Video, (1) Composite, (2) stereo mini jack
 - g. Outputs: (1) RGB, (1) stereo mini jack
 - h. Minimum 2 watt amplifier with internal speaker
 - i. Warranty: (3) year projector, 90 day lamp
 - j. AC power cord
 - k. AV cables
 - l. IR remote control with batteries
 - m. Manuals and documentation
 - n. Digital video projector shall be a Mitsubishi XD490U.
2. Projector mount
- a. Projector mount shall be a Peerless PRS Series projector mount kit Model PRS242 which includes a projector mount and an adapter plate.
 - b. Ceiling plate shall be a Peerless Unistrut adapter ACC 550.
 - c. Contractor shall provide and install Unistrut support members, clamps, threaded pipe and other appurtenances necessary for a complete and professional installation. See diagram T15 for a typical installation.
 - d. Contractor shall provide and install 1-1/2" NPT black mounting pipes. Contractor shall field verify mounting pipe lengths.

2.24 SUPPLEMENTAL DIGITAL CLOCKS

A. General

- 1. Contractor shall furnish and install a complete Digital Time and Program System as shown on the plans and hereinafter specified including backboxes, and wiring, all to be ready for operation.
- 2. The intent of these specifications is to provide a complete and satisfactory operating system of continuous, automatic supervision and synchronization of all clocks.
- 3. Contractor shall furnish the technology architect with descriptive information and engineering data on the equipment he proposes to furnish under these specifications. Approval shall be received from the technology architect before final purchase is made of this equipment.

4. The manufacturer of this equipment shall provide a complete set of operating instructions, circuit diagrams and other information necessary for proper installation, operation and maintenance. Two copies of the operating instructions shall be furnished to the owner upon completion of the installation.

B. Function

1. The Digital Time and Program Control System shall provide at least the following functions:
2. Provide a microprocessor controlled Master Time-Program Clock that shall supervise and correct all Dukane digital and secondary clocks and most synchronous motor driven and impulse secondary clocks as manufactured by others. It shall provide circuitry to control associated electromechanical devices such as bells and lights.
3. Provide multiple circuit, 24-hour, 1-minute interval programming for multiple time events and functions for AM, PM, and day of week. Variable schedules shall be provided for a quick schedule change from the normal sequence to a special or seasonal sequence of events.
4. Provide an electronic lockout code to protect against unauthorized operation.
5. Provide for both 12-hour and 24-hour time format.
6. Permit deactivating of any quarter, half or full day programming.
7. Provide an alternate power source with battery backup for at least 7 days after a power failure.
8. Provide immediate correction of all digital secondary clocks after the end of a power failure.
9. Provide signaling within one minute after restoration of primary power, indicating that all clocks are being automatically corrected.
10. Provide correction of all secondary clocks for time errors at least once every 24 hours.
11. Permit manual, unscheduled signaling over any one or over all program circuits.
12. Permit manual, unscheduled correction of all secondary clocks at any time.
13. The Master Time-Program Clock shall be UL Listed under section 863, Electric Time-Indicating and Recording Devices, CSA (Canadian Safety Administration) and FCC registered under Part 15, Subpart J required by FCC for all Class A computing devices.
14. Provide compact, easy to read secondary clocks.
15. Provide digital secondary clocks with LED numerals that are either 2 inches (5 cm) or 4 inches (10.1 cm) high - as specified on drawings.
16. Provide a variety of clocks, including single and double-faced digital clocks and digital speaker clocks, and provide for both wall and ceiling mount as specified on drawings.

17. Provide independently operated clock-elapsed timer units capable of timing in seconds, minutes, and hours.
18. Provide a clock-elapsed timer remote control for activation of the start, reset, and stop operations of the timer.
19. Provide a power supply, capable of operating on 120 or 240Vac, for running digital and synchronous motor driven clocks, synchronous adapters, and associated relays.

C. Equipment

1. The Dukane Master Time-Program Clock shall be a compact microprocessor controlled unit capable of maintaining the correct time on the Dukane digital secondary clocks. In addition to virtually all other types of corrective secondary clocks, it will control any or all combinations of zone devices, such as bells, on the basis of up to seven preprogrammed schedules. Schedules may be selected as follows: a) seven schedules/64 events; b) 1 schedule/128 events and 5 schedules/64 events; c) 2 schedules/128 events and 3 schedules/64 events; d) 3 schedules/128 events and 1 schedule/64 events. These schedules can be selected for quick changes between a normal and seasonal or special sequence of events. Each time event is programmed using the time of day in hours and minutes, AM or PM, and the day(s) of the week (Sunday through Saturday) the event occurs. Correction for daylight saving time can be initiated a week in advance. All memory is protected against unauthorized entry by a four digit electronic lockout code assigned at startup.
2. Dukane Model 110-3693 Power Supplies shall be supplied as indicated on the plans in sufficient quantity to provide 24Vac @ 5 amps for operating either digital clocks or synchronous motor driven clocks and their adapters. The power supply shall require 120 or 240Vac, 50/60 Hz @ 168 watts for operation.
3. The secondary clocks shall be furnished and installed as indicated on the plans. They shall be completely solid-state and corrected by the Dukane 24A701/24A702 Master Time-Program Clock. The digital secondary clocks shall have either a 2-inch (5 cm) or 4-inch (10.1 cm) high LED display for maximum visibility. The digital clocks shall be capable of displaying time in either 12-hour or 24-hour format, and shall operate in either BRIGHT or NORMAL mode.
4. The Clock-Elapsed Timer shall be Dukane Model 24A720, furnished and installed as indicated on the plans. The Clock-Elapsed Timer shall be capable of displaying time in a 12 or 24-hour format of elapsed time in seconds, minutes, and hours. The system shall operate from a 15-24Vdc source or from a 110 or 220Vac, 50/60 Hz source. The digital display shall be a 1-inch (2.5 cm) high LED unit designed for maximum visibility.
5. The Clock-Elapsed Timer Remote Control shall be Dukane Model 9A1840 as indicated on the plans. The Remote Control shall activate the start, reset, and stop operations on the Clock-Elapsed Timer from a remote location.
6. The Synchronous Adapter(s) shall be the following Dukane Models when corrected from Dukane digital clock data furnished and installed as indicated on the plans:
 - a. Dukane Model 9A1880 (chassis plus one adapter board) or Dukane Model 9A1881 (chassis plus two adapter boards) for Dukane 240 Series (National) Synchronous Motor Driven Clocks.

- b. Dukane Model 9A1660A for translating Dukane digital clock data pulses into correction pulses compatible with the Dukane 24SS Series Clocks or Simplex Clock System's synchronous motor driven secondary clocks.
- c. Approved manufacturers are listed below.

<u>Manufacturer</u>	<u>Model Number</u>	<u>Description</u>
Digital Display Systems	BSA41225 ACSW	2 1/2" LED Display-Single Face
Digital Display Systems	BSA41260 ACSW	5-3/4" LED Display-Single Face
Digital Display Systems	BSA41260-2 ACSW	5-3/4" LED Display-Double Face

2.25 VIDEO SPLITTER

A. VGA video splitter cable:

- 1. Provide DVI to DVI + VGA splitter cables with the following minimum specifications:
 - a. DVI to DVI + VGA Cable
Model: DVI-8415a
400 Meadowmont Village Circle, Suite 425
Chapel Hill, NC 27577
(888) 463-9927
www.dvigeart.com

2.26 CABLING

A. Cabling:

- 1. This contractor shall provide compliance for the entire end-to-end link and will comply with the standards governing the entire channel.
- 2. This Contractor shall furnish and install all wiring as indicated on the Drawings. All wiring and terminations shall be in full conformance with all of the current editions or revisions of all applicable codes and standards as previously listed under "Regulatory Agencies" of this Section of the Specifications for their intended use on this Project.
- 3. It shall be the responsibility of this contractor to provide open top cable supports, i.e. "J" hooks, in the ceiling space for cable support.
- 4. Cabling shall be run parallel and perpendicular to building walls.
- 5. All cabling installed in ceiling spaces shall be plenum rated.
- 6. All cables shall be installed in existing conduits and raceways or an Engineer approved raceway system. Where conduits do not exist, provide "J" hooks sized appropriately for the bundle.
- 7. All cabling shall be continuous from termination to termination and free from splices, reverses, or other connections. Provide a 15 foot minimum service loop above accessible ceiling for each terminated cable to accommodate future changes. Cable slack shall be stored in a fashion as to protect it from damage.

8. Remove only the amount of cable jacket necessary for termination.
9. Carefully lay all cable with appropriate radius of curvature and protect at bends and corners. Observe minimum bend radius and tension limitations as specified by EIA/TIA.
10. All cables must be routed and managed for a neat and aesthetically pleasing appearance. All work must be installed in a neat and workman like manner.
11. Bundled cables shall be secured with plenum rated Velcro® ties. Zip ties will not be permitted.
12. The contractor shall assure that at the completion of cable installation, cables are free from twists, kinks, sharp bends, cuts, gouges or any other physical damage that might cause alterations to the electrical or optical characteristics of the cables.
13. The contractor shall work carefully with all ceilings and return ceilings to original conditions. Any damages or expenses are the responsibility of the contractor.
14. All entrance and intra-building cable penetration, conduit, cores, wall and ceiling penetrations will be sealed with a 3 M type fire retardant.

2.27 LABELING

- A. The contractor shall install District supplied asset tags on all equipment over \$500.00 in value provided under this bid. The contractor shall populate a District supplied Microsoft Excel database with the following information:
 1. District asset tag number
 2. Building/location
 3. Equipment identification number
 4. Manufacturer serial number
 5. Install Date
- B. The contractor shall stencil identification information on all digital video projectors. The Owner will provide stencils, ink and rollers for the contractor's use.

2.28 VIDEO EQUIPMENT

- A. General: The video equipment shall be new, of modern design, and current standard production of the manufacturer.
- B. All miscellaneous equipment required for a complete, professional installation shall be included in the base bid. No allowances for any additional equipment, hardware, cabling, inserts, jacks, blanks, or miscellaneous will be considered unless specifically excluded from the base bid.

2.29 FRONT-PROJECTION SCREENS

- A. Manually Operated Screens, General: Manufacturer's standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.

1. Screen Mounting: Top edge securely anchored to a 3-inch- diameter, rigid steel roller; bottom edge formed into a pocket holding a tubular metal slat, with ends of slat protected by plastic caps, and with a saddle and pull attached to slat by screws.
- B. Surface-Mounted, Metal Encased, Manually Operated Screens: Units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed steel sheet not less than 0.027 inch thick or aluminum extrusions; with flat back design and baked-enamel finish, wood grain vinyl not acceptable. Provide end caps and universal mounting brackets, finished to match end caps. For ceiling mounted units provide manufacturers T-Bar scissors clip.
 1. Products:
 - a. Da-Lite Screen Co., Inc.; Model C.
 - b. Draper, Inc.; Luma 2
- C. Screen Material and Viewing Surface:
 1. Matte-White Viewing Surface: Peak gain of 0.9 to 1.0, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
 - a. Products:
 - 1) Da-Lite Screen Co., Inc.; Da-Mat.
 - 2) Draper, Inc. Fiberglass Matte White.
 2. Material: Vinyl-coated glass-fiber fabric.
 3. Mildew Resistance: Rating of 0 or 1 when tested according to ASTM G 21.
 4. Flame Resistance: Passes NFPA 701.
 5. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.
 6. Seamless Construction: Provide screens, in sizes indicated, without seams.
 7. Edge Treatment: Without black masking borders.
 8. Size of Viewing Surface.
 - a. 60 inches high by 80 inches wide, 100 inches diagonal.

2.30 BACKGROUND MUSIC CENTER

- A. The background music center shall includes the following separately mounted components:
 1. Digital AM/FM tuner with 5 presets.
 2. Compact disc player.
 3. High speed audio cassette duplicator.

4. Dual audio record/play cassette.

- B. The background music center shall be fully zoneable and shall be equipped to provide two (2) sources to the broadcast simultaneously and independently to 1-16 field of selectable zones simultaneously.

2.31 DISTRIBUTION CABLE

A. Trunk Cable for RF System:

1. The trunk line cable shall be AL500 foam plenum rated dielectric solid shielded aluminum jacket. Refer to Drawings for exact type.
2. Loss per hundred (100') feet, at 1000 MHz shall be no greater than 4.1 dB.
3. Cable shall be free of any and all attenuation peaks greater than 1 dB from 5 to 1000 MHz.
4. The structural return loss shall be 30 dB or greater with variable bridge, slow sweep, fixed bridge.

B. Drop Cable:

1. All drop cable shall be plenum rated quad shielded RG-6U foam dielectric. Refer to drawings for exact type.
2. Loss per hundred (100') feet, at 1000 MHz shall be no greater than 6.6 dB.
3. Cable shall be free of any and all attenuation greater than 1 dB nominally from 5 MHz to 1 GHz.
4. The structural return loss shall be 20 dB or greater with variable bridge, slow sweep and fixed termination.

C. Other Cables:

1. RG-6 patch cable. Length as required.
2. RCA patch cable. Length as required.
3. VGA patch cable. Length as required.
4. The Contractor shall furnish and install all RG-6, RCA and VGA patch cables for connection to each LCD. Length as required.
5. The Contractor shall furnish and install all RG-6, RCA and VGA patch cables for connection to each CCP. Length as required.
6. The Contractor shall furnish and install all RCA and VGA patch cables for connection to each Teachers outlet box. Length as required.

2.32 PASSIVE DEVICES

A. Taps:

1. All taps shall be of the CATV variety (Rated to 1000MHz).
2. They shall include 1, 2, 4 and 8 way multitaps with changeable plates for selecting tap values.
3. Attenuation range shall be 8, 11, 14, 17, 20, 23, 26, 29, 32 and 35 dB.
4. Housing shall be made of heavy duty die cast with corrosion resistant finish.
5. Frequency range shall be from 5 to 1000 MHz.
6. Flatness response attenuation (input to tap loss + or - 1dB from 10 to 605 MHz.
7. Impedance at all ports shall be 75 ohms.
8. Power capacity shall be 6 amps (nom.) A/C or DC.
9. Return loss shall be greater than 18 dB with fixed attenuation.

B. Splitters:

1. All splitters 2, 3, and 4 ways shall be made of heavy duty die-cast housing with corrosion resistant finish, and machine threaded F-61A terminals (Rated to 1 000MHz).
2. All splitters shall have the following features: 5/8"-32 tapered countered bore entry ports, reinforced seized center conductor post and RFI integrity exceeding FCC requirements.
3. Frequency range shall be from 5 to 1000MHz.
4. Isolation of 18 dB from 5 to 1000MHz.
5. Bandwidth shall be from 5 to 1000MHz.

a. Insertion Loss:

2 Way	4.4	dB max.
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3 Way	6	dB max.
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4 Way	7	dB max.
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6. Return loss shall be a minimum of 17 dB with fixed bridge.

C. Directional Couplers:

1. All directional couplers 8, 12, 16, 20 and 24 dB values shall have the following features: corrosion resistant housing, 5/8"-32 tapered countered bore entry ports, reinforced seized center conductor post and RFI integrity exceeding FCC requirements.
2. Frequency range shall be from 5 to 1000MHz.

3. Maximum attenuation shall be 9 dB from 5 to 1000MHz.
4. From 5-650 MHz, the insertion loss shall not exceed 2.2 dB on 8 dB and 12 dB taps and 12 dB on higher taps.
5. Isolation of 18 dB from 5 to 1000MHz.
6. Minimum return loss of 17 dB from 5 to 1000MHz with fixed bridge.

2.33 VOICE CENTRAL PROCESSING EQUIPMENT - PUBLIC ADDRESS

- A. The system shall consist of a central equipment cabinet, microprocessor control unit, power supply, zone modules, administrative control centers (ACC's), amplifiers, remote display units, classroom loudspeaker assemblies, and all associated material, hardware, wiring, and options as described herein to provide a complete working system which shall meet the specified requirements. The system minimum of one hundred and sixty (160) stations is to be rack mounted as indicated on the drawings.
- B. The system shall provide the following communication paths and functions:
 1. ACC to a single classroom loudspeaker.
 2. ACC to ACC.
 3. Simultaneous program distribution directed from any ACC without interrupting the intercom channel. The system shall be designed so as to accomplish any combination or all of the above functions simultaneously.
 4. Telephone system access to central PA system. Customer provided telephone system shall be capable of accessing the PA system performing the following.
 - a. All Page
 - b. Zone Page
 - c. Emergency Tone Alert
 - d. Classroom Call
- C. The system shall provide the facilities for:
 1. Paging
 2. Sounding emergency signals
 3. Timed event signals
 4. Control and distribution of one program channel to individual classrooms, selected groups, or all classroom speakers.
 5. Connection to building phone system.

- D. The system shall include the facilities for a master clock and programmer. The system master clock will be capable of correcting compatible brands of analog or digital or both types of secondary clocks.
- E. The system shall have an RS232 port for down load/up load capability. The Contractor shall provide the Owner with a diskette containing its architectural room number information, zone assignments for paging, and bell schedule. Information shall be loaded and unloaded from a standard PC.
- F. The Contractor shall provide off-site diagnostic capability through RS232 port. Use of programming mode shall not inhibit system operation.
- G. The system shall use industry standard twenty-five (25) volt technology.
- H. The Contractor shall provide a minimum of two (2) intercom channels.
 - 1. The Contractor shall provide microprocessor-based equipment of modular design, utilizing plug-in connections between all modules.
 - 2. Facilities to originate emergency calls, which would take precedence over all routine calls.
 - 3. System check with self-diagnostics.
 - 4. System to support up to four (4) ACC's, each having identical functions and control features.
 - 5. Automatic gain control on intercom speech channel.
 - 6. Built-in battery backup for internal system clock to maintain correct time for a period of seven (7) days after power loss. All other programmed data shall be stored in non-volatile EEPROM memory and will be retained indefinitely.
 - 7. Automatic preannounce tone over any loudspeaker selected for two (2) way communications. A privacy tone will sound whenever a loudspeaker is being monitored.
 - 8. Distribution of paging announcements via any ACC.
 - 9. Classroom loudspeakers are user programmable to any of eight (8) paging zones or class change zones.
 - 10. Unique system tones for emergency and civil emergency.
 - 11. Special tone for custodial call to all speakers.
 - 12. Programmable tones such as warble, siren, chime, etc.. Six separate items available.
 - 13. Provide one (1) VOX handset (for private communications), built-in microphone, speaker, and push-to-talk button on each ACC for intercom communications.
 - 14. Manual time tones, which can be initiate by any ACC.
 - 15. The system shall be zoned as follows:

- a. Each classroom shall be considered one (1) zone and shall have a dedicated audio circuit to the central equipment cabinet.
 - b. All corridor speakers will be on one (1) zone.
 - c. All outside horns will be on one (1) zone.
16. Capability for any ACC to direct a program to any one (1), group of, or all remote stations. A rack mounted AM/FM tuner/cassette with pre-amp shall be provided. The Contractor shall refer to the drawings for location.
17. Self-diagnostics for each ACC.
18. Easy menu-driven programming
19. Programmable system functions, including:
- a. alphanumeric room numbers
 - b. Five (5) call-in priority levels.
 - c. Two (2), Three (3), or four (4) digit alphanumeric dialing.
 - d. Twelve-hour (12) or twenty-four (24) hour clock display when ACC is in the idle state.
 - e. Two hundred and fifty-six events (256), eight (8) time schedules, eight (8) zones, and eight (8) user-programmable tones.

Each classroom shall be programmed to annunciate at any one (1) or all ACC'S.

21. Automatic distribution of user programmable time signals activated by an internal time clock.
22. Program room stations, zones, or multiple zones to receive the program source on a selected basis.
23. The system shall not require motor driven fans to keep system components cool.
24. Outside horns shall be activated for emergency announcements and tones only. Routine announcements and class change tones shall not go out over the outside horns.
25. Simultaneous program distribution and two (2) intercom channels.
27. System is to be compatible with a DTMF phone system and be able to use touch-tone phones to make and receive call from within the system.
28. System is to have a user-programmable, battery-backed master clock.
29. System is to be able to drive either digital or analog clocks or both from within the system.
30. The system is to have user programmable input ports that allow external devices to trigger time and emergency tones, external all-call, door monitor, night transfer switch, and other system functions. User programmable dry contact outputs are provided to signal external

devices when such functions as clock synchronization, all call, and remote annunciations occur.

31. System is to have an RS-232 Port for PC interface.
- I. The system shall contain an integral master clock and programmer that shall be capable of performing the following functions:
 1. Displaying the time of day in either twelve (12) or twenty-four (24) hour format at each ACC.
 2. Providing two hundred fifty-six (256) discrete time event entries for programming functions based on;
 - a. The time of day in hours and minutes.
 - b. The day or combination of seven (7) days of the week the event is to occur.
 - c. Selection of any one or any combination of eight (8) zones or outputs to be activated.
 - d. Selection of any one of eight (8) schedules to allow for maximum flexibility due to special circumstances or seasonal changes.
 - e. Selection of fourteen (14) user programmable tones.
 3. Provide for an editing and review routine to permit the user to change and edit time events, zones, and schedules.
 4. Correct compatible brands of secondary clocks, analog or digital or both.
 - J. The ACC shall be the control center for communications, paging, program distribution and signaling. The ACC will provide the following:
 1. Listening level control for intercom channel or program channel.
 2. Automatic gain control on intercom microphones.
 3. Provide one (1) VOX handset (for private communications), built-in microphone, speaker, and push-to-talk button on each ACC for intercom communications.
 4. ACC self-diagnostics.
 5. Provide ACC-keypad, menu-driven programmable systems functions, including:
 - a. Architectural alphanumeric room numbers with option to program call-in registering only at specific ACC's.
 - b. Room call-in priority levels.
 - c. Twelve (12) or twenty-four (24) hour time clock.
 - d. Two-hundred fifty-six event (256), eight (8) time schedules, eight (8) zones.

- e. Eight (8) speaker-paging zones.
 - f. System tone characteristics.
 - g. Eight (8) Speaker program zone assignment
 - h. Eight (8) Speaker time tone zone.
- 6. The Contractor shall provide access code for user-restricted entry to system programming functions.
- 7. Facility for emergency calls to take precedence over routine calls.
- 8. Distinct call-in alert tone for emergency call-in.
- 9. The Contractor shall provide distribution of special tone to all speakers for custodial call.
- 10. The Contractor shall provide built-in speaker at ACC to monitor program channel.
- 11. System programming may be accomplished from an ACC or from a PC type computer.
- 12. The ACC shall be capable of one hundred percent (100%) queuing of incoming calls in priority sequence.
- K. The central equipment shall be rack mounted in a standard nineteen-inch (19") cabinet. The central cabinet shall contain the following equipment:
 - 1. Digital card.
 - 2. Analog card.
 - 3. Telephone interface card (required).
 - 4. Zone switching card as required to accommodate system capacity.
 - 5. Power supply as required
 - 6. System Amplifier, 250 watts.
 - 7. AM/FM Tuner
 - 8. The unit shall require one hundred ten (110) VAC power but in the event of a power failure, the system shall switch over to a battery backup system provided by the Contractor.
- L. The ACC shall be a desktop unit located in the main office. It shall have a modular jack for quick disconnects for servicing.
- M. AM/FM Tuner:
 - 1. The Contractor shall provide one (1) AM/FM Tuner as part of the paging system.
 - 2. The unit shall be rack-mountable and fit a standard nineteen-inch (19") rack.

N. AM/FM Antenna:

1. The Contractor shall provide a heavy-duty roof-mounted antenna for receiving AM and FM radio signals.
2. The Contractor shall provide a minimum clearance between the antenna elements and the roof of ten (10) feet.
3. The Contractor shall provide a heavy-duty tripod mount for each antenna mast.
4. The Contractor shall provide a minimum horizontal clearance between the most protruding element of each antenna and other antenna(s), obstacles, obstructions and building construction of twenty (20) feet.
5. The Contractor shall provide all antenna assembly(s) and installation(s) as required to optimize reception.
6. The Contractor shall provide the entire installation and construction of all antenna assembly(s) in a manner to withstand one hundred (100) mph wind forces.
7. The Contractor shall ensure that the antenna assembly(s) are connected with a proper ground to prevent electrical hazards from lightning.
8. The Contractor shall provide lightning protection with lightning arrester(s) in the antenna feed cables(s) where entering the building.
9. The Contractor shall provide all cabling for the antenna system.

O. The Public Address shall have proper amplification to provide a minimum of two (2) watts of audio power to each PA speaker in the building, and five (5) watts of power to each exterior horn/speaker.

P. Access shall be from any telephone via entry of proper password. The PA shall permit:

1. Audio distribution to any selected zone or all zones simultaneously.
2. Media Centers will be a separate zone, offices will be a separate zone (1 zone for all offices), gymnasium will be a separate zone, cafeterias/cafeteriums will be a separate zone, and hallways will be provided with a total of four (4) zones and classrooms shall each be a separate zone.
3. Zone amplification shall be provided by individual twenty (20) watt plug-in cards, at the CPCC.
4. Each classroom shall have an individual five (5) watt PA amplifier at every CCP location.
5. All plug-in cards shall be housed in standard rail frames, with a capacity of sixteen (16) cards per frame.
6. PA system shall have a minimum of forty (40) hard-wired zones and shall be expandable. The hard wired zones shall be software programmable to accommodate arrangement of any combination of classrooms, offices, and corridors to form a program zone. The program zone shall have overlapping capabilities.

7. Each card shall have a visual anti-distortion level control.
8. A minimum of eight (8) program zones shall be provided initially configured.

Q. The background music shall be muted only in the zone where the page is directed. For "all zone" pages, the background music system shall be muted in all zones for local pages; it shall mute the music in only the paged zone.

2.34 PROGRAM DISTRIBUTION OPERATION

- A. The system shall provide facilities to distribute program material (i.e. music, radio broadcasts) in the following manner:
 1. The staff member approaches the central control cabinet and inserts a tape, compact disk, or tune desired radio broadcast utilizing the rack mounted tape-tuner CD player unit.
 2. The staff member then "direct-selects" room(s) or areas to send the program via an easy to use color guided room position switch bank panel.
 3. The staff members have full view and choice of all the rooms and locations available.
- B. The system provides two (2) simultaneous channels of background music as described in Background Music section.

2.35 SPEAKERS

- A. The speakers shall be 8" dual cone two-way with multiple taps. The taps shall be set at mid-range. After the system is installed and operational the sound system shall be balanced to provide uniform sound levels in all spaces by adjusting the taps on the speakers.
- B. The speakers shall be provided with backboxes, tie bridges, and white round baffles.

PART 3 - EXECUTION

3.1 TERMINAL EQUIPMENT AND INSTALLATION

- A. LCD's and Mounting Brackets: All LCD's shall be cable ready, 37" color receivers, unless otherwise noted on drawings. Each receiver shall be located on a mounting bracket capable of holding fifty (50) pounds of weight and be swivel type.
- B. Wire: The contractor shall provide all wire and cables for a complete and operational system.

3.2 INSTALLATION

- A. The contractor shall ring out and identify, with sturdy tie-wraps clearly marking every cable in the system (both ends). All markings shall include purpose destination and origination of the wire or cable.
- B. Cable lengths at every outlet will have a minimum of four (4') feet of slack and fifteen (15') feet service loop at the head-end.
- C. Apply tamper proof Asset Tag to all equipment exceeding \$500 in value. Asset number spreadsheet will be generated by the Contractor. The Contractor shall record the asset tag

number, equipment type, serial number, and equipment location in a database and submit to Owner for approval.

- D. The contractor shall use standard cable practices in the installation of the RF system.
- E. System design and engineering shall utilize a tap-off system exclusively.
- F. All head-end equipment will be rack mounted or housed within the standard nineteen 19", closed and lockable rack cabinets. Under no conditions shall any equipment be mounted on four 4' foot by eight 8' foot plywood or any other material.
- G. All equipment needing to be operated from the front panel will be rack mounted. "SHELVING" type installations are unacceptable.
- H. RF taps shall be secured to building supports or cable tray and not allowed to float at cable termination points.
- I. Broadband indoor distribution amplifiers shall be wall mounted in IC's. See drawings for video riser diagram.
- J. Classroom splitters shall be installed in classroom ceiling spaces prior to RG-6 cable entering conduit.
- K. The signal level at every tap shall be fifteen (+15 dB) plus or minus three (-3) dB between adjacent channels.
- L. Signal level at every outlet shall be five (+5 dB) plus or minus two (2) dB between adjacent channels.
- M. All passive components shall be designed for a frequency range of 5 to 16 Hz. The system shall be designed for adjacent channel operation.
- N. The Contractor shall carefully lay all cable with appropriate radius of curvature and protect at bends and corners.
- O. The Contractor shall provide and install equipment cabinets in the MDF as specified and detailed on the drawings.
- P. Equipment cabinets and patch panels electronics shall be arranged to allow for natural wiring progression in functional fields, minimize crossing of wires and allow for the easy access to each component.
- Q. The Contractor shall provide and install two (2) inch sleeves, with bushings, through all walls if not provided by the electrical contractor. Only those sleeves which have been depicted on the bid documents will be provided by the electrical contractor. The Contractor shall seal each sleeve, including the outside perimeter, with 3M-type fire retardant after cable installation. The fire rating classification shall equal or exceed the fire rating of the wall. The Contractor shall review all the drawings prior to its bid submission to identify locations for additional sleeves. Pricing for additional sleeves after award of contract will not be considered or approved unless it is the result of change of scope by the Owner.
- R. The Contractor shall be responsible for fire-stopping the interior of ALL cores and sleeves it uses as part of this project. Nelson putty shall be used for floor cores. Nelson pillows shall be used for 4" sleeves and for cable tray access through firewalls as necessary.

- S. RG-6 video cabling shall be continuous and splice free unless specifically stated otherwise. Cable slack shall be provided at the jack end and the directional tap end. A minimum of five (5) feet of slack cable shall be coiled and secured at each end. This slack is exclusive of the length of RG-6 that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a fashion as to protect it from damage.
- T. The Contractor shall loosely bundle cables with Velcro wraps, suitable for Plenum environments, every twenty (20) feet.
- U. The Contractor shall not fasten supports to pipes, ducts, mechanical equipment or conduit.
- V. The Contractor shall obtain permission from the Owner or the Technology Designer before drilling or cutting structural members.
- W. Powder actuated anchoring devices shall not be used to anchor any cable support or raceway system components.

3.3 INSTALLATION - PROJECTION SCREENS

- A. General: Install projection screens at locations indicated to comply with screen manufacturer's written instructions.
- B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
 - 1. Test manually operated units to verify that screen operating components are in optimum functioning condition.

3.4 INSTALLATION - CEILING MOUNTED PROJECTORS

- A. Provide and install Unistrut support members, clamps, threaded pipe and other necessary appurtenances.
- B. Provide and install Peerless Unistrut adapters.
- C. Provide and install 1-1/2" NPT black mounting pipes.
- D. Provide and install digital video projectors and accessories.
- E. Provide and install Peerless PRS Series mounting kits including projector mounts and adapter plates.
- F. Configure digital video projector lamp to operate in "low mode".
- G. Configure the splash screen on each digital video projector with an Owner provided logo.
- H. Mount projector to ceiling following the manufacturer's instructions.
- I. Provide and install new faceplates, frames, jacks, inserts and blanks as specified.

- J. Provide and install a DVI to DVI + VGA splitter cable.
- K. Connect LCD monitor to DVI to DVI + VGA splitter cable using a contractor provided DVI cable.
- L. Connect the VGA output of the DVI to DVI + VGA splitter cable to the contractor provided VGA outlet.
- M. Apply Owner provided asset tags to all projectors.
- N. Provide and install labels on all faceplates.
- O. Record the asset tag number, building/location, identification number, manufacturer serial number and installation date in an Owner provided Microsoft Excel database.
- P. Remove all packing material from school properties.
- Q. Calibrate, configure, and test new projector with the Owners existing computer source device.
- R. Refer to drawings for faceplate configurations and interconnection details.
- S. Any system or component that fails during installation shall be replaced upon discovery

3.5 TESTING AND CALIBRATION

- A. Ceiling mount projectors:
 - 1. Adjust for maximum image size on the Owners existing and new screens.
 - 2. Adjust focus, brightness, contrast, color settings and keystone as necessary for a proper image in an educational environment.
- B. Adjust video peaking control on the Extron receivers as necessary to obtain optimum picture sharpness.

3.6 SYSTEM TESTING - RADIATION LEAKAGE TESTING

- A. Beginning July 1, 1990, every RF cable television system shall comply with the NEW FCC RULES AND REGULATIONS on signal leakage. CODE OF FEDERAL REGULATIONS TITLE 47 - TELECOMMUNICATION PART 76-CABLE TELEVISION SERVICE.
- B. The rule simply stated says any operator of an RF system CANNOT leak frequencies into the atmosphere which may interfere with aeronautical and marine emergency radio frequencies.
- C. The limits of the radiation leakage are as follows: (See Table 1)

RADIATION

FREQUENCIES

LEAKAGE μ V/M

DISTANCE (FEET)

Below 54 Mhz	15	100'
Between 54 MHZ and 216 MHZ	20	10'
Over 216 MHZ	15	100'

TABLE 1

In order to test for these limits, the successful Contractor must supply the following equipment: Strength Level Meter (SLM) of adequate accuracy, such as a Wavetek Sam 1, a dipole antenna.

NOTE: Care must be taken to insure the dipole is properly tuned and placed prior to recording the measurements.

The method of accurately measuring and calculating the leakage of the RF system are as follows:

1. To get an accurate reading of the system, the lowest and highest frequencies should be tested. Lowest 55 MHz and highest 213 MHz.
2. Set-up horizontal dipole as shown in Figure 1. (Length of the elements on the dipole antenna are calculated by using the following formula:

$$L = \frac{11808 / f}{2}$$

L = Length in inches

f = Frequencies in MHz

3. Hook up antenna to the input of the SLM and read dBmv for the frequency being tested. From this reading a conversion from dBmv to uV/M will determine whether the system is in compliance with FCC RULES AND REGULATIONS, when compared to the Table listed above.
4. Critical Factors to be Aware of:
 - a. Good quality cable.
 - b. Connectors with RFI (Radio Frequency Interference) shielding.
 - c. Good quality Active and Passive Devices.
 - d. Care in the installing of cable system.
 - e. NOTE: In order to perform this next series of system tests the following test equipment shall be supplied by the installing contractor.

- 1) IFR-7550 Spectrum Analyzer.
- 2) WaveTek SAM I Signal Level Meter.
- 3) Fluke 77 volt-meter

3.7 FREQUENCY RESPONSE

- A. An IFR-7550 spectrum analyzer shall be used to measure and monitor system frequency response. The test point used will be directly off the test port of the combining network. After setting up the spectrum analyzer to view all of the channels in the system, adjustments, if needed, shall be made on the processing equipment to insure a flat frequency response with at least 15 dB separation between the audio and video signals.
- B. This test should be repeated after twenty-four (24) hours to insure that the frequency response has not drifted due to head-end burn-in.

3.8 CROSS MODULATION TEST

- A. Cross modulation is the maximum usable output level of a system. This effect can easily be seen on a TV receive. When cross modulation appears it is seen as herring bones or wipers which is an over modulation of a channel, i.e. one channel overlapping another channel.
- B. With the use of the spectrum analyzer and the Fluke 77 voltmeter, measurements shall be made using the following procedure:
 1. Feed the system output into the spectrum analyzer through a six (6) dB pad and a band pass filter. Center the desired carrier on the spectrum analyzer.
 2. Simultaneously modulate all channels 100%.
 3. Convert the vertical output of the IF section of the spectrum analyzer to the output of the volt meter, and set the spectrum analyzer band width to 300 kHz and reduce scan width to 20 kHz. Adjust frequencies for maximum amplitude and adjust analyzer to get a good trace on the display.
 4. Set band width on volt meter to 30 kHz and adjust frequency control until volt meter AFC locks on the 15 kHz modulation.
 5. Adjust analyzer variable IF until volt meter reads 0.
 6. Switch off modulation on channel displayed and read the cross modulation on the voltmeter. The percentage of change in levels is the percentage of cross modulation.

3.9 HUM MODULATION TEST

- A. Hum modulation is a 60 cycle AC voltage which has manifested itself into the system. This is easily detectable on a TV set as a large horizontal bar that moves slowly up or down. This test is accomplished by locking the system output to a signal level meter and reading the hum modulation directly. Because some hum is inherent in the instrument, the test is limited to relatively high levels of hum modulation (-50 dB or worse).

3.10 SIGNAL TO NOISE RATIO TEST

- A. To provide the highest quality TV picture at any point in the RF system, the signal to noise ratio must be measured at a level of at least 43 dB. What this means is that the RF signal must be sufficiently strong enough to override the noise in the system to avoid having poor quality (snowy) TV pictures.
- B. The testing procedure for (S/N) is as follows:
 - 1. Connect your SAM I signal level meter input to the output of the last device in the system (longest run from central processing control console (headend)).
 - 2. Disconnect all signals from the system and take readings from the lowest and highest channels used in the system.
 - 3. Obtain a corrected noise level for each channel using the noise calibration of the particular meter being used.
 - 4. By subtracting the corrected noise level for each channel from the normal signal readings at that point in the system, you will determine the signal to noise ratio at the channel in the system.
 - 5. The overall S/N ratio of the system is the average of the lowest and highest channels.

3.11 AUDIO SYSTEM INTERCONNECTS

- A. This Contractor shall provide all interconnect wiring from the telephone system to the PA/intercom head-end for accessing the PA system through the telephone system.

END OF SECTION 16790

SECTION 16795 - TELEPHONE AND DATA COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY OF WORK

- A. This Specification, in conjunction with the Drawings, establishes the requirements necessary to achieve the intended performance and function of the Telephone and Data Communications Systems (TDCS)
- B. The TDCS consists of telephone and data information storage, information processing, and/or information delivery and distribution equipment integrated together to form a cohesive integrated communication system.
- C. Provide as part of the bid proposal a complete bill of materials, including catalog cuts and equipment configuration for each of the systems, i.e. telephone and data systems.
- D. Provide the services necessary to furnish, install, train, and to provide maintenance to support the TDCS including an integrated system of peripheral apparatus conforming to acceptable industry standards. All work shall be in accordance with the true intent of these Drawings and Specifications, and as required to leave the TDCS complete and in satisfactory operating condition, excluding those items listed under "Work by Others."
- E. The TDCS shall be comprised of new equipment that is of modern design, and current standard production of the manufacturer.
- F. Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these Specifications, Manufacturers recommendations and the latest edition or revision of all applicable codes and standards.
- G. The TDCS includes providing and integrating the following principal systems:
 - 1. Telephone Wiring
 - 2. Telephone Termination Equipment
 - 3. Data Wiring
 - 4. Data Termination Equipment
 - 5. Training
- H. Ceiling Removal and Replacement:
 - 1. For construction work during times that school is in session, the removal and reinstallation of the acoustical ceiling panels on a daily basis shall be the work of the trades requiring same.
 - 2. For construction work during times that school is not in session (summer) this trade shall remove and reinstall acoustical ceiling panels.
 - 3. This trade shall be responsible for the replacement of all damaged or soiled acoustical panel and cleaning the metal grid upon completion of all trades work.
- I. Furnish and install all system specialty back boxes. Standard electrical back boxes will be furnished by the Electrical Contractor.

- J. Provide any additional Items, not specifically mentioned herein, necessary to meet system requirements as specified, without claim for additional payment.

1.3 CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS

- A. It is intended that any contractor furnishing materials or labor necessary for the completion of this specification shall furnish it in compliance with this specification. Where conflict exists with other specifications concerning such materials and labor, this specification takes precedence unless otherwise approved in writing by the Engineer.
- B. Drawings pertaining to this specification shall be considered as a part of said specification and shall be a part of the bid documents.

1.4 RELATED WORK PROVIDED BY OTHERS

- A. The building file servers used for school administrative functions, Library Management/Circulation Systems, Curriculum functions, and similar type file servers not specifically dedicated to operate the systems hereinafter specified will be furnished by Owner.
- B. The conduit system, wireways, cable trays, outlet boxes, and 120-volt and higher power systems are provided and installed by the Electrical contractor.
- C. Telephones and related telephone switch gear will be provided by others.

1.5 BILL OF MATERIALS - BID PROPOSAL REQUIREMENTS

- A. Provide a complete bill of materials depicting quantities, model numbers and footage, catalog cuts, operating characteristics, physical characteristics, and equipment configuration for each of the systems.
- B. The information shall be assembled in three ring binders complete with Table of Contents. All pages shall have page numbers which shall be included in Table of Contents.
- C. The Table of Contents shall be as follows:
 - 1. Tab No. 1 Cover Letter
 - 2. Tab No. 2 Bid Proposal Form
 - 3. Tab No. 3 Voluntary Alternates
 - 4. Tab No. 4 Organizational Chart / Schedule / Manpower
 - 5. Tab No. 5 Telephone Wiring and Distribution Equipment
 - 6. Tab No. 6 Data Wiring, Data Equipment Configuration and Distribution Equipment
 - 7. Tab No. 7 Maintenance Agreements and Service Agreements and Warranties
 - 8. Tab No. 8 Company Profiles for Prime Contractors , Major Sub-contractors and Major Suppliers
 - 9. Tab No. 9 Miscellaneous (Optional)
- D. Description of Contents:
 - 1. Tab No. 1, Cover Letter, shall include an executive overview of the project and depicting this contractor's complete understanding of the project.
 - 2. Tab No. 2, Bid Proposal Form shall include a completed bid proposal as found in Section 00410 and the bid bond as a requirement to submit a qualified bid, warranties, and service agreements.

3. Tab No. 3, Voluntary Alternates, in a section which is optional and made available to permit all bidders to submit alternates to the bid documents. These voluntary alternates shall clearly define the intent of the alternate, cost impact to implement the alternates, and a description of the deviation in functions and features between the alternates and the base bid documents. Include catalog cuts in this section for each alternate product required. The catalog cuts shall be keyed to the description of the alternate. Each alternate shall be independent of any alternate and shall be uniquely identified i.e. VAL -1 (Technology Alternate No. 1) VAL-2, VAL-3, etc.
4. Tab No. 4, Organizational Chart, shall depict the prime contractor, the subcontractors, major suppliers, trainers, project managers, superintendents, executive staff of each firm, service staff, the names of the individuals occupying those positions, telephone numbers, facsimile numbers, and E-mail addresses of all individuals on the organizational chart.
 - a. Provide a schedule that depicts major milestones required to achieve the completion dates previous specified. Typical milestone events are as follows:
 - 1) Delivery date and installation date of systems.
 - 2) Completion date of wiring above the ceilings.
 - 3) Delivery date and installation date of data equipment.
 - 4) System start up for the TDCS (separate Telephone from Data).
 - 5) Start-up/debug time the system.
 - 6) Training dates for the TDCS.
 - 7) Provide an estimate of anticipated manpower required to meet the specified completion dates.
5. Tab No. 5, Telephone Wiring and Distribution Equipment shall include the following information:
 - a. Manufacturer's name.
 - b. Number of years providing similar equipment in schools.
 - c. Installation company's name.
 - d. Number of years installing similar equipment in schools.
 - e. Description of system operation.
 - f. Equipment model numbers.
 - g. System configuration for all components in the IDF's.
 - h. Catalog cuts for all the equipment located in the IDF's including the gateways, power injectors, and other items required.
 - i. Punchdown blocks, Category 6 horizontal cables, RJ-45 outlets, devices plates, etc. System description of how the system operates describing all the functions and features associated with the equipment. Include in the description how the equipment will be required to be modified as it pertains to the construction phasing.
 - j. Complete bill of materials indicating quantities take-off for the products being provided, specifically. The following principal features:
 - 1) Punchdown blocks, Cat. 6.
 - 2) Cat. 6 cables.
 - 3) RJ-45 Category 6 Connectors
6. Tab No. 6, Data Wiring, Data Equipment, Configuration and Distribution Equipment shall include the following information:
 - a. Manufacturer's name.
 - b. Number of years providing similar equipment in schools.
 - c. Installation company's name.
 - d. Number of years installing similar equipment in schools.

- e. Description of system operation.
- f. Equipment model numbers.
- g. System configuration for all components in the MDF and IDF's.
- h. Catalog cuts for all the equipment located in the MDF's and IDF's including the rack.
- i. Punchdown blocks, switch equipment, fiber punchdown blocks, Category 6 horizontal cables, fiber cables backline, RJ-45 outlets, devices plates, etc. System description of how the system operates describing all the functions and features associated with the equipment. Include in the description how the switch equipment will be required to be modified as it pertains to the construction phasing.
- j. List of the management programs provided with the base bid and the functions and features of the management program.
- k. Complete bill of intervals indicating quantities take-off for the products being provided, specifically. The following principal features:
 - 1) Cabinets.
 - 2) Punchdown blocks, Cat. 6.
 - 3) Fiber patch panels.
 - 4) Cat. 6 cables.
 - 5) RJ-45 Category 6 Connectors.
 - 6) Faceplates

7. Tab Nos. 7, 8 and 9 are self-descriptive as to their intended content.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

- A. The system shall be registered under the most current applicable rulings of the Federal Communications Commission (FCC). Provide the FCC registration number with the equipment submittal. All components and installations shall bear an Underwriters' Laboratories (UL) listing and shall conform with the latest edition or revision of the following codes and standards:

- | | | |
|-----|-------|--|
| 1. | ANSI | American National Standards Institute |
| 2. | ASTM | American Society for Testing and Materials |
| 3. | BICSI | Building Industry Consulting Service International |
| 4. | EIA | Electronics Industries Association |
| 5. | FCC | Federal Communications Commission |
| 6. | ICEA | Insulated Cable Engineers Association |
| 7. | IEEE | Institute of Electrical and Electronics Engineers |
| 8. | ISO | International Organization for Standardization |
| 9. | NEC | National Electrical Code |
| 10. | NEMA | National Electrical Manufacturer's Association |
| 11. | NFPA | National Fire Protection Association. |
| 12. | TIA | Telecommunications Industry Association |
| 13. | UL | Underwriters Laboratories, Inc. |

- B. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and Drawings and Specifications.

1.7 EQUIPMENT MANUFACTURER QUALIFICATIONS

- A. The system shall be built and tested by a manufacturer who has regularly engaged in the production of the components of similar TDCS systems for a minimum of five years to assure one source of supply and responsibility.

1.8 EQUIPMENT SUPPLIER AND INSTALLER QUALIFICATIONS

- A. The supplier of the TDCS system shall maintain permanent service facilities in the area of the installation. The facilities shall include a permanent source of factory trained service technicians on 24-hour call experienced in servicing this type of equipment and shall provide warranty and routine maintenance service to afford the Owner maximum coverage. He shall also provide a central source of support to guarantee immediate answers to Owner's problems resulting from misunderstanding of the operation of the equipment.
- B. The installation of the TDCS system shall be performed by fully qualified personnel having had experience on the installation of this type of system and able to certify that they have had no less than five years of continuous experience in this area and have made installation similar to this and of this size or larger.

1.9 SUBMITTALS

- A. Shop Drawings: Within twenty-eight (28) calendar days after award of contract, submit detailed shop drawings to the Engineer for approval. Do not begin installation or fabrication without such approval. All shop drawings shall be marked with the pertaining specification paragraph or drawing number when submitted.
- B. Shop drawings shall be provided for all custom assemblies including distribution racks, telephone and data distribution equipment, headend equipment, etc. Submit samples of lettering/label size and typeface to be employed on custom panels and other equipment.
- C. Shop drawings shall be provided clearly depicting any proposed modification to the project drawings. Any modifications shall be highlighted on the shop drawings.
- D. Shop drawings shall be provided indicating equipment cabinets, equipment cabinet elevations, punch down blocks, layouts, wire management cable labeling schemes, outlet labeling schemes, punch down and rack outlet labeling scheme, cable routes and the location of ancillary items transformers, terminal blocks and power distribution.
- E. Specification schematic drawings depict functional, and require additional detail according to specific components used. Shop drawing shall be provided indicating the addition of any components not detailed in this specification but necessary to provide a properly functioning and complete system.
- F. Shop drawings and record drawings shall be submitted on the following equipment and systems:
 - 1. Cabinet Elevations
 - 2. Cabinet Components and Wiring Diagrams.
 - 3. Telephone/Data cabinets, data outlets.
 - 4. Telephone/Data LAN cable routing plans.
 - 5. Telephone/Data outlet numbering schemes.
- G. Shop drawings of the intended grounding systems and grounding paths shall be provided.
- H. Layout shop drawings shall be provided for each MDF and IDF indicating by dimension and by scale location of all components.

1.10 EXISTING CONDITIONS

- A. This Contractor shall visit the site prior to submitting a bid. No subsequent allowance will be made due to failure to thus observe and verify conditions which may affect the work. Report to the Engineer any discrepancies between this specification and existing conditions and similarly report obvious omissions.

1.11 JOB CONDITIONS

- A. Keep the job adequately staffed at all times. Unless illness, loss of personnel or other circumstances beyond the control of the contractor, maintain the same individual in charge throughout.
- B. Cooperate with all appropriate parties in order to achieve well-coordinated progress with the overall construction completion schedule and satisfactory final results.
- C. Watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or to preserve symmetry and aesthetically pleasing appearance.
- D. Immediately report to the Engineer any design or installation irregularities, so that appropriate action may be taken.
- E. Do all cutting, patching and painting necessary for proper and finished installation of the system and repair any damage done as a result of such installation. Cleanup and dispose of trash from all work areas.

1.12 QUALITY ASSURANCE

- A. Parts listed shall be complete, type numbers accurate and equipment furnished shall conform to manufacturer's specifications.
- B. All materials shall be new and shall conform to applicable provisions of Underwriters Laboratories and the American Standards Association.
- C. Procure and pay for all necessary permits, licenses and inspections and observe any requirements stipulated therein. Conform in all trades with all local regulations and codes.
- D. Comply with federal, state and local labor regulations and applicable union regulations.

1.13 GUARANTEE, SERVICE AND TRAINING

- A. All systems and components shall be guaranteed free of defects in materials and workmanship for a period of one (1) year from the date of acceptance and shall be repaired or replaced within twenty-four (24) hours following report of such defects by the Owner. The date of acceptance shall be defined as the date the Certificate of Substantial Completion is signed by the Architect/Engineer and the Owner.
- B. The TDCS System Contractor, this includes the telephone and data system providers or his representative, shall be available on call and shall respond on site within four (4) hour notice, and without cost to the Owner, during the first twelve (12) months of full scale operation, following acceptance of the system, to assist the Owner and/or his representatives in any problems that may arise during the initial period of operation.

1.14 MAINTENANCE CONTRACT

- A. Submit a maintenance and service contract with service rates for the telephone and data systems covering all labor and materials necessary to repair damages to the system. The contract shall include a differentiation between and definitions of "emergency" and "non-emergency" service with applicable rates for each.
- B. Submit a second year extended warranty contract fee with proposal for each portion of the system (i.e. telephone and data).

1.15 SPARE PARTS

- A. Guarantee the availability of all spare parts and maintain locally an adequate compliment of components that are applicable to the TDCS for five (5) years.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The following sections specifically list the acceptable equipment types and items for this project. Where quantities are not noted, they may be obtained from the Drawings. In the event of a discrepancy between the Specifications and the Drawings, the greater quantity or better quality shall be furnished.
- B. During the installation, make provisions for all equipment included in the base bid and any alternates, whether taken or not, so that items which are to be provided as alternates may be added to the system without rewiring or additional construction.
- C. All miscellaneous equipment required for a complete, professional installation shall be included in the base bid. No allowances for any additional equipment, hardware, cabling, or miscellaneous will be considered unless specifically excluded from the base bid.
- D. Time shall be allocated in the job for the purpose of training school personnel in the proper use and maintenance of the provided equipment.
- E. No exposed cabling shall be permitted in the wiring of any functions of the provided system. All cable shall be housed in appropriate raceways suitable and designed for such purposes.
- F. All work materials shall be removed at the end of the work day and the work area left in the same condition as found.
- G. This Contractor shall have a minimum of five years of experience in the specific application of the equipment proposed of these systems.
- H. The communication bidder supplying the equipment shall show satisfactory evidence, upon request, that they maintain a fully equipped service organization capable of furnishing adequate inspection and service to the system, including replacement parts. The vendor shall be prepared to offer a service contract for the maintenance of the system after the guarantee period. The bidder shall produce evidence that they have a fully experienced and established service organization for at least five years and proven satisfactory installations during that time.
- I. Adherence to a schedule of working hours which is agreeable with the Owner will be required.
- J. The Owner reserves the right to reject any or all alternate equipment bids and to select the bid that is considered to serve "THE BEST INTEREST OF THE OWNER."

2.2 EQUIPMENT CABINET AND RACK REQUIREMENTS

A. Equipment cabinets:

1. The TDCS system equipment cabinets shall accommodate 19-inch wide. The cabinets shall be manufactured all the same size (height, width and depth) with lockable, hinged and louvered rear door. The equipment cabinets will have removable side panels. Provide side panels on two ends only.
2. The equipment cabinets shall have a lockable Lexan front cover. All equipment cabinets will be keyed alike.
3. All cabinets will meet EIA/TIA standards.
4. Each equipment cabinet shall include:
 - a. Two (2) 15-amp power strips with a minimum of two outlets per 12 inches of vertical rack space will be included and mounted on each cabinet.
 - b. A top mounted fan, thermostatically controlled.
 - c. All racks shall include vertical chimney secured to cable tray.
 - d. All equipment cabinets will be bonded with a #6 ground cable.
5. All MDF equipment cabinets will be Middle Atlantic part number MRK-4436 or engineer approved equal.
6. All IDF Equipment cabinets will be Middle Atlantic part number SR-40-32. Where two (2) SR-40-32 cabinets are shown side-by-side, the contractor shall install a zero clearance latch system.

2.3 DATA SYSTEM

A. Description of System:

1. The data system shall include providing a complete operational and tested data system in each building. The data system will consist of providing new equipment as they pertain to the following principle features:
 - a. Category 6 cables Horizontal.
 - b. Category 6 patch panels.
 - c. RJ-45 Category 6 outlets.
 - d. Testing.
 - e. Documentation.
 - f. Training.
2. This contract will consist of providing all of the necessary equipment and labor needed provide new TDCS equipment in accordance to the drawings and specifications.
3. This contractor is responsible for providing a complete and operational data system for the each building. Provide the following principal items for each building.
 - a. Providing new IDF Data cabinets.
 - b. Providing new fiber patch panels.
 - c. Providing new Category 6 unshielded twisted pair cabling as indicated on the drawings.
 - d. Training of personnel on use of the system.
 - e. Providing data outlets as indicated on Drawings.
 - f. The contractor shall provide an operational data network including wiring and terminations as indicated on the drawings and within this specification.
 - g. Refer to Drawing to determine new versus existing equipment.

4. Backbone/Riser Cable (MDF to IDF)

- a. Data cable indoor: Indoor fiber optic backbone cables (MDF to IDF cabinets) will be 6-strand, 50 micron, multi-mode, tight-buffered, installed in one (1) 1 1/4" plenum rated innerduct. See drawings and site requirements section for details. Indoor fiber optic cables will be OFNP. A 50-micron, single armored, plenum rated, multi-mode fiber is an acceptable substitute to tight-buffered fiber in innerduct. Indoor armored fiber must be grounded and bonded per the NEC and BICSI requirements.
- b. Voice cable indoor: 25 pair Unshielded Twisted Pair (UTP), 24 AWG, EIA/TIA Category 3, plenum rated.
- c. Approved manufacturers:
 - 1) Uniprise
 - 2) Berktek
 - 3) Belden/CDT
 - 4) Mohawk
 - 5) General
 - 6) Panduit
 - 7) Engineer approved equal

5. Horizontal Cable

- a. Data cable indoor: blue, plenum rated, four (4) pair, 24 AWG, UTP, rated Category 6. Functionally equivalent to Berk-Tek Lanmark 1000 or Mohawk AdvanceNet.
- b. Voice cable indoor: white or gray, plenum rated, four (4) pair, 24 AWG, UTP, rated Category 6. Functionally equivalent to Berk-Tek Lanmark 1000 or Mohawk AdvanceNet.
- c. Approved manufacturers:
 - 1) Uniprise
 - 2) Berktek
 - 3) Hubbell
 - 4) Belden/CDT
 - 5) Mohawk
 - 6) General
 - 7) Panduit
 - 8) Engineer approved equal

6. Other cables

- a. The Contractor shall provide a #6 AWG stranded copper wire cable between equipment cabinets and ground bars located at each closet.

B. Media Outlets and Connectors

- 1. For data: red, eight (8) position, eight (8) conductor, 110 IDC, modular snap-in jacks, certified Category 6, T568B jack pin assignment.
- 2. For voice: ivory, eight (8) position, eight (8) conductor, 110 IDC, modular snap-in jacks, certified Category 6, T568B jack pin assignment.
 - a. The contractor shall furnish and install ivory, eight (8) position, eight (8) conductor, 110 IDC, modular snap-in jacks, certified Category 6, T568B jack pin assignment at all wall mount phone locations indicated on the drawings.

3. Faceplates will be of a size to accommodate the raceway and gang boxes identified on building drawings with adequate punch-outs for appropriate snap-in jacks.
4. Approved manufacturers:
 - 1) Leviton
 - 2) Hubbell
 - 3) Ortronics
 - 4) Panduit
 - 5) Engineer approved equal

C. Cable Termination Equipment

1. Fiber Backbone cable: A minimum 24 port (minimum) fiber patch panel for 19 inch rack mounting with multi-mode, SC compatible, field installable, connector panel modules.
 - a. Provide adequate cable slacking (looping) in order to meet the minimum bending radius requirements of the fiber optic strands. Provide a means of securing the cable sheath and storing excess fiber slack. Provide a means of storing excess jumper slack. If pigtails are used, house a splice tray capable of supporting all splices. Provide a means of labeling all terminations and associated cables.
 - b. All necessary components to connect the associated fibers must be provided. Fiber connectors must not be loose in the frame after termination and testing is completed.
2. Horizontal cable: Horizontal voice and data cables will be terminated in the telecommunications closet on rack mounted, 48-port patch panels with 110 style termination block, rated Category 6.
 - a. Patch panels will have a rear mounted strain relief bar to organize cables and maintain Category 6 bend radius.
 - b. 2U horizontal wiremanager shall be located above and below every 48-port patch panel. All horizontal wiremanagers shall be capable of front and rear cable management. All horizontal wiremanagers shall have front and rear removable covers.
3. Copper backbone cable: In the MDF, copper riser cable will terminate on wall mounted, high density, 110 IDC, terminal blocks. The wiring blocks shall be fire retardant, molded plastic consisting of horizontal index strips for terminating twenty-five (25) pairs of conductors each. Clear label holders shall be provided with the wiring blocks. The insert labels shall contain vertical lines spaced on the basis of circuit size (five (5) pair) and shall not interfere with running, tracing or removing jumper wire/patch cords.
 - a. In the IDF, copper riser cable will be terminated in a rack mounted, 24-port patch panel with 110 IDC termination blocks.

PART 3 - EXECUTION

3.1 GENERAL

- A. This Contractor shall furnish and install all wiring as indicated on the Drawings. All wiring and terminations shall be in full conformance with all of the current editions or revisions of all applicable codes and standards as previously listed under "Regulatory Agencies" of this Section of the Specifications for their intended use on this Project.

- B. No exposed cabling shall be permitted in the wiring of any functions of the provided system. All cable shall be housed in appropriate raceways suitable and designed for such purposes.
- C. All work materials shall be removed at the end of the working day and the work area left in the same condition as found.
- D. This Contractor shall have a minimum of five years of experience in the specific application of the equipment proposed of these systems.
- E. All conductive communications cabling installed outdoors shall be properly grounded and bonded and lightning protected per the NEC®. Refer to drawing for details.
- F. Adherence to a schedule of working hours, which is agreeable with the Owner, will be required.
- G. All cables must be routed and managed for a neat and aesthetically pleasing appearance. All work must be installed in a neat and workman like manner.
- H. The contractor shall work carefully with all ceilings and return ceilings to original conditions. Any damages or expenses are the responsibility of the contractor. Every effort will be made to schedule the requirements under this Contract in such a manner so as to complete all above ceiling work prior to ceiling tile installation.
- I. The Drawings indicate cable type to be used. Further, the Drawings indicate a manufacturer's catalog number for reference of quality and functionality.
- J. Communication bonding and grounding shall be in accordance with the NEC® and NFPA. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment.
- K. The contractor shall not place any distribution cabling alongside power lines, or share the same conduit, channel or sleeve with electrical apparatus.
- L. The contractor shall provide any necessary screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware, etc., necessary to facilitate the installation of the system.
- M. It shall be the responsibility of the contractor to furnish any special installation equipment or tools necessary to properly complete the system. This may include, but is not limited to, tools for terminating cables, testing and splicing equipment for copper/fiber cables, communication devices, jack stands for cable reels, or cable wenchers.

3.2 INSTALLATION-CABLING

- A. Category 6 cables shall be continuous from MDF or IDF to media outlet and free from splices, reverses, grounds or other connections. Provide a 5-foot minimum service loop, above accessible ceiling, for each terminated cable, to accommodate future changes.
- B. Fiber optic cabling shall be continuous and splice free unless specifically stated otherwise. Cable slack shall be provided at the MDF and IDF. A minimum of 5-meters (approx. 15-feet) of slack cable shall be coiled and secured at each location. This slack is exclusive of the length of fiber that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a fashion as to protect it from damage.

- C. Fiber optic cable will run from MDF to IDF and terminate on fiber patch panels.
- D. All fiber cables shall be terminated both active and spare cables.
- E. All data fiber cables shall be terminated with SC connectors.
- F. All fiber strands shall be terminated in an approved rack mounted enclosure.
- G. All fiber cables shall be installed in corrugated, Plenum, innerduct that are run in cable tray or "J" hooks or are exposed at patch panels or shall be installed in conduit or floor and wall penetrations.
- H. Terminate Category 6 cable according to T568B jack pin assignments.
 - 1. Remove only the amount of cable jacket necessary for termination. Maintain wire twist for all pairs of Category 6 cable to within 0.5 inches maximum from termination point.
- I. Do not run cable longer than maximum 90 meter EIA/TIA recommended length.
- J. Copper and optical fiber splices in the horizontal distribution are prohibited.
- K. All cables installed in ceiling spaces shall be plenum-rated.
- L. Horizontal voice and data cable pairs will run from each jack to the MDF or IDF and terminate on Category 6 patch panels.
- M. All cables shall be installed using "J" hooks, conduits, cable tray or an approved raceway system. Where cable tray is not available, horizontal cable will be supported every five feet with "J" hooks sufficient in size to handle all bundled cables while minimizing crushing. Copper and fiber optic cables will be divided into separate bundles and run in separate "J" hooks. If cable slack exceeds twelve (12) inches between supports, additional supports will be installed to take up slack and relieve cable stress.
- N. Carefully lay all cable with appropriate radius of curvature and protect at bends and corners. Observe minimum bend radius and tension limitations as specified by EIA/TIA for Category 6 and fiber optic cables.
- O. Loosely bundle cables with Velcro® ties, suitable for Plenum environments, every twenty feet. Identify fiber every twenty feet with "fiber optic cable" warning labels.
- P. Provide and install equipment cabinets in MDF and IDF as specified and detailed on Drawings.
- Q. Equipment cabinets and patch panels shall be arranged to allow for natural wiring progression in functional fields, minimize crossing of wires and allow for the easy access to each component.
- R. All 110 blocks shall be securely fastened to closet backboards provided by this contractor.
 - 1. Provide all required D-rings or other approved cable guides as required to provide a neat installation.
 - 2. All cables shall terminate in numerical sequence.

- S. The contractor shall assure that at the completion of cable installation, cables are free from twists, kinks, sharp bends, cuts, gouges or any other physical damage that might cause alterations to the electrical or optical characteristics of the cables.
- T. All entrance and intra-building cable penetration, conduit, cores, wall and ceiling penetrations will be sealed with a 3M type fire retardant.

3.3 LABELING

- A. All cable designations and color-coding shall be in full compliance with EIA/TIA 606.
- B. Clearly label cables at both ends with permanently applied, mechanically printed labels. Hand written labels will not be acceptable. Use standardized colors and alphanumeric codes. Engineer will approve labeling system and method.
- C. In work areas, place cable ID labels around each cable in outlet box, on front of faceplate and on front of jack.
- D. In the MDF and IDF, place ID labels around each cable. Labels shall be located within six inches of the termination.
- E. Front label each Category 6 and fiber patch panel port and any equipment attached to the cable system.

3.4 CATEGORY 6 (Data) UTP CABLE TESTING.

- A. The Contractor shall, at all times, permit and facilitate work inspection by the Owner's Representative and by public authorities having jurisdiction. The Owner's Representative shall have the authority to stop the work, if required, to insure proper execution.
- B. Each Category 6 UTP cable pair shall be tested end to end from the data outlet termination to the IDF closet patch panel.
- C. Test shall be performed with connectors installed.
- D. Cable performance shall meet the standards outlined in EIA/TIA-568 A/Bus or minimum.
- E. Each cable shall be tested for infinite resistance between cables and ground.
- F. Tone, verify and certify cable and jack/connectors as free from shorted pairs, open pairs, reversed pairs, crossed pairs and grounded pairs. One hundred percent of all pairs must be in good working condition.
- G. Check cable length and labeling at both ends.
- H. Cables and connectors comprising Category 6 must be certified compliant with the performance requirements listed in EIA TSB36 (cables and TSB40 (connectors).
 - 1. As a minimum, test documentation will include:
 - a. Cable Identification Number
 - b. Worst Case Near End Cross Talk (NEXT)
 - c. Attenuation

- d. PSNEXT
 - e. Return Loss
 - f. PSELFEXT
 - g. Signal-to-Noise Ratio
 - h. Ambient Noise
 - i. Loop Resistance
 - j. Equal Level Far-End Crosstalk (EL-FEXT)
 - k. Return Loss
 - l. Propagation Delay
 - m. Propagation Delay Skew
 - n. Cable Length
 - o. Test Date
2. Each data circuit, including all connectors shall be tested to verify all bandwidth performance and crosstalk specifications as outlined Category 6. Any cables not in one hundred percent compliance with the minimum performance criteria relating to Category 6 will be replaced with no additional cost to Owner.
- I. Cable testing will be conducted by a programmable micro-computer based tester capable of testing all specific standard requirements and generating completed printed test results.
1. Test equipment shall be a Microtest, Fluke, or approved equivalent. Equipment will be designed, and of such grade, so as to provide reliable certification and testing.
- J. A detailed copy of all test reports shall be provided to the Owner in CD format. Additionally, this contractor shall provide hardcopy documentation indicating cable length and the pass/fail test results for each Category 6 cable installed.
- K. Any outlet, cable or component that does not meet the required operational tests or fails to meet installation standards as specified shall be repaired or replaced by the contractor as directed by the School District and at no expense to the School District.

3.5 VOICE RISER AND VOICE CABLE TESTING.

- A. The Contractor shall, at all times, permit and facilitate work inspection by the Owner's Representative and by public authorities having jurisdiction. The Owner's Representative shall have the authority to stop the work, if required, to insure proper execution.
- B. Each cable pair shall be tested end to end from the station outlet termination to the IDF closet termination and from the IDF's to the MDF.
- C. Each cable shall be tested for proper end-to-end polarity.
- D. Each cable pair shall be tested for abnormal electrical noise and/or interference.
- E. Each cable shall be tested for infinite resistance between cables and ground.
- F. Tests shall be performed using the Microtest OmniScanner. The "Autotest" function shall be used to test each UTP cable.
- G. The "Autotest" tests shall consist of the following eight (8), individual tests.
- 1. Wire Map.
 - 2. Length.

3. NEXT.
4. Attenuation.
5. Attenuation-to-Crosstalk (ACR)
6. Impedance.
7. Capacitance.
8. Loop Resistance.

- H. A detailed copy of all test reports shall be provided to the Owner in CD format. Additionally, this contractor shall provide hardcopy documentation indicating cable length and the pass/fail test results for each voice cable installed.

3.6 FIBER OPTIC TESTING

- A. Fiber Cabling Testing - All Fiber Optic Cable shall be tested using an Optical Time Domain Reflectometer (OTDR). Documentation for each test shall be provided to Owner. The signature trace of each cable must include the attenuation per kilometer and total length of each strand. Insertion loss testing shall be performed using a hand-held tester. Acceptance tests for all fiber strands shall include attenuation, attenuation uniformity, and continuity, testing shall be performed at 1300nm and 850nm wavelengths. Corrective action shall be taken by this contractor in the design of the system to insure all loss budgets are maintained.
- B. The supplied OTDR test result will determine the following:
1. The overall length of each segment.
 2. Proper termination.
 3. Continuity in the fiber.
 4. Total segment attenuation.
 5. Irregularities in the fiber.
 6. Insertion loss testing for each strand at 850nm and 1300nm.
- C. On the reel testing required prior to installation. Each fiber strand will be checked with an OTDR at 850 nm to identify point discontinuities. Hard copy results are to be provided.
- D. Fusion or Mechanical Splice Testing - Optical fiber splice whether fusion or mechanical, shall not exceed a maximum optical attenuation of 0.3dB when tested in accordance with ANSI/EIA/TIA 355-59.
- E. SC Connector Testing - Optical connectorization, shall not exceed a maximum optical attenuation of 0.75dB per mated connection when tested in accordance with ANSI/EIA/TIA 455-59.
- F. Any cable or component that does not meet the required operational tests or fails to meet installation standards as specified, shall be repaired or replaced as directed by the Engineer at no additional cost to the Owner.

3.7 DRAWINGS AND DOCUMENTATION

- A. Fully detailed documentation and record drawings of installation layout and performance shall be submitted for review within thirty (30) days of completion of work and shall include as a minimum:
1. Marked drawings showing distance and routing of all inside cable with gauge, type and numbering scheme.

2. Location of outlets with their identification number prepared on most recent installation drawing.
3. Drawings showing distribution frame layouts, cross connect locations, cable routing from rooms.
4. Drawings showing layout of panels and equipment in cabinets.
5. Drawings shall accurately record actual locations of each item of fixed equipment, and show interconnecting wiring. Drawings will indicate location of equipment and tagged circuits. A functional block diagram will also be required.

B. Documentation Requirements

1. Drawings, whenever submitted, shall be submitted with three (3) copies to the Owner.
2. Cable and outlet identification, locations, performance and test results will be entered into Excel or approved PC based spreadsheet. The Contractor spreadsheet template and format will be approved by the Owner.
3. Final record drawings shall be submitted as one (1) ANSI C color laminated drawing, two (2) sets of scaled 20# bond drawings and two (2) CD-ROM in PDF format. Drawings shall be professionally done. Hand drawings and notations will not be accepted.

C. Cable Record Book

1. The Contractor shall prepare and deliver complete and accurate cable records entered into Excel or approved PC based spreadsheet. Minimum information to be included for each cable in the Cable Record Book is:
 - a. Location (room number)
 - b. Jack Number
 - c. Serving Closet
 - d. Patch Panel Number
 - e. Patch Panel Port
 - f. Cable Type and Use (Cat 6, voice)

- D. E. All drawings and the information contained therein become the sole property of the Owner.

END OF SECTION 16795

SECTION 16830 - AUDIO/VISUAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Some information contained in this specification is also found on the associated audio/video drawings. Work shown on either is deemed to be in both. If a discrepancy in quantity exists between this specification and the associated drawings, the Contractor shall furnish the greater quantity unless otherwise directed by the owner.
- C. Some information contained in this specification and associated drawings is also noted on the project technology specification and drawings. Any conflicts between the technology sections and the Audio Visual Systems shall be immediately reported to the Architect and Consultant.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Cafeteria/Stage Sound System: The systems shall include the sound reinforcement systems for the cafeteria and the stage. System shall include, but not be limited to, speakers, monitors, amplification, processing, microphones, mixing board, outboard gear, electronics, wire, rigging, and anything else necessary to provide a complete and functioning system to the owner.
 - a. A speaker cluster with downfill cabinets will be installed for coverage of the cafeteria.
 - b. The main equipment rack will be located in a back-stage storage room. Main system amplifiers, monitor amplifiers, 70-volt amplifier, processing, and some outboard equipment for the main system will be located in the main equipment rack.
 - c. Input/output panels will be installed in various locations around the facility. Microphone inputs, monitor outputs, and other connectors will be on these panels. See drawings for details and locations.
 - d. A Stage Managers System (SMS) will be installed in the stage area. This portable rack will contain user-friendly controls of both the audio and video systems to facilitate use of the space by non-technical personnel. The SMS will house a dual CD player, mixer, wireless mic system, video remote control panel, and some other equipment. See drawings for locations and details.
 - 2. Cafeteria/Stage Video System: A basic video system consisting of screen, projector, switcher, wire, cabling and anything else necessary to provide a complete and functioning system to the owner shall also be installed within the cafeteria space. Screen to be provided and installed by general trades.
 - a. A new 12 X 16 motorized projection screen shall be installed behind the proscenium, hung from the ceiling. Screen to be provided and installed by general trades.
 - b. A new projector shall be installed in the cafeteria. The projector will be installed on a motorized lift in front of the proscenium. See drawings for installation locations and details.
 - c. A system switcher/controller shall be installed in the main equipment rack. This unit shall take computer inputs from a stage outlet as well as the Stage Manger System (SMS) and route them to the projector as well as both LCD's. Control system shall also control the raising and lowering of the projection screen and projector lift. Interactive

- touchscreen located on the stage manager system shall control all AV devices such as VCR/DVD player and CD/MP3 player.
3. Vocal/Drama Music Room Sound System
 - a. Two wall-mounted speakers shall be utilized to provide sound reinforcement for the room. A rack will be installed on the wall of the room containing all sources, amplifiers, processing, and other additional equipment. See drawings for further details. See drawings for further details.
 4. Band Sound System
 - a. Two wall-mounted speakers shall be utilized to provide sound reinforcement for the room. A rack will be installed on the wall of the room containing all sources, amplifiers, processing, and other additional equipment. See drawings for further details. See drawings for further details.
 5. Orchestra Sound System
 - a. Two wall-mounted speakers shall be utilized to provide sound reinforcement for the room. A rack will be installed on the wall of the room containing all sources, amplifiers, processing, and other additional equipment. See drawings for further details.
 6. Gym Sound System
 - a. Six ceiling-mounted speakers shall be utilized to provide sound reinforcement for the room. A rack will be installed on the wall of the room containing all sources, amplifiers, processing, and other additional equipment. See drawings for further details.

1.3 EQUIPMENT MANUFACTURER QUALIFICATIONS

- A. The system shall be built and tested by a manufacturer who has regularly engaged in the production of the components of similar Audio Visual Systems for a minimum of five years to assure one source of supply and responsibility.

1.4 EQUIPMENT SUPPLIER AND INSTALLER QUALIFICATIONS

- A. The supplier of the Audio Visual System shall maintain permanent service facilities in the area of the installation. The facilities shall include a permanent source of factory trained service technicians on 24-hour call experienced in servicing this type of equipment and shall provide warranty and routine maintenance service to afford the Owner maximum coverage. He shall also provide a central source of support to guarantee immediate answers to Owner's problems resulting from misunderstanding of the operation of the equipment.
- B. The installation of the Audio Visual System shall be performed by fully qualified personnel having had experience on the installation of this type of system and able to certify that they have had no less than five years of continuous experience in this area and have made installation similar to this and of this size or larger.

1.5 SUBMITTALS

- A. Shop Drawings: Within twenty-eight (28) calendar days after award of contract, submit detailed shop drawings to the Engineer for approval. Do not begin installation or fabrication without such approval. All shop drawings shall be marked with the pertaining specification paragraph or drawing number when submitted.
- B. Shop drawings shall be provided for all custom assemblies. Submit samples of lettering/label size and typeface to be employed on custom panels and other equipment.
- C. Shop drawings shall be provided clearly depicting any proposed modification to the project drawings. Any modifications shall be highlighted on the shop drawings.

- D. Shop drawings shall be provided indicating equipment cabinets, equipment cabinet elevations, punch down blocks, layouts, wire management cable labeling schemes, outlet labeling schemes, punch down and rack outlet labeling scheme, cable routes and the location of ancillary items transformers, terminal blocks and power distribution.
- E. Specification schematic drawings depict functional, and require additional detail according to specific components used. Shop drawing shall be provided indicating the addition of any components not detailed in this specification but necessary to provide a properly functioning and complete system.
- F. Shop drawings of the intended grounding systems and grounding paths shall be provided.
- G. Installing Contractor shall furnish (6) sets of submittal sheets, printed on 8.5x11 inch paper and bound on the left-hand side, for all equipment to be installed.
- H. Installing Contractor shall furnish (4) sets of shop drawings showing all components, wires, and connections, complete with wire numbers, proposed rack layouts, and proposed rigging. Shop drawings are to be bound on the left side and printed on B-size (11x17) paper.
- I. Installing Contractor shall provide documentation showing authorized dealer status for all major components submitted, including speakers, amplifiers, processing, and mixing boards. If the Installing Contractor is not an authorized dealer for any major components, the Installing Contractor must include the credentials and dealer documentation for the Subcontractor supplying and installing the components.

1.6 STANDARDS REQUIREMENTS OF REGULATORY AGENCIES

- A. The system shall be registered under the most current applicable rulings of the Federal Communications Commission (FCC). Provide the FCC registration number with the equipment submittal. All components and installations shall bear an Underwriters' Laboratories (UL) listing and shall conform with the latest edition or revision of the following codes and standards:
 - 1. ANSI American National Standards Institute
 - 2. ASTM American Society for Testing and Materials
 - 3. BICSI Building Industry Consulting Service International
 - 4. EIA Electronics Industries Association
 - 5. FCC Federal Communications Commission
 - 6. ICEA Insulated Cable Engineers Association
 - 7. IEEE Institute of Electrical and Electronics Engineers
 - 8. ISO International Organization for Standardization
 - 9. NEC National Electrical Code
 - 10. NEMA National Electrical Manufacturer's Association
 - 11. NFPA National Fire Protection Association.
 - 12. TIA Telecommunications Industry Association
 - 13. UL Underwriters Laboratories, Inc.
- B. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and Drawings and Specifications
- C. EIA Compliance: Comply with following Electronics Industries Standards.
 - 1. Sound Systems, EIA-160
 - 2. Loudspeakers, Dynamic Magnetic Structures and Impedance, EIA-299-A

3. Racks, Panels and associated equipment, EIA-310-A
4. Amplifiers for Sound Equipment, SE-101-A
5. Speakers for Sound Equipment, SE-103

D. UL Compliance: Comply with requirements of UL-50

1.7 DELIVERY, STORAGE, AND HANDLING

- E. Include delivery, storage, and handling of all products and materials to be delivered and installed.
- F. Installing contractor shall be responsible for providing on-site storage if necessary. Installing Contractor may negotiate a storage facility with the Construction Manager, but shall still be responsible for his own materials.

1.8 EXISTING CONDITIONS

- A. This Contractor shall visit the site prior to submitting a bid. No subsequent allowance will be made due to failure to thus observe and verify conditions which may affect the work. Report to the Engineer any discrepancies between this specification and existing conditions and similarly report obvious omissions.

1.9 JOB CONDITIONS

- A. Keep the job adequately staffed at all times. Unless illness, loss of personnel or other circumstances beyond the control of the contractor, maintain the same individual in charge throughout.
- B. Cooperate with all appropriate parties in order to achieve well-coordinated progress with the overall construction completion schedule and satisfactory final results.
- C. Watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or to preserve symmetry and aesthetically pleasing appearance.
- D. Immediately report to the Engineer any design or installation irregularities, so that appropriate action may be taken.
- E. Do all cutting, patching and painting necessary for proper and finished installation of the system and repair any damage done as a result of such installation. Cleanup and dispose of trash from all work areas.

1.10 QUALITY ASSURANCE

- A. Parts listed shall be complete, type numbers accurate and equipment furnished shall conform to manufacturer's specifications.
- B. All materials shall be new and shall conform to applicable provisions of Underwriters Laboratories and the American Standards Association.
- C. Procure and pay for all necessary permits, licenses and inspections and observe any requirements stipulated therein. Conform in all trades with all local regulations and codes.
- D. Comply with federal, state and local labor regulations and applicable union regulations.

- E. Installing Contractor Qualifications: Contractors bidding this section and performing the associated work shall have at least a NICET Level 1 certification for the lead installer and project engineer. Contractors unable to provide proper certification should confirm qualifications with the Consultant prior to bidding. Failure to provide proper qualifications shall be grounds for disqualification from the bidding process.

1.11 GUARANTEE, SERVICE AND TRAINING

- A. All systems and components shall be guaranteed free of defects in materials and workmanship for a period of one (1) year from the date of acceptance and shall be repaired or replaced within twenty-four (24) hours following report of such defects by the Owner. The date of acceptance shall be defined as the date the Certificate of Substantial Completion is signed by the Architect/Engineer and the Owner.
- B. The Audio Visual System Contractor, this includes the telephone and data system providers or his representative, shall be available on call and shall respond on site within four (4) hour notice, and without cost to the Owner, during the first twelve (12) months of full scale operation, following acceptance of the system, to assist the Owner and/or his representatives in any problems that may arise during the initial period of operation.

1.12 MAINTENANCE CONTRACT

- A. Submit a maintenance and service contract with service rates for the telephone and data systems covering all labor and materials necessary to repair damages to the system. The contract shall include a differentiation between and definitions of "emergency" and "non-emergency" service with applicable rates for each.

1.13 SPARE PARTS

- A. Guarantee the availability of all spare parts and maintain locally an adequate compliment of components that are applicable to the Audio Visual for five (5) years.
- B. Provide five (5) sets of system hardware and software manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS-GENERAL

- C. The following sections specifically list the acceptable equipment types and items for this project. Where quantities are not noted, they may be obtained from the Drawings. In the event of a discrepancy between the Specifications and the Drawings, the greater quantity or better quality shall be furnished.
- D. During the installation, make provisions for all equipment included in the base bid and any alternates, whether taken or not, so that items which are to be provided as alternates may be added to the system without rewiring or additional construction.
- E. All miscellaneous equipment required for a complete, professional installation shall be included in the base bid. No allowances for any additional equipment, hardware, cabling, or miscellaneous will be considered unless specifically excluded from the base bid.

- F. Time shall be allocated in the job for the purpose of training school personnel in the proper use and maintenance of the provided equipment.
- G. No exposed cabling shall be permitted in the wiring of any functions of the provided system. All cable shall be housed in appropriate raceways suitable and designed for such purposes.
- H. All work materials shall be removed at the end of the work day and the work area left in the same condition as found.
- I. This Contractor shall have a minimum of five years of experience in the specific application of the equipment proposed of these systems.
- J. The communication bidder supplying the equipment shall show satisfactory evidence, upon request, that they maintain a fully equipped service organization capable of furnishing adequate inspection and service to the system, including replacement parts. The vendor shall be prepared to offer a service contract for the maintenance of the system after the guarantee period. The bidder shall produce evidence that they have a fully experienced and established service organization for at least five years and proven satisfactory installations during that time.
- K. Adherence to a schedule of working hours which is agreeable with the Owner will be required.
- L. The Owner reserves the right to reject any or all alternate equipment bids and to select the bid that is considered to serve "THE BEST INTEREST OF THE OWNER."
- M. All equipment and components shall be new and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by Underwriters' Laboratories, Inc.
- N. All components and the system as a whole shall meet or exceed the minimum standards issued by the EIA. All work and materials in conjunction with this installation shall meet or exceed the provisions of the National Electrical Code and other applicable codes.
- O. The Installing Contractor shall be responsible for providing a complete and fully functional system, including all necessary components, whether included in this specification or not.

2.2 MANUFACTURERS

- A. The following manufacturers, quantities, and model numbers shall form the basis of the system. These are minimum requirements. Contractor is responsible to verify all quantities prior to ordering and installation. Quantities are provided for reference only. Contractor is still responsible to provide a complete and working system without claim for additional payment.

CAFETERIA/STAGE SOUND SYSTEM: EQUIPMENT RACKS

- 1. Main Equipment Rack (qty 1): Forty-four space floor rack with perforated, lockable front and lockable rear door. Minimum 30" usable depth. Provide with (4) 4.5" cooling fans, fan guards, fan top plate, side panels, and all necessary hardware. Also provide rack with copper buss bar for grounding installed. Rack to be placed on 6" wood base installed by Installing Contractor.
 - a. Middle Atlantic WRK-44SA-32

2. Stage Manager Equipment Rack (qty 1): Twenty-one space metal rolling rack with solid, lockable front door, solid lockable rear door, and casters.
 - a. Middle Atlantic PTRK-21
3. Rack Light (qty 2): Rack work light to be installed in each Rack.
 - a. Middle Atlantic WL-60
4. Rack-mounted Power strip (qty 2): Provide power strips for additional outlets at each rack.
 - a. Middle Atlantic PD-815R
5. Power cord extension (qty 1): Provide power cord extension for stage manager equipment rack.
 - a. Proco E123-25 or similar.

CAFETERIA/STAGE SOUND SYSTEM: SPEAKERS, AMPLIFIERS, MIXER, & PROCESSING

1. Speaker Stage Left/Right (qty 4): Two-way full-range loudspeaker. Coordinate color with architect and owner. Attach to wall with manufacturer's bracket.
 - a. JBL
2. Amplifier (qty 4): Two space 2-channel rack mountable amplifier. Provide cover plate for volume controls.
 - a. Crown
 - b. BiAmp
3. Digital Signal Processor – DSP-1 (qty 2): DPS processors shall be located in the main equipment rack.
 - a. Crown
4. Mixer MIX (qty 1): Ten space rack mountable analog mixer. Provide with: (16) inputs, (4) outputs, and (1) rack mount kit.
 - a. Mackie 1604

CAFETERIA/STAGE SOUND SYSTEM: WIRE & PLATES

1. Mic/Line Wire 22AWG 2-conductor with shield -- M, L (qty as needed):
 - a. Belden 9451
2. Speaker Wire – (qty as needed):
 - a. West Penn 227
3. Wall plates (qty: as needed)
 - a. Refer to drawing for details

CAFETERIA/STAGE SOUND SYSTEM: OUTBOARD EQUIPMENT

1. CD/MP3/Cassette player (qty 1): Two space, rack mounted device located in the main equipment rack.
 - a. Tascam CC-222

- b. Engineer approved equal
- 2. Rack Drawer (qty 1): Three space, rack-mounted storage drawer.
 - a. Middle Atlantic UD3
- 3. Wireless microphone receiver, handheld transmitter, and rack mount kit (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser EW345G2 wireless microphone
 - b. Shure
 - c. Engineer approved equal
- 4. Wireless microphone receiver and rack mount kit (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser EK300G2
 - b. Shure
 - c. Engineer approved equal
- 5. Wireless microphone body pack transmitter (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser SK500G2
 - b. Shure
 - c. Engineer approved equal
- 6. Headset microphone (qty 2): Coordinate color with Owner's Rep. Provide microphone with connector for Sennheiser Evolution Transmitter.
 - a. Countryman E6

CAFETERIA/STAGE SOUND SYSTEM: MISCELANEOUS EQUIPMENT

- 1. Stage monitor speakers (qty 6): Two way stage monitor.
 - a. EAW SM12
- 2. Microphone (qty 3): Hanging microphone system with interchangeable capsules.
 - a. AKG HM1000 with CK80 capsule
- 3. Two space blank (qty as necessary): Two rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB2
- 4. Single space blank (qty as necessary): Single rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB1
- 5. Loose Cables (qty 2): Ten foot mic cable.
 - a. Proco M-10 or similar
- 6. Loose Speaker Cable (qty 2): Twenty-five flexible speaker cable.
 - a. Proco S12NN-25 or similar

CAFETERIA/STAGE VIDEO SYSTEM

1. Video Projection Screen (qty 0): 16x20' Electric Screen. Provided by General trades. Not in Contract.
2. Video Projector (qty 1): Contractor must site-verify distance from projector to screen. Provide proper lens to fill entire screen. Install with mounting bracket, pipe, and additional hardware as necessary to suspend from structure.
 - a. Mitsubishi XD490U
3. Projector Lift (qty 1): Fourteen foot projector scissors lift. Install projector lift in location shown on drawing. Lift to be controlled by Crestron unit installed by this contractor.
 - a. Display Devices DL3B
 - b. Engineer approved equal
4. Crestron A/V System (qty 1 each):
 - a. Crestron CP2
 - b. Crestron QM-MD7x2
 - c. Crestron QM-RX to provide control connectivity and video content to each display device.
 - d. Crestron Touchpanel TPS-4000 with swivel mount kit SMK-3000 for stage manager equipment rack
5. VGA Extender/Line Driver (qty 1): VGA amplifier for computer signal from stage.
 - a. Extron Extender WM
6. DVD/VCR combo player (qty 1): Combination DVD and VCR player.
 - a. Zenith XBV 342
7. DVD/VCR rack mount (qty 1): Provide custom rack-mount tray with positive locking brackets for securely holding player in place.
 - a. Middle Atlantic RSH
8. Video Patch Cable (qty 2): Video Patch Cable for patching composite video panel signals.
 - a. ProCo RG59UBNC-3
9. Video Wire - Video Jacks - V (qty as needed): Use Manufacturer's connector and tools as necessary.
 - a. West Penn 819
 - b. Belden 1505A
10. Control Wire - E (qty as needed): Communication wire for SPC200 remote control to System Switcher.
 - a. Crestnet
11. RGBHV Wire - 15 D-sub connectors and RGBHV outputs -- V5 (qty as needed): Use Manufacturer's connector and tools as necessary.
 - a. West Penn 8195
 - b. Belden 7796

VOCAL/DRAMA ROOM

1. Equipment Rack (qty 1): Twenty-one space metal rolling rack with solid, lockable front door, solid lockable rear door, and casters.
 - a. Middle Atlantic PTRK-21
2. Rack-mounted Power strip (qty 2): Provide power strips for additional outlets at each rack.
 - a. Middle Atlantic PD-815R
3. Speaker (qty 2): Two-way full-range loudspeaker. Provide white speakers unless black is requested by the owner or architect. Coordinate color with architect and owner. Attach to wall with manufacturer's bracket.
 - a. JBL Control 28
 - b. Engineer approved equal
4. CD/Cassette Recorder (qty 1): Two space rack-mounted CD/Tape combo recorder.
 - a. Tascam CC-222
5. Tuner/Tone Generator/Metronome (qty 1): One space rack mounted device
 - a. Akai HV10
 - b. Engineer approved equal
6. Headphone Amplifier (qty 1): 1U rack mounted Headphone amplifier
 - a. Rane HC 4
 - b. Engineer approved equal
7. Amplifier (qty 1): Two space 2-channel rack mountable amplifier. Provide cover plate for volume controls.
 - a. Crown
 - b. BiAmp
8. Digital Signal Processor – DSP-1 (qty 1): DPS processors shall be located in the equipment rack.
 - a. Crown
9. Recording Mixer (qty 1): Mixer for recorded program.
 - a. Mackie 1604 with rack mount kit
 - b. Engineer approved equal
10. Rack Drawer (qty 1): Three space, rack-mounted storage drawer.
 - a. Middle Atlantic UD3
11. Two space blank (qty as necessary): Two rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB2
12. Single space blank (qty as necessary): Single rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB1
13. Mic/Line Wire 22AWG 2-conductor with shield -- M, L (qty as needed):

- a. Belden 9451
- b. West Penn 454
- 14. Speaker Wire -(qty as needed):
 - a. West Penn 227
 - b. Belden 8477
- 15. Microphone (qty 4): Hanging microphone system.
 - a. AKG CHM21
 - b. Engineer approved equal
- 16. Wireless microphone receiver, bodypack transmitter, and rack mount kit (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser EW322G2 clip-on wireless microphone
 - b. Shure
 - c. Engineer approved equal
- 17. Condenser Microphones (qty 2):
 - a. Shure PG81
- 18. Headphones (qty 3): Teacher and practice rooms headphones
 - a. AKG K141
 - b. Engineer approved equal
- 19. Headphone volume control (qty 3):
 - a. Bogen
 - b. Engineer approved equal
- 20. Microphone Stands (qty 2):
 - a. AKG KM260/1 black, straight stand w/ round base
- 21. Microphone Stand Boom Arm (qty 2):
 - a. AKG KM211/1 black telescoping boom arm
- 22. Loose Speaker Cable (qty 2): Twenty-five flexible speaker cable.
 - a. Proco S12NN-25 or similar
- 23. Loose Cables (qty 4): Ten foot mic cable.
 - a. Proco M-10 or similar
- 24. Loose Cables (qty 4): Twenty-five foot mic cable.
 - a. Proco M-25 or similar

BAND CLASSROOM

- 1. Equipment Rack (qty 1): Twenty-one space metal rolling rack with solid, lockable front door, solid lockable rear door, and casters.
 - a. Middle Atlantic PTRK-21

2. Rack-mounted Power strip (qty 2): Provide power strips for additional outlets at each rack.
 - a. Middle Atlantic PD-815R
3. Speaker (qty 2): Two-way full-range loudspeaker. Provide white speakers unless black is requested by the owner or architect. Coordinate color with architect and owner. Attach to wall with manufacturer's bracket.
 - a. JBL Control 28
 - b. Engineer approved equal
4. CD/Cassette Recorder (qty 1): Two space rack-mounted CD/Tape combo recorder.
 - a. Tascam CC-222
5. Tuner/Tone Generator/Metronome (qty 1): One space rack mounted device
 - a. Akai HV10
 - b. Engineer approved equal
6. Headphone Amplifier (qty 1): 1U rack mounted Headphone amplifier
 - a. Rane HC 4
 - b. Engineer approved equal
7. Amplifier (qty 1): Two space 2-channel rack mountable amplifier. Provide cover plate for volume controls.
 - a. Crown
 - b. BiAmp
8. Digital Signal Processor – DSP-1 (qty 1): DPS processors shall be located in the equipment rack.
 - a. Crown
9. Recording Mixer (qty 1): Mixer for recorded program.
 - a. Mackie 1604 with rack mount kit
 - b. Engineer approved equal
10. Rack Drawer (qty 1): Three space, rack-mounted storage drawer.
 - a. Middle Atlantic UD3
11. Two space blank (qty as necessary): Two rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB2
12. Single space blank (qty as necessary): Single rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB1
13. Mic/Line Wire 22AWG 2-conductor with shield -- M, L (qty as needed):
 - a. Belden 9451
 - b. West Penn 454
14. Speaker Wire – S12 (qty as needed):
 - a. West Penn 227

- b. Belden 8477
- 15. Microphone (qty 4): Hanging microphone system.
 - a. AKG CHM21
 - b. Engineer approved equal
- 16. Wireless microphone receiver, bodypack transmitter, and rack mount kit (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser EW322G2 clip-on wireless microphone
 - b. Shure
 - c. Engineer approved equal
- 17. Condenser Microphones (qty 2):
 - a. Shure PG81
- 18. Headphones (qty 3): Teacher and practice rooms headphones
 - a. AKG K141
 - b. Engineer approved equal
- 19. Headphone volume control (qty 3):
 - a. Bogen
 - b. Engineer approved equal
- 20. Microphone Stands (qty 2):
 - a. AKG KM260/1 black, straight stand w/ round base
- 21. Microphone Stand Boom Arm (qty 2):
 - a. AKG KM211/1 black telescoping boom arm
- 22. Loose Speaker Cable (qty 2): Twenty-five flexible speaker cable.
 - a. Proco S12NN-25 or similar
- 23. Loose Cables (qty 4): Ten foot mic cable.
 - a. Proco M-10 or similar
- 24. Loose Cables (qty 4): Twenty-five foot mic cable.
 - a. Proco M-25 or similar

ORCHESTRA ROOM

- 1. Equipment Rack (qty 1): Twenty-one space metal rolling rack with solid, lockable front door, solid lockable rear door, and casters.
 - a. Middle Atlantic PTRK-21
- 2. Rack-mounted Power strip (qty 2): Provide power strips for additional outlets at each rack.
 - a. Middle Atlantic PD-815R

3. Speaker (qty 2): Two-way full-range loudspeaker. Provide white speakers unless black is requested by the owner or architect. Coordinate color with architect and owner. Attach to wall with manufacturer's bracket.
 - a. JBL Control 28
 - b. Engineer approved equal
4. CD/Cassette Recorder (qty 1): Two space rack-mounted CD/Tape combo recorder.
 - a. Tascam CC-222
5. Tuner/Tone Generator/Metronome (qty 1): One space rack mounted device
 - a. Akai HV10
 - b. Engineer approved equal
6. Headphone Amplifier (qty 1): 1U rack mounted Headphone amplifier
 - a. Rane HC 4
 - b. Engineer approved equal
7. Amplifier (qty 1): Two space 2-channel rack mountable amplifier. Provide cover plate for volume controls.
 - a. Crown
 - b. BiAmp
8. Digital Signal Processor – DSP-1 (qty 1): DPS processors shall be located in the equipment rack.
 - a. Crown
9. Recording Mixer (qty 1): Mixer for recorded program.
 - a. Mackie 1604 with rack mount kit
 - b. Engineer approved equal
10. Rack Drawer (qty 1): Three space, rack-mounted storage drawer.
 - a. Middle Atlantic UD3
11. Two space blank (qty as necessary): Two rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB2
12. Single space blank (qty as necessary): Single rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB1
13. Mic/Line Wire 22AWG 2-conductor with shield -- M, L (qty as needed):
 - a. Belden 9451
 - b. West Penn 454
14. Speaker Wire – (qty as needed):
 - a. West Penn 227
 - b. Belden 8477
15. Microphone (qty 4): Hanging microphone system.

- a. AKG CHM21
- b. Engineer approved equal
- 16. Wireless microphone receiver, bodypack transmitter, and rack mount kit (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser EW322G2 clip-on wireless microphone
 - b. Shure
 - c. Engineer approved equal
- 17. Condenser Microphones (qty 2):
 - a. Shure PG81
- 18. Headphones (qty 3): Teacher and practice rooms headphones
 - a. AKG K141
 - b. Engineer approved equal
- 19. Headphone volume control (qty 3):
 - a. Bogen
 - b. Engineer approved equal
- 20. Microphone Stands (qty 2):
 - a. AKG KM260/1 black, straight stand w/ round base
- 21. Microphone Stand Boom Arm (qty 2):
 - a. AKG KM211/1 black telescoping boom arm
- 22. Loose Speaker Cable (qty 2): Twenty-five flexible speaker cable.
 - a. Proco S12NN-25 or similar
- 23. Loose Cables (qty 4): Ten foot mic cable.
 - a. Proco M-10 or similar
- 24. Loose Cables (qty 4): Twenty-five foot mic cable.
 - a. Proco M-25 or similar

GYMNASIUM

- 25. Equipment Rack (qty 1): Twenty-one space metal rolling rack with solid, lockable front door, solid lockable rear door, and casters.
 - a. Middle Atlantic PTRK-21
- 26. Rack-mounted Power strip (qty 2): Provide power strips for additional outlets at each rack.
 - a. Middle Atlantic PD-815R
- 27. Speaker (qty 6): Two-way full-range loudspeaker. Provide white speakers unless black is requested by the owner or architect. Coordinate color with architect and owner. Attach to wall with manufacturer's bracket.
 - a. JBL
- 28. CD/Cassette Recorder (qty 1): Two space rack-mounted CD/Tape combo recorder.

- a. Tascam CC-222
- 29. Amplifier (qty 1): Two space 2-channel rack mountable amplifier. Provide cover plate for volume controls.
 - a. Crown
 - b. BiAmp
- 30. Digital Signal Processor – DSP-1 (qty 1): DPS processors shall be located in the equipment rack.
 - a. Crown
- 31. Recording Mixer (qty 1): Mixer for recorded program.
 - a. Crown 28M
 - b. Engineer approved equal
- 32. Microphone Stands (qty 2):
 - a. AKG KM260/1 black, straight stand w/ round base
- 33. Condenser Microphones (qty 2):
 - a. Shure PG81
- 34. Rack Drawer (qty 1): Three space, rack-mounted storage drawer.
 - a. Middle Atlantic UD3
- 35. Two space blank (qty as necessary): Two rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB2
- 36. Single space blank (qty as necessary): Single rack space 18 gauge flanged, black, blank panel.
 - a. Middle Atlantic EB1
- 37. Mic/Line Wire 22AWG 2-conductor with shield -- M, L (qty as needed):
 - a. Belden 9451
 - b. West Penn 454
- 38. Speaker Wire --(qty as needed):
 - a. West Penn 227
 - b. Belden 8477
- 39. Wireless microphone receiver, bodypack transmitter, and rack mount kit (qty 2). Coordinate frequency range with Owner's Representative.
 - a. Sennheiser EW345G2 transmitter + handheld microphone
 - b. Shure
 - c. Engineer approved equal
- 40. Loose Speaker Cable (qty 2): Twenty-five flexible speaker cable.
 - a. Proco S12NN-25 or similar
- 41. Loose Cables (qty 4): Ten foot mic cable.

- a. Proco M-10 or similar
- 42. Loose Cables (qty 4): Twenty-five foot mic cable.
Proco M-25 or similar

PART 3 - EXECUTION

3.1 MATERIAL AND WORKMANSHIP

- A. Non-compliance with any of the following as deemed by the Owner, Architect, or Consultant shall be cause for rejection of work and replacement by the Installing Contractor at no added cost to the Owner.
- B. Material, workmanship, wire, and wiring methods shall be performed as specified.
- C. If, in the opinion of the Installing Contractor, an installation practice is desired or required, which is contrary to these specifications or drawings, a written request for modification shall be made to the Architect and Consultant. Modifications shall not be implemented without the written approval from the Architect and Consultant.
- D. All materials and labor shall be furnished whether mentioned or not to form a complete system operational as per the intentions and description set forth in Part 1. Include delivery, unloading, placement, fastening to walls, floors, ceiling, counters, or other structures where required, interconnecting wiring of the system components, and all other work and materials necessary to form a complete operational system.
- E. It shall be the responsibility of the contractor to cooperate at all times, and to the fullest extent, with all trades and contractors doing work in the building, to the end that lost time, work stoppages, interference, and inefficiencies do not occur. Communicate installation scheduling with the Electrical Contractor, and coordinate with other trades

3.2 INSTALLATION

- A. The contractor shall ring out and identify, with sturdy tie-wraps clearly marking every cable in the system (both ends). All markings shall include purpose destination and origination of the wire or cable.
- B. Install projection screens, lifts and mounts at locations indicated to comply with manufacturer's written instructions.
- C. Cable lengths at every outlet will have a minimum of four (4') feet of slack and fifteen (15') feet service loop at the head-end.
- D. Apply tamper proof Asset Tag to all equipment exceeding \$500 in value. Asset number spreadsheet will be generated by the Contractor. The Contractor shall record the asset tag number, equipment type, serial number, and equipment location in a database and submit to Owner for approval.
- E. The contractor shall use standard cable practices in the installation of the AV system.
- F. All equipment needing to be operated from the front panel will be rack mounted. "SHELVING" type installations are unacceptable.

- G. The Contractor shall carefully lay all cable with appropriate radius of curvature and protect at bends and corners.
- H. The Contractor shall provide and install equipment cabinets as specified and detailed on the drawings.
- I. The Contractor shall provide and install two (2) inch sleeves, with bushings, through all walls if not provided by the electrical contractor. Only those sleeves which have been depicted on the bid documents will be provided by the electrical contractor. The Contractor shall seal each sleeve, including the outside perimeter, with 3M-type fire retardant after cable installation. The fire rating classification shall equal or exceed the fire rating of the wall. The Contractor shall review all the drawings prior to its bid submission to identify locations for additional sleeves. Pricing for additional sleeves after award of contract will not be considered or approved unless it is the result of change of scope by the Owner.
- J. The Contractor shall be responsible for fire-stopping the ~~interior~~ of ALL cores and sleeves it uses as part of this project. Nelson putty shall be used for floor cores. Nelson pillows shall be used for 4" sleeves and for cable tray access through firewalls as necessary.
- K. Audio video cabling shall be continuous and splice free unless specifically stated otherwise. Cable slack shall be provided at the jack end and the directional tap end. A minimum of five (5) feet of slack cable shall be coiled and secured at each end. This slack is exclusive of the length that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a fashion as to protect it from damage.
- L. The Contractor shall loosely bundle cables with Velcro wraps, suitable for Plenum environments, every twenty (20) feet.
- M. The Contractor shall not fasten supports to pipes, ducts, mechanical equipment or conduit.
- N. The Contractor shall obtain permission from the Owner or the Technology Designer before drilling or cutting structural members.
- O. Powder actuated anchoring devices shall not be used to anchor any cable support or raceway system components. All equipment not specifically portable shall be held firmly in place and supported by fastenings, brackets, etc., capable of supporting the load with a minimum safety factor of 5 or as approved by the Architect.
- P. Boxes, equipment, cabling, rack, etc. shall be installed and secured plumb and square with building lines.
- Q. At all times during the installation the Installing Contractor shall consider not only the operational efficiency of equipment but also the aesthetics of the space. Questions or conflicts between operation and aesthetics should be directed to the Architect and Owner's Representative.
- R. All inter-rack cabling shall be neatly strapped, dressed, and supported as approved by the Owner or Consultant.
- S. Terminal block, boards, strips, or connectors shall be furnished for all cables, which interface with racks, cabinets, consoles, or equipment modules.

- T. All cables shall be grouped according to the signals being carried in order to reduce signal cross-talk. Separate groups shall be formed for the following cables:
 - 1. Group one: Power Cables
 - 2. Group two: Video Cables
 - 3. Group three: Microphone level audio cables
 - 4. Group four: Line level audio cables
 - 5. Group five: Speaker level audio cables
- U. Power cables, control cables, and high level cables shall be run on the left side of an equipment rack, as viewed from the rear. All other cables shall be run on the right side of the equipment rack, as viewed from the rear.
- V. Cabling within racks shall be contained in Panduit finger tray or wire-tied to the side of the rack in a neat and orderly fashion. Such cables shall remain separated as indicated in section D of this specification.
- W. All cables routed outside of racks and conduit shall be contained in a suitable harness or wireway to maintain a neat, clean, and finished product.

3.3 LOUDSPEAKER INSTALLATION

- A. Mount loudspeakers per manufacturers' specifications using appropriate brackets.
- B. All rigging and support steel required for installation shall be furnished by the Installing Contractor. Installing Contractor is responsible to verify weight and load conditions for all rigging to ensure structural integrity of the building. Any additional structural enhancements shall be performed at the expense of the Installing Contractor without claim for additional payment. If significant structural adjustments are necessary, a Structural Engineer licensed to work in the State of Michigan shall be retained by the Installing Contractor to certify the proposed hanging methods.
- C. All loudspeakers shall be installed per plans and arranged as shown on the drawings. All conflicts should be reported and satisfactorily worked out with other trades. If significant changes are required, verify with the Consultant prior to making changes. Failure to verify with the Consultant shall result in the Installing Contractor assuming full liability for speaker placement. If a changed speaker placement is deemed unacceptable by the owner the Installing Contractor shall rectify the problems to the owner's satisfaction without claim for additional payment.
- D. All loudspeakers shall be installed with the ability to adjust speakers +/-5 degrees vertically. Some adjustment may be necessary at the system commissioning with the Consultant.

3.4 LABELS

- E. Except where otherwise specified, label all connectors on plates or panels, switches, controls, and receptacles. Labeling material to have white lettering and to be engraved black plastic laminate with metal backing or engraved black anodized aluminum plates. Minimum plate thickness shall be .125". Dry transfer or other types of adhesive labels are not acceptable. All labels shall correspond to the drawings.
- F. Identify all wires and cables at every termination and connection point with permanent type markers.

- G. Every piece of rack-mounted equipment shall have an engraved label indicating function and schematic label. For amplifiers, indicate schematic label and loudspeaker(s) served by labeled equipment.
- H. Place a complete schematic diagram, permanently fixed to the inside of the rear rack door for each system. Cover the schematic with clear plastic sheet.

3.5 GROUNDING PROCEDURES

- A. In order to minimize problems resulting from improper grounding, and to achieve maximum signal-to-noise ratios, the following grounding procedures shall be adhered to:
 - 1. Under no circumstances shall the racks contact the conduit raceway system, the steel structure of the building, or ventilation ducts.
 - 2. Under no conditions shall the AC neutral conductor, at any location, be used for a system ground.
 - 3. Audio Cable Shields: All audio cable shields shall be grounded at one point only. There shall be no exceptions. For inter- and intra-rack wiring this requires that the shield be connected at the one end only. On un-grounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at one end only.
- B. There shall be no deviations from the above unless specifically required by the manufacturer of the equipment or when necessary to minimize crosstalk and to maximize signal-to-noise ratios in the audio, video, and control systems.
- C. If a different installation practice is desired by the Installing Contractor in regards to the signal grounding, the Installing Contractor may submit alternate grounding methods to the Consultant for approval. Installing contractor shall bear all responsibility for any deviations from the above stated grounding procedure, even if allowed by the Consultant, Owner, or Architect.

3.6 CONTRACTOR SYSTEM CHECKOUT

- A. Before Acceptance Tests are scheduled, the Contractor shall perform his own systems checkout. He shall furnish all required test equipment and shall perform all work necessary to determine and/or modify performance of the system to meet the requirements of these specifications and drawings. This work shall include the following:
 - 1. Testing of all Microphone inputs and Tie-lines
 - 2. Testing of all Speaker Lines and Jacks
 - 3. Testing of any other wires or components
 - 4. Test all Audio for compliance with the Performance Standards.
 - 5. Check all controls functions, from all controlling points to all controlled devices, for specified operation.

6. Align all equipment for optimum performance and to meet manufacturers' published specifications. Establish and mark normal settings for all level controls, and record these settings in the Systems Operation and Maintenance Manual.

3.7 SYSTEM PERFORMANCE, TESTS AND ADJUSTMENTS

- A. Testing Personnel: The Installing Contractor shall have a minimum of two persons knowledgeable as to the systems as installed available for testing and adjustment with the Consultant.
 1. All costs to the Installing Contractor for testing personnel shall be included in the bid.
 2. Installing Contractor shall allow for up to (8) eight hours of testing and adjustments with the Consultant.
 3. Failure of the Installing Contractor to provide adequate personnel or testing equipment causing lost time to the Consultant shall result in the Installing Contractor paying the Consultant's standard hourly rate for additional time and expenses as necessary.
- B. Test Equipment:
 1. All equipment for testing and adjustments to the sound system shall be furnished by the Installing Contractor. Test equipment shall include:
 - a. Computer Measurement Platform: SMAART, TEF, SIM or other approved equal
 - b. Dual Trace Oscilloscope
 - c. High Quality Multi-meter: Fluke or Similar
 - d. Sweepable Tone Generator
 2. The Consultant may choose to bring and use some of his own test equipment.
 3. Furnish make, model, and serial number of all test equipment to be used to the Consultant prior to performing any test and adjustments to the system.
- C. Loudspeaker Impedances: Measure and record the impedance of each loudspeaker line. For high frequency drivers take impedance measurement at 4000 Hz. For mid-range drivers take impedance measurement at 1000 Hz. For low frequency drivers take impedance measurements at 100 Hz. An impedance sweep may also be performed using TEF, SMAART, or other approved equal. Results of all impedance tests shall be recorded and furnished to the owner for future system repair and trouble-shooting.
- D. Noise and RF Pickup:
 1. Set up system for each specified mode of operation.
 2. Check to ensure that system is free of noise, hum, and radio frequency interference.
- E. Buzzes, Rattles, Distortion:

1. Apply high-quality music signal to the system. Adjust the system for frequent peaks at its specified maximum sound pressure level.
2. Apply sine-wave sweep from 50 to 5,000 Hz at 10 dB below full amplifier power.
3. In both cases, listen carefully for buzzes, rattles and objectionable distortion.
4. Correct all causes of such defects. If cause is outside system, promptly notify the Owner indicating cause and suggested corrective procedures.

F. Equalization:

1. Prior to system commissioning furnish names of personnel involved in project management, final adjustment, and tuning. Furnish a profile of experience and training of the personnel completing the tuning.
2. Final equalization and setup shall be done under the supervision of the Consultant. As described in the above sections.

G. SPL Recording:

1. Measure the SPL at a minimum of eight points within the space to confirm that coverage at octave band center frequencies from 63 Hz to 8000Hz is a maximum of +/- 3dB.

3.8 SUBMITTALS

- A. All tuning and adjustment shall have hard copy data bound and turned over to the Engineer and Consultant. Submit record drawings and Documentation of Tests, Measurements and Adjustments performed. All submittals shall be furnished before final payment is released.
- B. A copy of all DSP settings shall be burned to CD and placed in the rack after the completion and acceptance of all work and testing.
- C. The original submittal drawings shall be corrected for record purposes and show all changes and addition.

3.9 DRAWINGS AND DOCUMENTATION

- A. Fully detailed documentation and record drawings of installation layout and performance shall be submitted for review within thirty (30) days of completion of work and shall include as a minimum:
 1. Marked drawings showing distance and routing of all inside cable with gauge, type and numbering scheme.
 2. Location of outlets with their identification number prepared on most recent installation drawing.
 3. Drawings showing distribution frame layouts, cable routing from rooms.
 4. Drawings showing layout of panels and equipment in cabinets.

5. Drawings shall accurately record actual locations of each item of fixed equipment, and show interconnecting wiring. Drawings will indicate location of equipment and tagged circuits. A functional block diagram will also be required.

B. Documentation Requirements

1. Drawings, whenever submitted, shall be submitted with three (3) copies to the Owner.
2. Cable and outlet identification, locations, performance and test results will be entered into Excel or approved PC based spreadsheet. The Contractor spreadsheet template and format will be approved by the Owner.
3. Final record drawings shall be submitted as one (1) ANSI C laminated drawing, two (2) sets of scaled 20# bond drawings and two (2) CD-ROM in PDF format. Drawings shall be professionally done. Hand drawings and notations will not be accepted.

C. Cable Record Book

1. The Contractor shall prepare and deliver complete and accurate cable records entered into Excel or approved PC based spreadsheet. Minimum information to be included for each cable in the Cable Record Book is:

- D. All drawings and the information contained therein become the sole property of the Owner.

3.10 FINAL INSPECTION

- A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of the Owner or Owner's Authorized Representative.
- B. The Installing Contractor, at the Installing Contractor's expense, shall rectify any components not found to function in a satisfactory manner as defined by this specification.

END OF SECTION

TROY SCHOOL DISTRICT
BID# 9343
SCHOOL TECHNOLOGY SYSTEMS

	Bid Bond	Familial Disclosure	Category 1 Voice/Data Cabling & Electronics	Category 2 PA & Media Retrieval & Digital Clocks	Category 3 Sound Systems/AV	Mandatory Alt #1 Category 6E Upgrade	Mandatory Alt #2 Upgrade to 42" LCD	Voluntary Alt Cafeteria Sound System
Netech	Y	Y	\$ 194,341.43			\$ 17,610.00		
Analyst International	Y	Y	207,760.15			25,169.76		
Hatzel & Buehler	Y	Y	221,109.00			17,710.00		
Digital Age Technologies	Y	Y	221,267.00			11,229.00		
Sound Engineering	Y	Y	233,168.00	\$ 493,890.00	\$ 82,820.00	15,242.00	\$ 71,250.00	\$ 17,445.00
Tel Systems	Y	Y			111,456.33			