Integrated Design Solutions

architecture engineering interiors & technology

Project Manual

Troy School District
School Technology Systems
Secondary School Renovations,
Transportation
TSD Bid No. 9416

IDS Project No. 03234-1000 BP 22

April 16, 2007
Bids

Project Manual

Troy School District
School Technology Systems
Secondary School Renovations, Transportation
TSD Bid No. 9416
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

SECTION 00010 - TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 00100 - ADVERTISEMENT FOR BIDS

DATE: April 16, 2007

PROJECT: Troy School District
School Technology Systems
Secondary School Renovations, Transportation
TSD Bid No. 9416
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 May 2, 2007, 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 April 16, 2007 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 MI, 43636 S. Woodward Ave., Bloomfield Hills, MI 48302 (248) 972-1000
McGraw Hill Construction, 20475 Woodingham Dr. Detroit, MI 48221(313) 342-6449.
Construction News Service, 1773 R W Berends Drive SW Wyoming, MI 49519 (616) 530-3940.

The Technology Designer will furnish one (1) sets of documents to the bidders at no charge.

A recommended pre-bid conference is scheduled for April 19th at 10:00 AM local time. All Bidders are required to attend. Bidders shall meet at Troy School District Administration Building, 4400 Livernois, Troy, Michigan, 48098. Attendance at the pre-bid conference is strongly recommended.

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, SECONDARY RENOVATIONS, TRANSPORTATION, TSD Bid No. 9416, 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

SECTION 00410 - BID FORM

OWNER: Troy School District
4400 Livernois
Troy, Michigan 48098

PROJECT: Troy School District
School Technology Systems
Secondary Renovations, Transportation
TSD Bid No. 9416
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, Secondary Renovations, Transportation for the TSD Bid No. 9416 Project in accordance with the Drawings and Specifications prepared by Integrated Design Solutions, LLC dated April 16, 2007, and agrees to accept payment as herein provided.

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 16795

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 16790

1.	Cost to install a 32" CRT TV and 32" CRT TV bracket, patch cables, set top box complete.	Add: $_____	Deduct: $_____
2.	Cost to provide a classroom control panel including back box. Include cabling to two (2) speakers (no speakers) audio cabling to an TV, video cabling to TV, 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.	The cost to furnish and install one (1) thru ten (10) data outlets originating in the same wiring closet. Provide the Category 6 cable (minimum 250'), RJ-45 Category 6 outlets both ends, terminations both ends and testing. Also to include installation of Category 6 patch cord. Cable shall be Berk-Tek LanMark 1000 or equal.	Add: $_____/ea	Deduct: $_____/ea
2.	The cost to furnish and install ten (10) or more data outlets originating in the same wiring closet. Provide the Category 6 cable (minimum 250'), RJ-45 Category 6 outlets both ends, terminations both ends and testing. Also to include installation of Category 6 patch cord. Cable shall be Berk-Tek LanMark 1000 or equal.	Add: $_____/ea	Deduct: $_____/ea

3.	The cost per foot for twelve (12) strand multimode fiber installed in 1.25" plenum rated innerduct.	Add: $_____/ft	Deduct: $_____/ft
4.	The cost to connectorize and test a fiber end with an SC connector.	Add: $_____/ea	Deduct: $_____/ea
5.	The cost per foot for one hundred (100) pair, 24AWG, twisted pair, plenum cable.	Add: $_____/ft	Deduct: $_____/ft
6.	The cost to furnish and install a two inch (2") horizontal sleeve with fire stop per specifications.	Add: $_____/ea	Deduct: $_____/ea
7.	The cost to furnish and install a four inch (4") vertical or horizontal sleeve with fire stop per specification	Add: $_____/ea	Deduct: $_____/ea
8.	The cost to furnish and install a "J"-hook cable support per specifications.	Add: $_____/ea	Deduct: $_____/ea
9.	The cost per foot to furnish and install center hung 18" cable tray.	Add: $_____/ft	Deduct: $_____/ft
10.	Cost to furnish and install a technology cabinet. Cabinet shall be middleatlantic MRK4432 with top fans, one (1) power strip, front lexan locking door, and rear steel locking door.	Add: $_____/ea	Deduct: $_____/ea
11.	Cost to furnish and install one (1) category 6 patch panel. Terminations included under unit price 1 or 2.	Add: $_____/ea	Deduct: $_____/ea

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.	Boulan Park MS	8/12/2007 and 8/12/2008
2.	Larson MS	8/12/2007 and 8/12/2008
3.	Smith MS	8/12/2007
4.	Transportation	8/12/2007
5.	Troy HS	8/12/2007

WITHDRAWAL OF BIDS

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 then 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 _____, 2007, by _____.

_____
, Notary Public
_____ County, Michigan
My Commission Expires:_____
Acting in the County of :_____

END OF SECTION

State of Michigan
Department of Labor and Economic Growth

Wage and Hour Division
6546 Mercantile Way, Suite 5
PO Box 30476
Lansing, MI 48909-7976
Telephone: 517-335-0400
Fax: 517-335-0077
www.michigan.gov/wagehour

Official Request 420
Requestor: TROY SCHOOL DISTRICT

Project Description: Technology & Computer Lab Technology Renovations
Project Number: SECONDARY SCHOOLS & ELEMENTARY SCHOOLS

Oakland County

Official 2007 Prevailing Wage Rates for State Funded Projects

Issue Date: 3/28/2007
Contract must be awarded by 6/26/2007

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Asbestos & Lead Abatement Laborer						
Asbestos & Lead Abatement Laborer		MLDC	$31.30	$41.83	$52.35	H H H X X X X D Y
Asbestos & Lead Abatement, Hazardous Material Handler						
Asbestos and Lead Abatement, Hazardous Material Handler		AS207	$31.30	$43.13	$54.95	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	$47.76	$71.64	$95.52	H H D H D D D D N
	Apprentice Rates:					
	First 6 months		$30.33	$45.50	$60.66	
	2nd 6 months		$32.21	$48.32	$64.42	
	3rd 6 months		$34.10	$51.15	$68.20	
	4th 6 months		$35.98	$53.97	$71.96	
	5th 6 months		$37.86	$56.79	$75.72	
	6th 6 months		$39.73	$59.60	$79.46	

Official Request #: 420
Requestor: TROY SCHOOL DISTRICT
Project Description: Technology & Computer Lab Technology Renovations

Project Number: SECONDARY SCHOOLS & ELEMENTARY SCHOOLS
County: Oakland

Official Rate Schedule

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.

Official 2007 Prevailing Wage Rates for State Funded Projects

Issue Date: 3/28/2007

Contract must be awarded by 6/26/2007

Classification Name / Description		Straight Hourly	Time and a Half	Double 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	$42.63	$60.13	$77.63	H H D H H H H D N
Apprentice Rates:					
1st 6 months		$24.90	$33.67	$42.43	
2nd 6 months		$26.65	$36.28	$45.92	
3rd 6 months		$30.15	$41.55	$52.93	
4th 6 months		$33.66	$46.80	$59.94	
5th 6 months		$35.40	$49.43	$63.44	
6th 6 months		$38.92	$54.70	$70.47	
Drywall					
Drywall Taper	PT-22-D	$38.45	$50.90	$63.35	H H D H D D D D N
Apprentice Rates:					
First 3 months		$26.00	$32.23	$38.45	
Second 3 months		$28.49	$35.96	$43.43	
Second 6 months		$30.98	$39.69	$48.41	
Third 6 months		$33.47	$43.43	$53.39	
4th 6 months		$34.71	$45.29	$55.87	

Official Request #: 420
Requestor: TROY SCHOOL DISTRICT
Project Description: Technology & Computer Lab Technology Renovations

Project Number: SECONDARY SCHOOLS & ELEMENTARY SCHOOLS
County: Oakland

Official Rate Schedule

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Official 2007 Prevailing Wage Rates for State Funded Projects

Issue Date: 3/28/2007

Contract must be awarded by 6/26/2007

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Electrician						
Inside Wireman		EC-58-IW	$46.88	$64.00	$81.13	H 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	
Sound and 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	
Elevator Constructor						
Elevator Constructor Elevator Constructor		EL 36	$47.71		$81.45	D D D D D D D D Y
	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 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						
Spray Insulation		AS25S	$20.14	$29.14		H H H H H H H H N

Official Request #: 420
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County: Statewide

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Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Heat and Frost Insulator and Asbestos Worker						
Heat and Frost Insulators and Asbestos Workers		AS25	$48.20	$62.86	$77.52	H H H H H H H D Y
	Apprentice Rates:					
	1st Year		$29.59	$37.66	$45.72	
	2nd Year		$37.60	$47.13	$56.66	
	3rd Year		$39.40	$49.66	$59.92	
	4th Year		$42.34	$54.07	$65.80	
Ironworker						
Fence Erecting		IR-25-F	$39.87	$59.58	$79.29	H H D H H H D D Y
Glazing		IR-25-GZ1	$48.48	$72.64	$96.65	H H D H H H D D Y
Mesh Iron Work		IR-25-MR	$42.25	$60.43	$78.60	H H D H D D D D N
Pre-engineered Metal Work		IR-25-PE-Z1-Z2	$39.88	$50.38	$60.88	H H H X X X X D Y
	Apprentice Rates:					
	1st level		$22.79	$27.88	$32.97	
	2nd level		$24.01	$29.61	$35.21	
	3rd level		$25.25	$31.36	$37.47	
	4th level		$26.47	$33.08	$39.70	
	5th level		$27.70	$34.83	$41.95	
	6th level		$28.93	$36.56	$44.20	
Reinforced Iron Work		IR-25-RF	$47.46	$68.09	$88.71	H H D H D D D D N
Rigging Work		IR-25-RIG	$52.48	$78.56	$104.64	H H H H H H H D N
Siding & Decking		IR-25-SD	$45.10	$67.43	$89.75	H H D H H H D D Y
Structural, ornamental, conveyor, welder and pre-cast Apprentice rates apply to structural, converyor, fence, glazing, reinforced, rigging, & siding decking		IR-25-STR	$52.61	$78.69	$104.77	H H D H H H D D Y
	Apprentice Rates:					
	Level 1		$26.51	$39.54	$52.57	
	Level 2		$29.12	$43.46	$57.79	
	Level 3		$31.73	$47.37	$63.01	
	Level 4		$34.34	$51.29	$68.23	
	Level 5		$36.94	$55.19	$73.43	
	Level 6		$39.57	$59.13	$78.69	
	Level 7		$42.16	$63.02	$83.87	
	Level 8		$44.78	$66.95	$89.11	

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Project Number: SECONDARY SCHOOLS & ELEMENTARY SCHOOLS
County: Oakland

Official Rate Schedule

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Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Industrial Door erection & construction	IR-25-STR-D	$34.69	$46.09	$57.48	H H D H H H D D Y
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	$36.48	$51.89	$67.29	H H D H D D D D Y
Apprentice Rates:					
0-1,000 work hours		$30.91	$43.53	$56.15	
1,001-2,000 work hours		$32.02	$45.20	$58.37	
2,001-3,000 work hours		$33.14	$46.88	$60.61	
3,001-4,000 work hours		$35.37	$50.23	$65.07	
Signal man (on sewer & caisson work); air,electric or gasoline tool operator (including concrete vibrator operator,acetylene torch & air hammer operator); scaffold builder, caisson worker	L1076-A-B	$36.74	$52.28	$67.81	H H D H D D D D Y
Lansing Burner, Blaster & Powder Man	L1076-A-C	$37.23	$53.01	$68.79	H H D H D D D D Y
Furnance battery heater tender, burning bar & oxy-acetylene gun, expediter man, top man and/or bottom man (blast furnace work)	L1076-A-D	$36.98	$52.64	$68.29	H H D H D D D D Y
Cleaner/ sweeper laborer, furniture laborer	L1076-A-E	$31.03	$43.71	$56.39	H H D H D D D D Y
Plasterer Tender, Plastering Machine Operator	LPT-1	$37.86	$53.96	$70.05	H H D H D D D D N
Apprentice Rates:					
0 - 1,000 hours		$30.91	$43.53	$56.15	
1,001 - 2,000 hours		$32.02	$45.20	$58.37	
2,001 - 3,000 hours		$33.14	$46.88	$60.61	
3,001 - 4,000 hours		$35.37	$50.23	$65.07	

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
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	$36.48	$51.89	$67.29	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$30.91	$43.53	$56.15	
1,001-2,000 work hours		$32.02	$45.20	$58.37	
2,001-3,000 work hours		$33.14	$46.88	$60.61	
3,001-4,000 work hours		$35.37	$50.23	$65.07	
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	$37.48	$53.39	$69.29	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$31.66	$44.66	$57.65	
1,001-2,000 work hours		$32.82	$46.40	$59.97	
2,001-3,000 work hours		$33.99	$48.15	$62.31	
3,001-4,000 work hours		$36.32	$51.65	$66.97	
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	$32.54	$43.21	$53.88	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$27.70	$35.95	$44.20	
1,001-2,000 work hours		$28.67	$37.40	$46.14	
2,001-3,000 work hours		$29.64	$38.86	$48.08	
3,001-4,000 work hours		$31.57	$41.76	$51.94	
Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder.	LAUCT-Z1-2	$32.65	$43.38	$54.10	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$27.79	$36.08	$44.38	
1,001-2,000 work hours		$28.76	$37.54	$46.32	
2,001-3,000 work hours		$29.73	$39.00	$48.26	
3,001-4,000 work hours		$31.68	$41.92	$52.16	

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
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	$32.71	$43.47	$54.22	H H H H H H H D Y
Apprentice Rates:					
	0-1,000 work hours	$27.83	$36.14	$44.46	
	1,001-2,000 work hours	$28.81	$37.62	$46.42	
	2,001-3,000 work hours	$29.78	$39.07	$48.36	
	3,001-4,000 work hours	$31.73	$42.00	$52.26	
Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.	LAUCT-Z1-4	$32.89	$43.74	$54.58	H H H H H H H D Y
Apprentice Rates:					
	0-1,000 work hours	$27.97	$36.36	$44.74	
	1,001-2,000 work hours	$28.95	$37.82	$46.70	
	2,001-3,000 work hours	$29.94	$39.31	$48.68	
	3,001-4,000 work hours	$31.91	$42.26	$52.62	
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	$33.14	$44.11	$55.08	H H H H H H H D Y
Apprentice Rates:					
	0-1,000 work hours	$28.16	$36.64	$45.12	
	1,001-2,000 work hours	$29.15	$38.12	$47.10	
	2,001-3,000 work hours	$30.15	$39.62	$49.10	
	3,001-4,000 work hours	$32.14	$42.61	$53.08	
Class VI - Dynamite man and powder man.	LAUCT-Z1-6	$33.47	$44.61	$55.74	H H H H H H H D Y
Apprentice Rates:					
	0-1,000 work hours	$28.40	$37.00	$45.60	
	1,001-2,000 work hours	$29.42	$38.53	$47.64	
	2,001-3,000 work hours	$30.43	$40.04	$49.66	
	3,001-4,000 work hours	$32.46	$43.09	$53.72	

Official Request #: 420
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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	$26.75	$34.53	$42.30	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$23.36	$29.44	$35.52	
1,001-2,000 work hours		$24.04	$30.46	$36.88	
2,001-3,000 work hours		$24.72	$31.48	$38.24	
3,001-4,000 work hours		$26.07	$33.50	$40.94	
Landscape Laborer					
Landscape specialist includes; air, gas, and diesel equipment operator, lawn sprinkler installer.	LLAN-Z1-A	$23.38	$32.46	$41.54	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	$19.16	$26.13	$33.10	X X H X X X H D Y
Marble Finisher					
Marble Finisher	TT32-MF	$38.37	$48.46	$58.54	H H D H D D D D N
Apprentice Rates:					
Level 1		$18.73	$24.22	$29.71	
Level 2		$19.79	$25.81	$31.83	
Level 3		$23.93	$30.38	$36.83	
Level 4		$25.23	$32.33	$39.43	
Level 5		$26.56	$33.85	$41.14	
Level 6		$27.99	$35.64	$43.28	
Level 7		$29.48	$37.17	$44.85	
Level 8		$30.80	$38.73	$46.65	
Marble Mason					
Marble Mason	TT32-MM	$44.26	$57.29	$70.32	H H D H D D D D N
Apprentice Rates:					
Level 1		$24.21	$31.14	$38.06	
Level 2		$26.93	$34.56	$42.20	
Level 3		$29.70	$37.59	$45.48	
Level 4		$32.10	$40.83	$49.56	
Level 5		$34.18	$43.17	$52.16	
Level 6		$37.52	$48.11	$58.71	
Level 7		$38.55	$49.53	$60.51	
Level 8		$39.18	$50.47	$61.77	
Operating Engineer					
Crane with boom & jib or leads 120' or longer	EN-324-A120	$47.81	$64.26	$80.70	H H D H D D D D Y

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Crane with boom & jib or leads 140' or longer	EN-324-A140	$48.63	$65.49	$82.34	H H D H D D D D Y
Crane with boom & jib or leads 220' or longer	EN-324-A220	$48.93	$65.94	$82.94	H H D H D D D D Y
Crane with boom & jib or leads 300' or longer	EN-324-A300	$50.43	$68.19	$85.94	H H D H D D D D Y
Crane with boom & jib or leads 400' or longer	EN-324-A400	$51.93	$70.44	$88.94	H H D H D D D D Y
Compressor or welding machine	EN-324-CW	$36.96	$47.98	$59.00	H H D H D D D D Y
Forklift, lull, extend-a-boom forklift	EN-324-FL	$44.27	$58.95	$73.62	H H D H D D D D Y
Fireman or oiler	EN-324-FO	$35.93	$46.44	$56.94	H H D H D D D D Y
Regular crane, job mechanic, concrete pump	EN-324-RC	$46.95	$62.97	$78.98	H H D H D D D D Y
Regular engineer, hydro-excavator, remote controlled concrete breaker	EN-324-RE	$45.98	$61.51	$77.04	H H D H D D D D Y
Apprentice Rates:					
Period 1		$36.47	$47.34	$58.22	
Period 2		$38.02	$49.67	$61.32	
Period 3		$39.57	$52.00	$64.42	
Period 4		$41.12	$54.32	$67.52	
Period 5		$42.68	$56.66	$70.64	
Period 6		$44.23	$58.99	$73.74	
Operating Engineer - Marine Construction					
Diver/Wet Tender, Engineer (hydraulic dredge)	GLF-1	$49.29	$64.74	$80.19	X X H H H H H D Y
Holidays paid at $95.64 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	$47.79	$62.49	$77.19	X X H H H H H D Y
Holidays paid $91.89 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	$44.59	$57.69	$70.79	X X H H H H H D Y
Holidays paid at $83.89 per hour					

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Subdivision of county 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	$40.19	$51.09	$61.99	X X H H H H H H D Y
Holidays paid at $72.89 per hour					
Subdivision of county 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	$46.22	$61.89	$77.55	H H H H H H H D Y
Apprentice Rates:					
1st 6 months		$36.62	$47.58	$58.55	
2nd 6 months		$38.18	$49.92	$61.67	
3rd 6 months		$39.75	$52.28	$64.81	
4th 6 months		$41.31	$54.62	$67.93	
5th 6 months		$42.89	$56.99	$71.09	
6th 6 months		$44.45	$59.33	$74.21	
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	$45.27	$60.46	$75.65	H H H H H H H D Y
Apprentice Rates:					
1st 6 months		$35.95	$46.59	$57.21	
2nd 6 months		$37.48	$48.88	$60.27	
3rd 6 months		$39.00	$51.16	$63.31	
4th 6 months		$40.52	$53.44	$66.35	
5th 6 months		$42.04	$55.72	$69.39	
6th 6 months		$43.56	$58.00	$72.43	
Level D - Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWCI-Z1D	$43.97	$58.51	$73.05	H H H H H H H D Y
Apprentice Rates:					
1st 6 months		$35.05	$45.23	$55.41	
2nd 6 months		$36.51	$47.43	$58.33	
3rd 6 months		$37.95	$49.58	$61.21	
4th 6 months		$39.42	$51.79	$64.15	
5th 6 months		$40.86	$53.95	$67.03	
6th 6 months		$42.32	$56.13	$69.95	

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Level D When Capping Landfill Coveralls, safety boots, glasses or chemical splash goggles and hard hats.	EN-324-HWCI-Z1DCL	$43.72	$58.14	$72.55	H H H H H H H D Y
Apprentice Rates:					
1st 6 months		$34.87	$44.96	$55.05	
2nd 6 months		$36.31	$47.12	$57.93	
3rd 6 months		$37.76	$49.30	$60.83	
4th 6 months		$39.20	$51.45	$63.71	
5th 6 months		$40.63	$53.60	$66.57	
6th 6 months		$42.08	$55.78	$69.47	
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	$41.99	$55.54	$69.09	H 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	$41.04	$54.12	$67.19	H 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	$39.74	$52.17	$64.59	H 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	$39.49	$51.79	$64.09	H 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	$48.87	$65.86	$82.85	H 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	$47.92	$64.44	$80.95	H 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	$46.62	$62.49	$78.35	H 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	$46.37	$62.11	$77.85	H H H H H H H D Y

Official Request #: 420
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Project Description: Technology & Computer Lab Technology Renovations

Project Number: SECONDARY SCHOOLS & ELEMENTARY SCHOOLS
County: Oakland

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Classification Name / Description		Straight Hourly	Time and a Half	Double 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	$49.17	$66.31	$83.45	H 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	$48.22	$64.89	$81.55	H 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	$46.92	$62.94	$78.95	H 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	$46.67	$62.56	$78.45	H 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	$44.94	$59.97	$74.99	H 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	$44.07	$58.66	$73.25	H 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	$46.24	$61.92	$77.59	H 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	$47.19	$63.34	$79.49	H H H H H H H D Y
Operating Engineer Steel Work					
Crane w/ 120' boom or longer	EN-324-SW120	$51.51	$69.80	$88.08	H H D H H H D D Y

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County: Oakland

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Crane w/ 120' boom or longer w/ Oiler		EN-324-SW120-O	$52.51	$71.30	$90.08	H H D H H H D D Y
Crane w/ 140' boom or longer		EN-324-SW140	$52.69	$71.57	$90.44	H H D H H H D D Y
Crane w/ 140' boom or longer W/ Oiler		EN-324-SW140-O	$53.69	$73.07	$92.44	H H D H H H D D Y
Boom & Jib 220' or longer		EN-324-SW220	$52.96	$71.97	$90.98	H H D H H H D D Y
Crane w/ 220' boom or longer w/ Oiler		EN-324-SW220-O	$53.96	$73.47	$92.98	H H D H H H D D Y
Boom & Jib 300' or longer		EN-324-SW300	$54.46	$74.22	$93.98	H H D H H H D D Y
Crane w/ 300' boom or longer w/ Oiler		EN-324-SW300-O	$55.46	$75.72	$95.98	H H D H H H D D Y
Boom & Jib 400' or longer		EN-324-SW400	$55.96	$76.47	$96.98	H H D H H H D D Y
Crane w/ 400' boom or longer w/ Oiler		EN-324-SW400-O	$56.96	$77.97	$98.98	H H D H H H D D Y
Crane Operator & Job Mechanic		EN-324-SWCO	$51.15	$69.26	$87.36	H H D H H H D D Y
	Apprentice Rates:					
	0-999 hours		$40.04	$52.72	$65.39	
	1,000-1,999 hours		$41.85	$55.43	$69.01	
	2,000-2,999 hours		$43.66	$58.14	$72.63	
	3,000-3,999 hours		$45.48	$60.88	$76.27	
	4,000-4,999 hours		$47.28	$63.58	$79.87	
	5,000 hours		$49.10	$66.31	$83.51	
Crane w/ Oiler		EN-324-SWCO-O	$52.15	$70.76	$89.36	H H D H H H D D Y
Compressor or Welder Operator		EN-324-SWCW	$43.70	$58.08	$72.46	H H D H H H D D Y
Hoisting Operator		EN-324-SWHO	$50.51	$68.30	$86.08	H H D H H H D D Y
Oiler		EN-324-SWO	$42.29	$55.97	$69.64	H H D H H H D D Y
Tower Crane & Derrick where work is 50' or more above first level		EN-324-SWTD50	$52.24	$70.89	$89.54	H H D H 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	$53.24	$72.39	$91.54	H H D H H H D D Y

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Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Operating Engineer Underground						
Class I Equipment		EN-324A1-UC1	$43.72	$58.11	$72.50	H H H H H H H D Y
	Apprentice Rates:					
	0-999 hours		$34.89	$44.97	$55.04	
	1,000-1,999 hours		$36.33	$47.13	$57.92	
	2,000-2,999 hours		$37.76	$49.27	$60.78	
	3,000-3,999 hours		$39.21	$51.45	$63.68	
	4,000-4,999 hours		$40.65	$53.61	$66.56	
	5,000-5,999 hours		$42.09	$55.77	$69.44	
Class II Equipment		EN-324A1-UC2	$38.99	$51.02	$63.04	H H H H H H H D Y
Class III Equipment		EN-324A1-UC3	$38.26	$49.92	$61.58	H H H H H H H D Y
Class IV Equipment		EN-324A1-UC4	$37.69	$49.07	$60.44	H H H H H H H D Y
Master Mechanic		EN-324A1-UMM	$43.97	$58.49	$73.00	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, overpases, 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

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Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
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	$41.92	$62.88	$83.84	H H H H H H H D N
	Apprentice Rates:					
	1st 6 months		$21.61	$32.41	$43.22	
	2nd 6 months		$25.00	$37.50	$50.00	
	3rd 6 months		$28.39	$42.59	$56.78	
	4th 6 months		$31.83	$47.75	$63.66	
	5th 6 months		$35.16	$50.94	$67.92	
	6th 6 months		$38.53	$57.80	$77.06	
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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Official 2007 Prevailing Wage Rates for State Funded Projects

Issue Date: 3/28/2007
Contract must be awarded by 6/26/2007

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Plumber						
Plumber		PL-98	$51.88	$68.40	$84.91	H H D H D D D D Y
	Apprentice Rates:					
	Period 1		$17.11	$23.41	$29.71	
	Period 2		$17.11	$23.41	$29.71	
	Period 3		$26.78	$35.13	$43.47	
	Period 4		$27.41	$36.07	$44.73	
	Period 5		$28.57	$37.81	$47.05	
	Period 6		$29.72	$39.53	$49.35	
	Period 7		$30.87	$41.26	$51.65	
	Period 8		$32.04	$43.01	$53.99	
	Period 9		$33.19	$44.74	$56.29	
	Period 10		$34.35	$46.48	$58.61	
Roofer						
Commercial Roofer Straight time is not to exceed ten (10) hours per day or forty (40) hours per week.		RO-149-WOM	$45.01	$58.72	$72.42	H H D H H H D D N
	Apprentice Rates:					
	Apprentice 1		$29.78	$36.88	$44.64	
	Apprentice 2		$33.80	$41.54	$49.52	
	Apprentice 3		$35.16	$43.50	$52.14	
	Apprentice 4		$36.15	$44.94	$54.06	
	Apprentice 5		$37.33	$46.64	$56.32	
	Apprentice 6		$38.67	$48.58	$58.90	
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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Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Sprinkler Fitter						
Sprinkler Fitter		SP 704	$54.02	$72.89	$91.75	H H D H D D D D Y
	Apprentice Rates:					
	1st Period		$31.38	$38.93	$46.47	
	2nd Period		$33.27	$41.76	$50.25	
	3rd Period		$35.15	$44.58	$54.01	
	4th Period		$37.04	$47.41	$57.79	
	5th Period		$38.93	$50.25	$61.57	
	6th Period		$40.81	$53.07	$65.33	
	7th Period		$42.70	$55.91	$69.11	
	8th Period		$44.59	$58.74	$72.89	
	9th Period		$46.47	$61.56	$76.65	
	10th Period		$48.36	$64.39	$80.43	
Terrazzo						
Terrazzo Finisher		TT32-TRF	$38.77	$49.06	$59.34	H H D H D D D D N
	Apprentice Rates:					
	Level 1		$19.72	$25.71	$31.69	
	Level 2		$20.39	$26.71	$33.03	
	Level 3		$23.86	$30.27	$36.69	
	Level 4		$25.16	$32.23	$39.29	
	Level 5		$26.49	$33.74	$41.00	
	Level 6		$27.92	$35.33	$42.74	
	Level 7		$29.41	$37.18	$44.96	
	Level 8		$30.73	$38.74	$46.76	
Terrazzo Worker		TT32-TRW	$43.79	$56.59	$69.38	H H D H D D D D N
	Apprentice Rates:					
	Level 1		$24.11	$30.98	$37.86	
	Level 2		$26.83	$34.42	$42.00	
	Level 3		$29.60	$37.44	$45.28	
	Level 4		$32.00	$40.68	$49.36	
	Level 5		$34.08	$43.15	$52.21	
	Level 6		$37.34	$47.85	$58.35	
	Level 7		$38.42	$49.33	$60.25	
	Level 8		$39.25	$50.58	$61.91	

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Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Tile						
Tile Finisher		TT32-TF	$38.39	$48.49	$58.58	H H D H D D D D N
	Apprentice Rates:					
	Level 1		$18.63	$24.07	$29.51	
	Level 2		$19.69	$25.66	$31.63	
	Level 3		$23.83	$30.23	$36.63	
	Level 4		$25.13	$32.18	$39.23	
	Level 5		$26.46	$33.70	$40.94	
	Level 6		$27.89	$35.48	$43.08	
	Level 7		$29.38	$37.01	$44.65	
	Level 8		$30.70	$38.57	$46.45	
Tile Layer		TT32-TL	$43.69	$56.44	$69.18	H H D H D D D D N
	Apprentice Rates:					
	Level 1		$24.11	$30.98	$37.86	
	Level 2		$26.83	$34.42	$42.00	
	Level 3		$29.60	$37.44	$45.28	
	Level 4		$32.00	$40.68	$49.36	
	Level 5		$34.03	$42.94	$51.86	
	Level 6		$37.29	$47.77	$58.25	
	Level 7		$37.87	$48.51	$59.15	
	Level 8		$38.70	$49.75	$60.81	
Truck Driver						
on all trucks of 8 cubic yard capacity or less		TM-RB1	$33.66	$35.99		H H H H H H H H Y
of all trucks of 8 cubic yard capacity or over		TM-RB1A	$33.76	$36.14		H H H H H H H H Y
on euclid type equipment		TM-RB1B	$33.91	$36.36		H H H H H H H H Y
Underground Laborer Open Cut, Class I						
Construction Laborer		LAUC-Z1-1	$32.39	$42.99	$53.58	H H H H H H H D Y
	Apprentice Rates:					
	0-1,000 work hours		$27.59	$35.78	$43.98	
	1,001-2,000 work hours		$28.55	$37.22	$45.90	
	2,001-3,000 work hours		$29.51	$38.66	$47.82	
	3,001-4,000 work hours		$31.43	$41.54	$51.66	

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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	$32.50	$43.15	$53.80	H H H H H H H D Y
	Apprentice Rates:				
	0-1,000 work hours	$27.68	$35.92	$44.16	
	1,001-2,000 work hours	$28.64	$37.36	$46.08	
	2,001-3,000 work hours	$29.60	$38.80	$48.00	
	3,001-4,000 work hours	$31.54	$41.71	$51.88	
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	$32.55	$43.23	$53.90	H H H H H H H D Y
	Apprentice Rates:				
	0-1,000 work hours	$27.71	$35.96	$44.22	
	1,001-2,000 work hours	$28.68	$37.42	$46.16	
	2,001-3,000 work hours	$29.65	$38.88	$48.10	
	3,001-4,000 work hours	$31.58	$41.77	$51.96	
Underground Laborer Open Cut, Class IV					
Trench or excavating grade man.	LAUC-Z1-4	$32.63	$43.35	$54.06	H H H H H H H D Y
	Apprentice Rates:				
	0-1,000 work hours	$27.77	$36.06	$44.34	
	1,001-2,000 work hours	$28.74	$37.51	$46.28	
	2,001-3,000 work hours	$29.72	$38.98	$48.24	
	3,001-4,000 work hours	$31.66	$41.89	$52.12	
Underground Laborer Open Cut, Class V					
Pipe Layer	LAUC-Z1-5	$32.69	$43.44	$54.18	H H H H H H H D Y
	Apprentice Rates:				
	0-1,000 work hours	$27.82	$36.13	$44.44	
	1,001-2,000 work hours	$28.79	$37.58	$46.38	
	2,001-3,000 work hours	$29.77	$39.06	$48.34	
	3,001-4,000 work hours	$31.72	$41.98	$52.24	

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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	$30.14	$39.61	$49.08	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$25.90	$33.25	$40.60	
1,001-2,000 work hours		$26.75	$34.52	$42.30	
2,001-3,000 work hours		$27.60	$35.80	$44.00	
3,001-4,000 work hours		$29.29	$38.34	$47.38	
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	$26.76	$34.54	$42.32	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$23.37	$29.46	$35.54	
1,001-2,000 work hours		$24.05	$30.48	$36.90	
2,001-3,000 work hours		$24.73	$31.50	$38.26	
3,001-4,000 work hours		$26.08	$33.52	$40.96	

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STATE OF MICHIGAN

JENNIFER M. GRANHOLM
GOVERNOR

DEPARTMENT OF LABOR & ECONOMIC GROWTH
LANSING

ROBERT W. SWANSON
DIRECTOR

REQUIREMENTS OF MICHIGAN PUBLIC ACT 166 OF 1965, PREVAILING WAGES ON STATE PROJECTS

The Michigan Department of Labor & Economic Growth determines prevailing rates pursuant to the Prevailing Wage Law, Act 166, P.A. of 1965. The purpose of establishing prevailing rates is to provide rates of pay for workers on construction projects for which the state or a school district is the contracting agent and which is financed or financially supported by the state. By law, prevailing rates are compiled from the rates contained in collectively bargained agreements which cover the locations of the state projects. The attached prevailing rates provide an hourly rate which INCLUDES wage and fringe benefit totals for designated construction mechanic classifications. The overtime rates also include wage and fringe benefit totals. Please pay special attention to the overtime and premium pay requirements. The prevailing rate may be satisfied by payment in cash or payment in cash and credit for fringe benefits paid in cash or on behalf of a worker or fringe benefits provided to a worker.

State of Michigan responsibilities under the law:

- The department establishes the prevailing rate for each classification of construction mechanic ***requested by a contracting agent*** prior to contracts being let out for bid on a state project.

Contracting agent responsibilities under the law:

- If a contract is not awarded or construction does not start within 90 days of the date of the issuance of rates, a re-determination of rates must be requested by the contracting agent.
- Rates for classifications needed but not provided on the Prevailing Rate Schedule, including rates for registered apprentices, ***must*** be obtained ***prior*** to contracts being let out for bid on a state project.
- The contracting agent, by written notice to the contractor and the sureties of the contractor known to the contracting agent, may terminate the contractor's right to proceed with that part of the contract, for which less than the prevailing rates of wages and fringe benefits have been or will be paid, and may proceed to complete the contract by separate agreement with another contractor or otherwise, and the original contractor and his sureties shall be liable to the contracting agent for any excess costs occasioned thereby.

Contractor responsibilities under the law:

- Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
- Every contractor and subcontractor shall keep an accurate record showing the name and occupation of and the actual wages and benefits paid to each construction mechanic employed by him in connection with said contract. This record shall be available for reasonable inspection by the contracting agent or the department.
- Each contractor or subcontractor is separately liable for the payment of the prevailing rate to its employees.
- The prime contractor is responsible for advising all subcontractors of the requirement to pay the prevailing rate prior to commencement of work.
- The prime contractor is secondarily liable for payment of prevailing rates that are not paid by a subcontractor.
- A construction mechanic shall only be paid the apprentice rate if registered with the United States Department of Labor, Bureau of Apprenticeship and Training and the rate is included in the contract.

Enforcement:

A person who has information of an alleged prevailing wage violation on a state project may file a complaint with the Wage and Hour Division. The department will investigate and attempt to resolve the complaint informally.

Executive Order Number 2003-001 requires that contractors doing business with the State of Michigan be in compliance with state and federal law. A violation of Act 166 of 1965, as amended, the Prevailing Wages on State Projects act or Act 390 of 1978, as amended, the Payment of Wages and Fringe Benefits Act, may result in the debarment of a contractor from being awarded a contract for the provision of goods and services to the State of Michigan for a period of up to eight (8) years.

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, 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.

Regular Crane Operators rate shall include: Mechanics, Crane Operators, Dragline Operators, Boom Truck Operators, Power Shovel Operators and Concrete Pumps with booms.

Revised: 09/07/06

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.

(REV 05/07/04)

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 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) CRT TV Set Top Boxes to operate with new Dukane media retrieval system
3) CRT TV's
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

2. 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

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 incompleted 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 <u>not</u> 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 bluelines into electronic format and provide Owner record drawings in AutoCAD LT2006 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

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 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. Test TV's and set-top boxes for proper operation prior to removal, disconnect, remove, store (on site in the building in room designated by the Owner), and reinstall TV's, TV mounting brackets, set-top boxes, interconnect cables, and test for operation after installation. This work is being performed to accommodate installation of new ceiling grid and tiles and window replacements. The specific rooms/areas according to the drawings. TV's or set-top boxes found defective after reinstallation will be the responsibility of this contractor to repair or replace with new unless the Engineer shall be notified in writing at the time of "test" prior to removal of the units that they are not operational. The TV's and set-top boxes shall be tagged with markers indicating which room they were removed and subsequently shall be installed in the same room from which they were removed.

2. Test speaker in spaces where speakers are indicated to be removed, remove speakers, remove speaker grilles, speaker back boxes, store (on site in the building in room designated by the Owner), and test speakers after installation. This work is being performed to accommodate installation of new ceiling grid and tile. This contractor shall cut the tiles to accommodate installation of the speakers. Relocated speakers found defective is the responsibility of this contractor to correct unless the Engineer shall be notified in writing at the time of test prior to removal of the speakers that the speakers are non-operational.

3. Provide new/relocate existing televisions and new television brackets.

4. Provide ceiling mount TV brackets including supporting steel for all new TV mounting brackets for all new or relocated TV's 30" and larger unless otherwise noted on the Drawings.

5. Remove all abandoned video cable, paging cable, broadband cable, video control cable, hardline cable, taps, splitters complete.

6. Remove existing paging systems speakers and cabling. Provide new paging system speakers in classrooms, corridors and offices complete including backboxes, cables, speakers, grilles complete.

7. Provide new/relocate existing 1/2 inch RF hardline, new combiners, new splitters, new taps, new RG69U cables, drop cables, amplifiers, connectors complete for areas requiring new RF broadband cabling or areas being renovated.

8. Rebalance and tune the RF broadband system in each building.

9. Provide new Dukane set top boxes.

10. Provide new Dukane CCP's.

11. Provide CCP backboxes to the electrical contractor for all new or relocated CCP's. Refer to Drawings to determine mounting type for CCP's.

12. Work with the CM and other trades to coordinate the installation of the projects in phases as defined by the CM.

13. Provide and install new/relocate existing ceiling mounted projectors, mounts and cabling.

G. Furnish and install and/or relocate, in accordance with the drawings and specifications, all equipment necessary for an operational 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, TV 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 is 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 shall be 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 is 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.

B. Where required for installation and shown on the drawings, the plastic laminate enclosure housing the CCP coverplate, and containing the outlet boxes for various communication functions and containing 120 volt outlets are specified and installed by the architectural and electrical trades.

C. CCP back boxes shall be provided by the technology contractor (Division 16790) and turned over to the electrical contractor for installation. The cost for installation of the CCP back boxes shall be included in the technology contractor's bid and the work performed 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.
   h. Complete bill of materials indicating quantities and take off for the products being provided, specifically speakers, amplifiers, cable, instruments, audio source devices, mixers, wireless microphone systems, etc.

6. Tab No. 6, Video Distribution Equipment and video retrieval system shall include the following information:
   a. Installation company's name.
   b. Number of years installing similar equipment in schools.
   c. List of Michigan Schools that utilize equipment.
   d. Equipment model numbers.
   e. System interconnection drawings.
   f. Complete bill of materials indicating quantities, take offs for the products being provided, specifically cabling, connectors, amplifiers, splitters, taps, devices, etc.

7. Tab No. 7, Loose Video Equipment shall include the following information:
   a. Manufacturer's name.
   b. Installation company's name.
   c. Number of years installing similar equipment in schools.
   d. Description of system operation.
   e. Equipment model numbers.
   f. Catalog cuts for all the equipment, including TV's, camcorders, brackets, video projectors, multi-sync monitors, etc.
   g. System description of how the equipment operates describing all the functions and features associated with the equipment.
   h. Complete bill of materials indicating quantities take-offs for the products being provided.

8. Tab Nos. 9, 10 and 11 are self-descriptive as to their intended content.

1.7 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.
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, TV's, 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. TV 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. CRT TV's.
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 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.

1.12 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.

1.13 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.

1.14 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 shall be 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) has 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 TV installed.

1.15 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).

1.16 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.

PART 2 - PRODUCTS

2.1 MULTIMEDIA HEADEND EQUIPMENT (EXISTING)

A. The existing 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 (EXISTING)

A. Fan Controller:

1. Is dual operating for reliability, energy conservation, and greater fan life.

2. One fan (minimum) with filter is provided at the top of each cabinet. Fan size and quantity shall meet or exceed the requirements of the cabinet manufacturer.

3. Each fan is operated by a solid state temperature sensor for long and short time set point accuracy.

4. The rear doors are provided with louvers top and bottom to exhaust the heat and are located to prevent blockage of airflow from the fans.

B. Input Power:

1. Input AC power is 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 is factory wired to the vertically-mounted plugmold. The plugmold is 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 are protected by a transient voltage surge suppresser that is UL 1449 listed and have a maximum let-through voltage under Category B test of 500V.

C. Cabinets:

1. The existing VVCS system headend cabinets contain the voice and video source and control equipment located in 19-inch wide audio cabinet located in the MDF. The cabinets are 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 are keyed alike throughout the School District. The racks has removable side panels. Verify existing lockset with Owner and match. .

2. The data cabinets shall be similar to the remainder of the headend cabinets except that each data racks has 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 are manufactured by Mid-Atlantic MRK-4426.

2.3 VIDEO MEDIA RETRIEVAL SYSTEM (EXISTING SYSTEM)

A. The existing Video Retrieval System provides 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 has the minimum capacity of simultaneously accessing, controlling and distributing RF signals for one hundred twenty-five (125) media sources (1 GHz). The system is 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 are 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 has the ability of controlling all machine operating modes from their location, using the handheld infrared remote controller.

G. All equipment is rack mountable. Under no circumstances will shelf type mounting or "reaching in" configuration be acceptable.

H. System is 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 is 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 is 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 shall be 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 (EXISTING)

A. The MCPU is comprised of a number of computers all integrated to operate as one (1) multimedia central processing unit.

B. The following computers are 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 TV 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 is 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, is provided with its own keyboard and monitor and will be located on a desk in the headend room.

2.5 SCHEDULING COMPUTER (SC – EXISTING)

A. The scheduling is 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 TV sets in the system

D. The SC is 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 TV/receiver. Messages can be tailored for each classroom, a group of classrooms, or all classrooms.

E. The SC scheduling/control software is 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 is considered as a "request for use". Final acknowledgment and assignment is 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 are 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 (EXISTING)

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 shall be controlled by an internal battery backed clock/calendar board internal to the computer.

C. The output of the computer no. 2 is connected to a modulator in the headend for broadcast on the television program distribution system. The modulator is 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 is mounted below the monitor and labeled “Clock/Calendar/Messaging Computer Channel Music Channel 1 or 2 Selector”.

2.7 ELECTRONIC BULLETIN BOARD SYSTEM (EXISTING)

A. A separate Bulletin Board computer (Computer No. 3) and associated software is 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 is 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 (EXISTING)

A. The existing digital "Time/FIRE/WTHR/MSG/BELL" Display on the TV set top boxes (classroom control modules) (CCM), and other selected areas (see plans).

B. Each display function is 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 has 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 TV'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:

Manufacturer	Model Number	Description
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 (EXISTING)

A. The existing bells are 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 are 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 TV's are "on" the word "Bell" will be distributed to the TV's for the duration of the audio signal via the all call function. Where TV's are "off" the TV shall remain off.

9. The dismissal system uses the speaker/voice system.

2.10 LOCAL VIDEO ORIGINATION (EXISTING)

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 (EXISTING)

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 are automatically switched to the "pause" status for the duration of the all-call.

D. The TV'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. TV's which were in the "off" mode are automatically turned "on" for the duration of the video all-call. At the conclusion of the video all-call, the TV'S which were originally "off" will be turned "off" automatically and TV'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 TV's. Reactivation of VCR's and DVD's is by instructor's command.

2.12 ADDRESSABLE TV SET TOP BOX

A. The TV set top boxes are located in all classrooms and are capable of controlling the classroom TV 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 is 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 TV 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 is capable of either learning universal infrared commands or of having the infrared command set downloaded from the SC. All infrared command set information is 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 is 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 is 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 is 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 is 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 is displayed via video text on the TV receiver in lieu of on the set top box. When the TV 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 is 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 TV.

K. The set top box is 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 TV 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 is 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 TV 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 is 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 TV is off.

R. The set top box is 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 has a range of at least 40 feet in all ambient lighting (100 foot candles) conditions suitable for media viewing. The unit is 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 is capable of controlling up to eight different scheduled sources simultaneously, including TV'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 are deemed unacceptable.

E. The handheld IR remote control shall provide additional push buttons for auxiliary functions.

F. The hand held IR control unit is 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 are 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 is 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 is Dukane Model DSS2150 or engineer-approved equal.

2.15 INFRARED SOURCE CONTROLLERS (I-SC EXISTING)

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 is capable of providing a full array of media source remote control, including key functions that require auto-repeat commands. The I-SC is 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 shall be 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 is Dukane Model DSS2400 or engineer-approved equal.

2.16 SERIAL SOURCE CONTROLLERS (S-SC EXISTING)

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 is Dukane Model DSS2410 or engineer-approved equal.

2.17 MANUAL OVERRIDE PANEL (EXISTING)

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 (EXISTING)

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. Is frequency synthesized for optimum crystal lock.

o. Chip amplified using either Motorola or TRW high gain chips.

p. Has 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 has 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 has 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 is 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 are 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 TV’s are mounted, terminators are not required.

3. At locations where TV’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 shall be issued for reference and for connection purposes only.

2.20 TELEVISION SETS (EXISTING AND NEW)

A. Provide the number of television sets as indicated on the drawings and as hereinbefore specified. The television sets shall be 13", 19", 25", 27" 32" and 35" as indicated on the drawings. Unless otherwise noted on the drawings all TV sets shall be 32".

B. Each television set (monitor) shall be capable of remote control via an IR signal. Provide infrared controllers with each television set provided. The controllers shall be supplied with batteries installed.

C. Refer to TV/monitor-outlet interconnection detail on Drawings for further requirements

D. Approved Manufacturers:

Manufacturer	Model Number*		Description
RCA	14F400T	14"	Color Receiver
Sony	KV-13FS100	13"	Color Receiver
RCA	20V500T	20"	Color Receiver
Sony	KV-20FS120	20"	Color Receiver
RCA	27V530T	27"	Closed Captioned Color Receiver
Sony	KV-27FS120	27"	Closed Captioned Color Receiver
Zenith	C27A25	27"	Closed Captioned Color Receiver
RCA	32V550T	32"	Closed Captioned Color Receiver
Sony	KV-32SF120	32"	Closed Captioned Color Receiver
Zenith	C32F33	32"	Closed Captioned Color Receiver
Sony	KV-36FS120	36"	Closed Captioned Color Receiver

NOTE 1: All TV's shall have the following jacks on the back: video output, audio left output, audio right output, video input, audio left input, audio right input and S-video input. Video output must be an active output, not just a loop-through of the video input jack. It shall be the vendor's responsibility to verify the model numbers provided have all the required features for a complete and satisfactory installation.

* A later equivalent or better model may be substituted.

2.21 VCR'S (EXISTING)

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 (EXISTING)

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 (EXISTING)

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 projectors are a Mitsubishi XD550U.

2. Projector mount (EXISTING)

   a. Projector mount is a Peerless PRS Series projector mount kit Model PRS242 which includes a projector mount and an adapter plate.

   b. Ceiling plate is 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 (EXISTING)

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 shall be 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 is 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 is 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 are 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 are furnished and installed as indicated on the plans. They are completely solid-state and corrected by the Dukane 24A701/24A702 Master Time-Program Clock. The digital secondary clocks has either a 2-inch (5 cm) or 4-inch (10.1 cm) high LED display for maximum visibility. The digital clocks are 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 is Dukane Model 24A720, furnished and installed as indicated on the plans. The Clock-Elapsed Timer is 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 is a 1-inch (2.5 cm) high LED unit designed for maximum visibility.

5. The Clock-Elapsed Timer Remote Control is 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) are 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.

Manufacturer	Model Number	Description
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 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 and/or relocate 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 is 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.

2.26 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.

2.27 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.

2.28 BACKGROUND MUSIC CENTER (EXISTING)

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 is fully zoneable and is equipped to provide two (2) sources to the broadcast simultaneously and independently to 1-16 field of selectable zones simultaneously.

2.29 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 TV. 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.

2.30 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 has 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.
3 Way	6	dB max.
4 Way	7	dB max.

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 has 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.

2.31 VOICE CENTRAL PROCESSING EQUIPMENT - PUBLIC ADDRESS (EXISTING)

A. The system consists 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 shall be to be rack mounted as indicated on the drawings.

B. The system provides 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 is 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 is 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 includes 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 has 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 system provides off-site diagnostic capability through RS232 port. Use of programming mode shall not inhibit system operation.

G. The system uses industry standard twenty-five (25) volt technology.

H. The system provides a minimum of two (2) intercom channels.

1. The system provides 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 is 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. All existing ACC's shall be reused.

14. Manual time tones, which can be initiate by any ACC.

15. The system shall be zoned as follows:

    a. Each classroom is considered one (1) zone and has 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 is 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 is 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 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 has a user-programmable, battery-backed master clock.

29. System drives either digital or analog clocks or both from within the system.

30. The system has 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 has an RS-232 Port for PC interface.

I. The system shall contain an integral master clock and programmer that is 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 is 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. ACC self-diagnostics.

4. 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.

5. Facility for emergency calls to take precedence over routine calls.

6. Distinct call-in alert tone for emergency call-in.

7. The Contractor shall provide distribution of special tone to all speakers for custodial call.

8. The Contractor shall provide built-in speaker at ACC to monitor program channel.

9. System programming may be accomplished from an ACC or from a PC type computer.

10. The ACC is capable of one hundred percent (100%) queuing of incoming calls in priority sequence.

K. The central equipment is rack mounted in a standard nineteen-inch (19") cabinet. The central cabinet contains 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 is a desktop unit located in the main office. It has a modular jack for quick disconnects for servicing.

M. The Public Address has 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.

N. Access 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/cafetoriums 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 is provided by individual twenty (20) watt plug-in cards, at the CPCC.

4. Each classroom has an individual five (5) watt PA amplifier at every CCP location.

5. All plug-in cards is housed in standard rail frames, with a capacity of sixteen (16) cards per frame.

6. PA system has a minimum of forty (40) hard-wired zones and is expandable. The hard wired zones is software programmable to accommodate arrangement of any combination of classrooms, offices, and corridors to form a program zone. The program zone has overlapping capabilities.

7. Each card has a visual anti-distortion level control.

8. A minimum of eight (8) program zones is provided initially configured.

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

2.32 PROGRAM DISTRIBUTION OPERATION (EXISTING)

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.

2.33 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, tile bridges, and white round baffles.

PART 3 - EXECUTION

3.1 TERMINAL EQUIPMENT AND INSTALLATION

A. TV's and Mounting Brackets: All TV's shall be cable ready, 32" 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 velcro ties 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 equipment needing to be operated from the front panel will be rack mounted. "SHELVING" type installations are unacceptable.

G. RF taps shall be secured to building supports or cable tray and not allowed to float at cable termination points.

H. Broadband indoor distribution amplifiers shall be wall mounted in IC's.

I. Classroom splitters shall be installed in classroom ceiling spaces prior to RG-6 cable entering conduit.

J. The signal level at every tap shall be fifteen (+15 dB) plus or minus three (-3) dB between adjacent channels.

K. Signal level at every outlet shall be five (+5 dB) plus or minus two (2) dB between adjacent channels.

L. All passive components shall be designed for a frequency range of 5 to 16 Hz. The system shall be designed for adjacent channel operation.

M. The Contractor shall carefully lay all cable with appropriate radius of curvature and protect at bends and corners.

N. The Contractor shall provide and install equipment cabinets in the MDF as specified and detailed on the drawings.

O. 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 shall be the result of change of scope by the Owner.

P. The Contractor is 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.

Q. 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 shall be exclusive of the length of RG-6 that shall be required to accommodate termination requirements and shall be 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.

R. The Contractor shall loosely bundle cables with Velcro wraps, suitable for Plenum environments, every twenty (20) feet.

S. The Contractor shall not fasten supports to pipes, ducts, mechanical equipment or conduit.

T. The Contractor shall obtain permission from the Owner or the Technology Designer before drilling or cutting structural members.

U. Powder actuated anchoring devices shall not be used to anchor any cable support or raceway system components.

3.3 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.

3.4 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 uV/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

3.5 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.

3.6 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.

3.7 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).

3.8 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.

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 closets.
    h. Catalog cuts for all the equipment located in the closets 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 closets.
h. Catalog cuts for all the equipment located in the closets.
i. Punchdown blocks, switch equipment, 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 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) Cat. 6 cables.
4) RJ-45 Category 6 Connectors.
5) 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 (EXISTING)

A. Equipment cabinets:

1. All equipment cabinets are existing.

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 Category 6 unshielded twisted pair cabling as indicated on the drawings.
   b. Providing data outlets as indicated on Drawings.
   c. The contractor shall provide an operational data network including wiring and terminations as indicated on the drawings and within this specification.
   d. Refer to Drawing to determine new versus existing equipment.

4. 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

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. 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.

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 cables, communication devices, jack stands for cable reels, or cable wenches.

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. 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.

C. Do not run cable longer than maximum 90 meter EIA/TIA recommended length.

D. Copper splices in the horizontal distribution are prohibited.

E. All cables installed in ceiling spaces shall be plenum-rated.

F. Horizontal voice and data cable pairs will run from each jack to the MDF or IDF and terminate on Category 6 patch panels.

G. 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 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 ad relieve cable stress.

H. 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 cables.

I. Loosely bundle cables with Velcro© ties, suitable for Plenum environments, every twenty feet.

J. 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.

K. 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.

L. 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 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 per formed 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 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

TROY SCHOOL DISTRICT
Bid 9416 Secondary School Renovations
Transportation

	AMR Communications	Digital Age Tech., Inc.	Sound Engineering
Section 16790	NO BID	NO BID	175,874.00
1. Cost to install a 32" CRT TV and 32" CRT TV bracket, patch cables, set top box complete			
2. Cost to provide a classroom control panel including back box. Include cable to two speakers (no speakers), audio cabling to an TV, RF cabling from the corridor to the classroom control panel, telephone cable to the IDF music #1 and music #2 PA wiring and set-top box cable			
Section 16795	39,777.00	19,385.00	NO BID
1. The cost to furnish and install one thru ten data outlets originating in the same wiring closet. Provide category 6 cable, RJ-45 category outlets both ends, terminations both ends and testing. Also to include installation of Category 6 patch cord.			
2. The cost to furnish and install ten or more data outlets originating in the same wiring closet. Provide the Category 6 cable, RJ-45 Category 6 outlets both ends, terminations both ends and testing. Also to include installation of Category 6 patch cord.			
4. The cost per foot for twelve strand multimode fiber installed in 1.25" plenum rated innerduct			
5. The cost to connectorize and test a fiber end with an SC connector.			
6. The cost per foot for 100 pair, 24AWG, twisted pair, plenum cable.			
7. The cost to furnish and install a 4" vertical or horizontal sleeve with fire stop per specs.			
8. The cost to furnish and install a "J"-hook cable support per specs.			
9. The cost per foot to furnish and install center hung 18" cable tray.			
10. Cost to furnish and install a technology cabinet with top fans, power strip, locking door, and rear steel locking door.			
11. Cost to furnish and install one category 6 patch panel.			
			Voluntary Alternates Labor to remove TV (does not include overtime) - $101.00 Price includes testing prior to removal. Labor to reinstall TV - includes new dual arm by Peerless and Testing - $320.00