BID #2019-16R
HVAC UPGRADES
ELI WHITNEY ELEMENTARY SCHOOL

TOWN OF STRATFORD
PURCHASING DEPARTMENT
2725 MAIN STREET
STRATFORD, CT 06615

Date Submitted _____, 2019.

SEALED submissions are subject to the standard instructions set forth on the attached sheets. Any modifications must be specifically accepted by the Town of Stratford.

Bidder:

_____
Doing Business As (Trade Name)

_____
Address

_____
Town / State / Zip

Released: *Wednesday, 10th April, 2019*

Phillip Ryan, Purchasing Agent

_____
Title (Mr /Ms)

_____
Signature

_____
Telephone

_____
E-mail

Sealed bids will be received by the Purchasing Department at the office of the Purchasing Agent, 2725 Main Street, Room 202, Stratford, Connecticut 06615, up to:

11:00AM, Tuesday, 30th April, 2019

NOTE:

1. Bidders are to complete all requested data in the upper right corner of this page and must return this page with their bid proposal.
2. No bid shall be accepted from, or contracts awarded to, any person/company who is in arrears to the Town of Stratford upon debt, or contract or who has been within the prior five (5) years, a defaulter as surety or otherwise upon obligations to the Town of Stratford.
3. Submissions are to be submitted in a sealed envelope and clearly marked "BID #2019-16R" on the outside of the envelope, including all outer packaging, such as, DHL, FedEx, UPS, etc.

REFERENCES
Provide details of most recently performed and completed projects of equal scope:

REFERENCE #1:

Project Location		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

REFERENCE #2:

Project Location		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

REFERENCE #3:

Project Location		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

This page must be fully completed and submitted with your proposal, including accurate contact names and contact details. Prospective bidders may opt to submit own formatted reference sheets with complete project details and contact information.

SUBCONTRACTORS
Provide subcontractor details if any are to be employed as part of this contract, including labor rates:

SUBCONTRACTOR #1:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

SUBCONTRACTOR #2:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

SUBCONTRACTOR #3:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

SUBCONTRACTOR #4:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

NOTE: All sub-contractors are subject to approval by the Town of Stratford and are required to provide Fed ID #.

PURCHASING DEPARTMENT
TOWN OF STRATFORD
INSTRUCTIONS FOR BIDDERS
TERMS AND CONDITIONS OF BID

BID PROPOSALS

Bid proposals are to be submitted in a sealed envelope and clearly marked on the outside "BID #2019-16R" including all outer packaging such as DHL, FedEx, UPS, etc. All prices and notations must be printed in ink or typewritten. No erasures are permitted. Bid proposals are to be in the office of the Purchasing Department, Town Hall, 2725 Main Street, Room 202, Stratford, Connecticut, prior to date and time specified, at which time they will be publicly opened.

RIGHT TO ACCEPT / REJECT

AFTER REVIEW OF ALL FACTORS, TERMS AND CONDITIONS, INCLUDING PRICE, THE TOWN OF STRATFORD RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS, OR ANY PART THEREOF, OR WAIVE DEFECTS IN SAME, OR ACCEPT ANY PROPOSAL DEEMED TO BE IN THE BEST INTEREST OF THE TOWN OF STRATFORD.

POWER OF REJECTION

The Mayor shall have the power to reject all bids and to advertise again.

QUESTIONS

Questions concerning conditions, bidding guidelines and specifications should only be directed in writing to:

Mr. Brian Snyder, Project Architect: brian@snyderarchitects.com

Inquiries must reference date of bid opening, requisition or contract number, and must be received no later than as indicated in the bid documents prior to date of bid opening. Failure to comply with these conditions will result in the bidder waiving the right to dispute the bid specifications and conditions.

PRICES

Prices quoted must be firm, for acceptance by the Town of Stratford, for a period of ninety (90) days. Prices shall include all applicable duties. Bidders shall be required to deliver awarded items at prices quoted in their original bid.

F.O.B. DESTINATION

Prices quoted shall be net, delivered to destination. Bids quoting other than F.O.B. Destination may be rejected.

BID BOND

The BID BOND furnished, as bid security, must be duly executed by the bidder as principal. It must be in the amount equal to five percent (5%) of the total estimated bid, as guarantee that, in case the contract is awarded to the bidder, the bidder will, within ten days thereafter, execute such contract and furnish a Performance Bond and Payment Bond.

Small businesses may elect to obtain an irrevocable letter of credit or cashier's check in lieu of the Bid Bond. Such surety must also be in an amount equal to at least five percent (5%) of the total estimated bid.

All bid bonds shall be written by a surety company or companies licensed in the State of Connecticut, and shall have at least an A-VII policy holders rating, as reported by A.M. Best Rating Services, or otherwise deemed acceptable by the Town. The Town always reserves the right to reject surety companies, if an approved surety bond cannot be provided, the bidder shall be deemed non-responsive.

A complete list of certified surety companies can be accessed on the U.S. Government Department of Treasury website: https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm

NOTE: Failure to provide a Bid Bond or equivalent security is not cause for a waiver defect. Any bid not accompanied by such security will be excluded from consideration.

PERFORMANCE AND LABOR AND MATERIAL BOND

The successful bidder, within seven (7) business days after notification of award, will be required to furnish Performance and Labor and Material Bond provided by a company authorized to issue such bonds in the State of Connecticut, or Certified Check or properly executed Irrevocable Letter of Credit equal to a hundred per cent (100%) of the award.

In the event that the Contractor where required to provide evidence of insurance and a performance bond does not do so before beginning work, the Town of Stratford reserves the right to withhold payment from such supplier until the evidence of insurance and performance bond has been received by the Town.

All payment and performance bonds shall be written by a surety company or companies licensed to issue bonds in the State of Connecticut, and shall have at least an A-VIII policy holders rating, as reported by A.M. Best Rating Services, or otherwise deemed acceptable by the Town. The Town always reserves the right to reject surety companies, if approved surety bonds cannot be provided the contract shall be terminated.

A complete list of certified surety companies can be accessed on the U.S. Government Department of Treasury website: https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm

BOND REQUIREMENT – NON-RESIDENT CONTRACTORS

1. Non-resident contractors are required to deposit with the Department of Revenue Services a sum equivalent to 5% of the total contract value, as assurance that personal property taxes and/or any other State taxes assessed and due the State during the contract will be paid.
2. If this surety is not deposited with the State, the Town is required to deduct and submit to the State 5% of the total contract value.

PERMITS

The contractor shall be responsible for securing all necessary permits, state and local, and as required by the Town of Stratford.

PAYMENT PROCEDURES

No voucher, claim or charge against the Town shall be paid without the approval of the Director of Finance for correctness and legality.

PAYMENT PERIOD

The Town of Stratford shall put forth its best effort to make payment within thirty days (30) after delivery of the item acceptance of the work, or receipt of a properly completed invoice, whichever is later. Payment period shall be net thirty days (30) unless otherwise specified. For projects that do not require a performance or bid bond, The Town of Stratford reserves the right to retain five percent (5%) of total bid amount, which is payable ninety (90) days after final payment or acceptance of the work.

THE CONTRACTOR

The Contractor for the work described shall be thoroughly familiar with the requirements of all specifications, and the actual physical conditions of various job sites. The submission of a proposal shall be construed as evidence that the Contractor has examined the actual job conditions, requirements, and specifications. Any claim for labor, equipment, or materials required, or difficulties encountered which could have been foreseen had such an examination been carefully made will not be recognized.

ASSIGNMENT OF CONTRACT

No contract may be assigned or transferred without the consent of the Town of Stratford.

AWARD OF BIDS

Contracts and purchases will be made or entered into with the lowest responsible bidder meeting specifications, except as otherwise specified in the invitation. If more than one item is specified in the invitation, the Town of Stratford reserves the right to determine the low bidder on an individual basis or on the basis of all items included in the Invitation for Bids, unless otherwise expressed by the Town.

BIDDING FOR PUBLIC WORK OR IMPROVEMENT

Any public work or improvement costing more than seven thousand five hundred ($7,500.00) dollars shall be executed by contract except where specified work or improvement is authorized by the council based on detailed estimates submitted by the department authorized to execute such work or improvement.

All contracts for more than seven thousand five hundred ($7,500.00) dollars, shall be awarded to the lowest responsible bidder, after public advertisement and competition, as may be prescribed by ordinance.

The Mayor shall establish reasonable regulations for prefiling sub bids on construction contracts where it is anticipated that the contracting party shall subcontract all or a portion of the work to be done.

Any public work or improvement costing more than $7,500 shall be executed by contract except where specified work or improvement is authorized by the Council based on detailed estimates submitted by the Department authorized to execute such work or improvement. All contracts under this section shall be awarded by the Town Council to the lowest responsible bidder, after public advertisement as specified above.

NONUSE OF WASTES

A. All bids and contracts related to the retention of services to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford shall include a provision stating that no materials containing natural gas or oil waste shall be utilized in providing such a service.

B. All bids and contracts related to the purchase or acquisition of materials to be used to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford shall include a provision stating that no materials containing natural gas or oil waste shall be provided to the Town of Stratford.

C. The following statement, which shall be a sworn statement under penalty of perjury, shall be included in all bids related to the purchase or acquisition of materials to be used to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford and all bids related to the retention of services to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford:

   "We ____ hereby submit a bid for materials, equipment and/or labor for the Town of Stratford. The bid is for bid documents titled ____. We hereby certify under penalty of perjury that no natural gas waste or oil waste will be used by the undersigned bidder or any contractor, subcontractor, agent or vendor agent in connection with the bid; nor will the undersigned bidder or any subcontractor, agent or vendor agent thereof apply any natural gas waste or oil waste to any road or real property within the Town of Stratford as a result of the submittal of this bid if selected."

CHANGE ORDERS

Approval Required: Except as specified herein, when any public work or improvement has been executed by contract, no changes in the terms, conditions or scope of said contract nor deviations from the specifications made a part of that contract which would result in any way in an increase in the cost of that contract to the Town shall be allowed except by the approval of the Council.

Review: Any request for change orders shall first be considered by an appropriate committee appointed and then referred to the Council for appropriate action.

Mayor's Approval: Notwithstanding any provision to the contrary herein, the Mayor, acting upon the advice of the Town Engineer, shall have the authority to approve any such changes or deviations without the approval of the Council, provided that the cost of any such changes or deviations does not exceed the sum of $5,000, and further provided that, in the opinion of the Mayor, due to extraordinary conditions, unforeseen contingencies, market conditions or the nature of the requested change, it would not be feasible or in the best interest of the Town to delay approval of the requested change.

GUARANTEE

Equipment, materials and/or work executed shall be guaranteed for a minimum period of one (1) year against defective material and workmanship. The cost of all labor, materials, shipping charges and other expenses in conjunction with the replacement of defective equipment, and/or unsatisfactory work, shall be borne by the Contractor.

CATALOGUE REFERENCE

Unless expressly stated otherwise, any and all reference to commercial types, sales, trade names and catalogues are intended to be descriptive only and not restrictive; the intent is to indicate the kind and quality of the articles that will be acceptable. Bids on other equivalent makes, or with reference to other catalogue items will be considered. The bidder is to clearly state exactly what will be furnished. Where possible and feasible, submit an illustration, descriptive material, and/or product sample.

OSHA

The bidder will certify all equipment complies with all regulations and conditions stipulated under the Williams-Steiger Occupational Safety and Health Act of 1971, as amended. The successful bidder will further certify that all items furnished under this project will conform and comply with Federal and State of Connecticut OSHA standards. The successful bidder will agree to indemnify and hold harmless the Town of Stratford for any and all damages that may be assessed against the Town.

LIFE CYCLE COSTING

Where applicable, Life Cycle Costing will be used as a criterion for awarding bids. This is a method of calculating total cost of ownership of an item over the life of the product, which may include operation and maintenance expenses, transportation, salvage value, and/or disposal costs.

INSURANCE

The Contractor shall not commence any work under the Contract until all insurance required by this section has been obtained and Certificates of Insurance and any other evidence of required coverage requested by the Town, including a copy of the policy itself, have been received and approved by the Town.

Such policies shall stipulate that no coverage can be changed or canceled, including for non-payment of premium, unless the Town has had thirty (30) days prior notice in writing. Certificates of renewals or changes in policies shall be delivered to the Owner at least thirty (30) days prior to the expiration of the policy.

All insurance issuers chosen by the Contractor must be licensed to do business in the State of Connecticut and rated A- or better by A.M. Best Rating Services.

The Town always reserves the right to reject insurance companies, if approved insurance policies cannot be provided the contract shall be terminated.

The insurance requirements set forth below are minimum limits of coverage only and in no way limit the Contractor's liability.

The following insurance is required to be maintained in full force until all work required by the contract has been fully completed, except that Products/Completed Operations coverage shall be maintained for five (5) years.

Worker's Compensation Insurance: The Contractor shall carry Worker's Compensation and Employer's Liability Insurance in the form and in such amounts as may be currently required to comply with the Labor Laws of the State of Connecticut.

Automobile Insurance: The Contractor shall carry and maintain during the life of the Contract a policy with a combined single limit of $2,000,000 and rider CA9948 or equivalent.

This policy shall include all liability of the Contractor arising from the operation of all self-owned motor vehicles used in the performance of the Contract; and shall also include a "non-Ownership" provision covering the operation of motor vehicles not owned by the Contractor, but used in the performance of the work.

INSURANCE (continued)
Commercial General Liability:

- Bodily Injury and Property Damage $2,000,000
- Products/Completed Operations $2,000,000

This policy shall include Subcontractor's Liability coverage, protecting the Contractor and the Town against liability arising out of the activities of Subcontractors engaged by him in the performance of the work.

Umbrella Policy: An umbrella policy in the amount of $5,000,000, covering general liability, auto liability, and employer liability is required.

Pollution Liability Insurance: Where applicable, a policy in the amount of $5,000,000 including coverage for transport and other offsite risks. Such policy must be given to the Town for review and determination of acceptability before an award will be made.

Waiver of Subrogation: Waiver of subrogation is required on all policies.

Additional Insureds: The Town of Stratford, Stratford Board of Education, its officers, officials, employees, agents, Boards, and Commissions shall be named as Additional Insureds. The coverage shall be primary and non-contributory and contain no special limitations on the scope of protection afforded to the Town of Stratford. A waiver of subrogation applies under general liability, auto liability and workers compensation.

The coverage shall be primary and non-contributory and contain no special limitations on the scope of protection afforded to the Town of Stratford. A waiver of subrogation applies under general liability, auto liability and workers compensation.

Subcontractor's Insurance: Each Subcontractor engaged by the Contractor to perform any work under the Contract shall obtain all insurance required of the Contractor in the same amounts and subject to the same provisions specified above for the Contractor, including the Additional Insured requirement. Certificates of Insurance shall be submitted to the Contractor and the Town and approved by the Town, before commencing any work.

HOLD HARMLESS
Contractor shall defend, indemnify, and hold harmless the Town of Stratford, its officers, employees, agents or volunteers, from and against any and all claims and demands of any nature for any loss, damage or injury which any person may suffer by reason of, or in any way arising out of, this Agreement, unless caused by the sole negligence of the Town.

FEDERAL, STATE, AND LOCAL LAWS
All applicable Federal, State and local laws, rules and regulations of all authorities having jurisdiction over the locality of the project shall apply to the contract and are deemed to be included herein**.** If the total amount of the project, including any current or future change orders, exceeds $100,000.00 all work is to be done in accordance with Connecticut Department of Labor (CT-DOL) rules and regulations. More information may be obtained from: www.ctdol.state.ct.us

The Davis-Bacon and Related Acts, shall apply to contractors and subcontractors performing on federally funded or assisted contracts in excess of $2,000 for the construction, alteration, or repair (including painting and decorating) of public buildings or public works. More information may be obtained from: https://www.dol.gov/whd/govcontracts/dbra.htm

NOTE: The Town shall apply the most current wage decision applicable at the time of contract award.

CONFLICT OF INTEREST
No officer or employee or member of any elective or appointive board, commission, committee or council of the Town, whether temporary or permanent, shall have or acquire any financial interest gained from a successful bid, direct or indirect, in any project, matter, contract or business within his/her jurisdiction or the jurisdiction of the board, commission, committee or council of which he/she is a member. Nor shall the officer / employee / member have any financial interest, direct or indirect, in any contract or proposed contract for materials or services to be furnished or used in connection with any project, matter or thing which comes under his/her jurisdiction or the jurisdiction of the board, commission, committee or council of which he/she is a member.

SCOPE OF WORK / SITE INSPECTIONS

The bidder declares that the scope of the work has been thoroughly reviewed and any questions resolved (see above for name and number of individual to contact for questions). If applicable, the bidder further declares that the site has been inspected as called for in the specifications (q.v.).

EXCEPTION TO SPECIFICATIONS

No protest regarding the validity or appropriateness of the specifications or of the Invitation for Bids will be considered, unless the protest is filed in writing with the Purchasing Agent prior to the closing date for the bids. All bid proposals rendered shall be considered meeting the attached specifications unless exceptions are noted on a separate page dated and signed by the bidder.

UNLESS OTHERWISE NOTED

It will be assumed that all terms and conditions and specifications will be complied with and will be considered as part of the Bid Proposal.

TAX EXEMPT

Federal Tax Exemption 06-6002103.
Exempt from State Sales Tax under State General Statues Chapter 219-Section 12-412 Subsection A.

ADDENDUM #2

TOWN OF STRATFORD

HVAC Upgrades:
Eli Whitney Elementary School

1130 Huntington Road
Stratford, CT 06614

TOWN PROJECT NUMBER: 2019-016-R

ISSUED: 4/10/2019

PROJECT TEAM

Architect / Project Manager

SNYDER ARCHITECTS, LLC
Architecture . Planning . Construction Management
Trumbull, CT 203-243-3346
info@snyderarchitects.com

MEP Engineer

AKF Group
MEP Engineering
New Haven, CT 203-323-4333
akfct@akfgroup.com

The work shall be carried out in accordance with the following supplemental instructions and in accordance with the Contract Documents.

PROJECT MANUAL CHANGES

1. **Invitation To Bid**

   Project is being rebid. The following changes apply:

   - New Bid Opening Date: **Tuesday, April 30, 2019, 11:00am.**
   - Site Meeting:

     By appointment only. Contact Brian Snyder at brian@snyderarchitects.com if needed.
   - Send RFI's to brian@snyderarchitects.com
   - RFI's will not be accepted after **12:00pm, Thursday, 4/25/2019.**

2. **Bid Form**

   See attached revised Bid Form.

DRAWING CHANGES

1. **M-300, M-401, M-402, M-403, M-404**

   See attached revised drawings.

***** END OF ADDENDUM #2 *****

BID FORM

Bids must be submitted to the Town of Stratford Purchasing Office, attention Phillip Ryan, Purchasing Agent, on the following form signed by an authorized company officer. Bids will be opened on **Tuesday, April 30, 2019, 11:00am.**

Phillip Ryan, Purchasing Agent
Town of Stratford
2725 Main Street
Stratford, CT 06615

HVAC Upgrades:
Eli Whitney Elementary School
1130 Huntington Road
Stratford, CT 06614

To Whom It May Concern:

(I, We) _____ the undersigned having visited the project site at **Eli Whitney Elementary School** and having familiarized ourselves with the local conditions affecting the cost of the work and with Contract Documents and all addenda thereto, hereby propose to furnish all labor, materials, tools, equipment, insurance to pay all applicable taxes, and to do and perform all things as provided in the drawings and specifications for the following sum(s):

BASE BID:

Refer to enclosed drawings and specifications.

Contractor shall include all monies and fees to complete documented HVAC upgrades as indicated in bid documents. Contractor shall include a $5,000 allowance in base bid number for unforeseen conditions and changes to be used at Architect and Owners discretion. Any unused portion of allowance shall be credited back to owner.

*Written Form: _____

*Dollars: ($_____)

***PLEASE NOTE THAT STATE OF CONNECTICUT PREVAILING WAGES MUST BE USED IF TOTAL BID EXCEEDS $100,000.**

ADD ALTERNATE #1: HV-2 REPLACEMENT:

All work and materials necessary to remove and replace existing HV-2 unit as documented in construction documents.

*Written Form: _____

*Dollars: ($_____)

***Please note the ADDITIONAL COST ONLY**, not the basebid plus additional costs in Alternate bid numbers.

ADDENDA

In submitting this proposal, I have received and included in this Proposal, the following Addenda:

Addendum No.	Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Signed: _____ _____

Signature Corporate Seal

Company Name : _____

Address : _____

City, St, Zip Code : _____

Phone : (__ __ __) - __ __ __ - __ __ __ __

Fax : (__ __ __) - __ __ __ - __ __ __ __

SPLIT AIR COOLED CONDITIONING UNIT SCHEDULE

AIR HANDLING UNIT No.	LOCATION	SERVICE	TOTAL COOLING (MBH)	SENSIBLE COOLING (MBH)	EVAPORATOR COIL CONDITIONS			SUPPLY FAN			ELECTRICAL DATA			AHU MCA	AHU OPER. WEIGHT (LBS)	UNIT DIMENSIONS			MANUF. MODEL #	CONDENSING UNIT No.	CONDENSING UNIT								COND. WEIGHT (LBS)	UNIT DIMENSIONS			MANUF. MODEL #	REMARKS
					CFM	ENT. AIR DB/WB (°F)	LVG. AIR DB/WB (°F)	EXT. SP (IN. W.G.)	MOTOR W	RPM	VOLTS	PHASE	HZ			LENGTH (FT–IN)	WIDTH (FT–IN)	HEIGHT (FT–IN)			COMPRESSOR			EXT. SP (IN. W.G.)	ELECTRICAL DATA			COMPRESSOR MCA / MOCP		LENGTH (FT–IN)	WIDTH (FT–IN)	HEIGHT (FT–IN)		
																				QUANTITY	TYPE	LRA/RLA (EA.)		VOLTS	PHASE	HZ							
FCU–1	ATTIC	LOUNGE	40.5	31.6	1377	74	55	0.8	350	–	208	1	60	3.4	102	55–1/8	24–13/16	9–5/8	DAIKIN FBQ42PVJU	ACCU–1	1	–	–	–	208	1	60	27 / 30	283	35–7/16	13–9/16	52–15/16	DAIKIN RZR42PVJU8	SEE NOTES

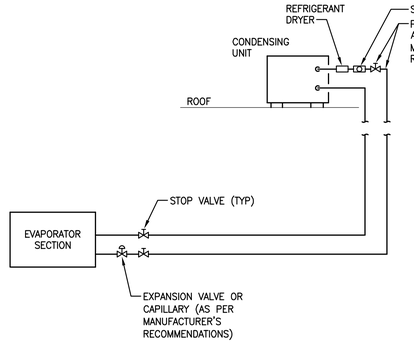
NOTES:
1. PROVIDE MERV 7 FILTER.
2. PROVIDE STAINLESS STEEL DRAIN PAN.
3. REFRIGERANT PIPING SHALL BE SIZED BASED ON MANUFACTURERS RECOMMENDATIONS.
4. PROVIDE DISCONNECT SWITCH BY ELECTRICAL CONTRACTOR.
5. BUILT–IN CONDENSATE PUMP.

ROOFTOP UNIT SCHEDULE

UNIT No.	LOCATION	SUPPLY FAN DATA						RETUR/ SPILL FAN DATA						HEATING DATA											UNIT ELECTRICAL DATA					UNIT DIMENSIONS					
														HOT WATER COIL DATA																					
		CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	WHEEL DIAMETER	CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	DRIVE TYPE	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	No. OF COILS	P.D. (FT)	TOTAL MBH	EAT (°F)	LAT (°F)	EPI	No. OF ROWS	FACE VELOCITY (FPM)	MAXIMUM AIR P.D. (IN. W.G.)	VOLTS	PHASE	HZ	MCA	MOCP	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	OPERATING WT. (LBS)	MANUF. MODEL #	REMARKS
HV–1	ROOF	7100	2	–	6.5	7.5	16"	7200	0.75	–	2.3	(2) 4	DIRECT	180	138.3	13	1	2	271	46	81	11	1	566	0.22	208	3	60	45.4	60	162.3	76.5	70.5	3128	DAIKIN DAHA15A	SEE NOTES
HV–2	ROOF	6125	2	–	5.1	7.5	16"	7200	0.75	–	2.3	(2) 4	DIRECT	180	138.7	11.3	1	1.6	233.6	46	81	10	1	488	0.16	208	3	60	45.4	60	162.3	76.5	70.5	3128	DAIKIN DAHA15A	ADD– ALTERNATE #1, SEE NOTES

NOTES:
1. PROVIDE MERV 8 FILTER FOR UNIT OUTSIDE AIR INTAKE.
2. PROVIDE DISCONNECT SWITCH BY ELECTRICAL CONTRACTOR.
3. PROVIDE WITH BURGLAR BARS AND LIGHTS.
4. ~~MANUFACTURED–PROVIDED ROOF CURB.~~ (2)
5. PROVIDE WITH BACNET/MSTP
6. PROVIDE WITH 3–WAY CONTROL VALVE.

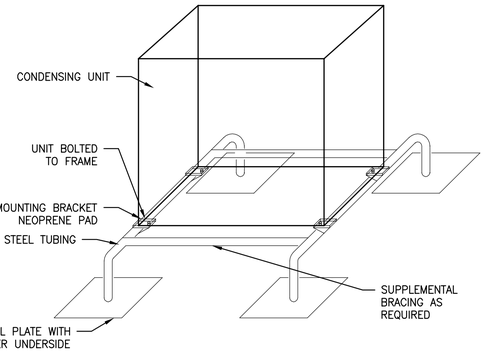
(1) (2)



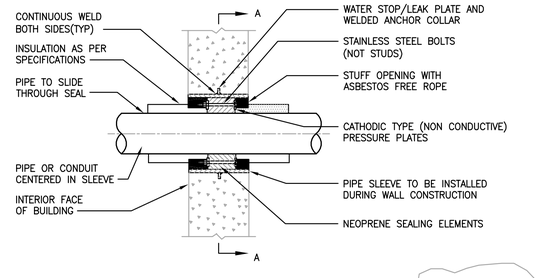
NOTES:

1. CONTRACTOR SHALL SIZE PIPING AS PER MANUFACTURER'S RECOMMENDATIONS FOR ACTUAL INSTALLED LENGTH AND ELEVATION DIFFERENCE BETWEEN CONDENSER AND EVAPORATOR. PROVIDE EXTRA OIL AS REQUIRED.

TYPICAL REFRIGERANT PIPING DETAIL



ROOF MOUNTED CONDENSING UNIT

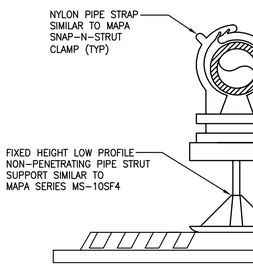


NOTES:

1. WHEN SEALING FLOOR PENETRATIONS, EXTEND SLEEVE 3" ABOVE FINISHED FLOOR.
2. WHEN CORE DRILL IS USED THE PIPE SLEEVE AND WATER STOP/LEAK PLATE ARE NOT REQUIRED.

SECTION A–A

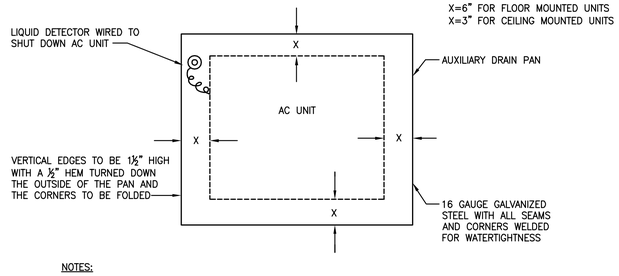
EXTERIOR WALL PIPE PENETRATION SEAL ASSEMBLY



NOTE:

1. USE FOR REFRIGERANT PIPING 3" OR SMALLER MAXIMUM SPACING 8'
2. REFRIGERANT PIPE SUPPORTS MUST COMPLY WITH MSS SP–58–2002

REFRIGERANT ROOFTOP PIPING SUPPORT

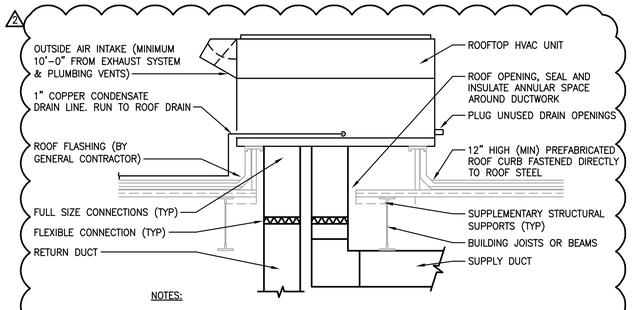


NOTES:

1. FOR CEILING INSTALLATIONS, SUPPORT AC UNIT AND DRAIN PAN INDEPENDENTLY FROM STRUCTURE OVERHEAD.
2. PITCH DRAIN PAN TO LIQUID DETECTOR. PROVIDE ¾" PLUGGED DRAIN AT LOW POINT.
3. PROVIDE AUXILIARY CONTACT ON LIQUID DETECTOR FOR INTERFACE WITH THE BUILDING MANAGEMENT SYSTEM WHEN SPECIFIED.
4. EXTEND PAN FOR CONTROL VALVE ASSEMBLY AND CONDENSATE PUMP.

AUXILIARY DRAIN PAN FOR AC UNITS

(2)



NOTES:

1. CONTRACTOR SHALL FURNISH AND INSTALL ALL ROOF CURBS.
2. CONTRACTOR SHALL PROVIDE ALL ROOF OPENINGS. CONTRACTOR SHALL PERFORM ALL WORK REQUIRED TO PROVIDE ROOF OPENINGS.
3. CONTRACTOR SHALL FURNISH, INSTALL AND/OR PAY FOR ALL SUPPLEMENTARY STRUCTURAL SUPPORTS REQUIRED TO FURNISH AND INSTALLED ROOF MOUNTED EQUIPMENT.
4. CONTRACTOR TO RUN CONDENSATE DRAIN LINE TO NEAREST ROOF DRAIN WITH PIPE SUPPORTS. PITCH PIPE FOR PROPER DRAINAGE.
5. FASTEN ROOFTOP UNIT TO ROOF CURB TO WITHSTAND WIND LOADS.
6. CONTRACTOR SHALL COORDINATE AND RETAIN THE BUILDING APPROVED ROOF CONTRACTOR TO MAINTAIN INTEGRITY OF ROOF AND WARRANTY.

ROOFTOP A.C. UNIT INSTALLATION

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID
03/14/2019	(1) ADDENDUM #1
04/10/2019	(2) ADDENDUM #2

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Drawing Title

MECHANICAL SCHEDULES AND DETAILS

Issued	Drawing No.
03/05/2019	M-300
Scale NTS	
Job No. 183171–000	

2) TYPE D–3: MINIMUM 6 LB FIBERGLASS BOARD. MAXIMUM 0.22 K–FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY APPLIED ALL PURPOSE OR ALL SERVICE FACING. SIMILAR TO MANVILLE 817 SPIN–GLAS AP.

D. INSTALLATION:

1) FIBERGLASS BLANKET: 2 INCH LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS OVER 24 INCH WIDE WITH MIN. 2 ROWS OF WELD PINS 12 INCH ON CENTER. SECURE ALL SEAMS WITH FOIL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE.

2) FIBERGLASS BOARD: SEAL JOINTS AND BREAKS IN FACING WITH 3 INCH WIDE TAPE TO MATCH FACING AND ADHERE WITH VAPOR SEAL ADHESIVE. APPLY 5 INCH WIDE TAPE AT CORNERS, WELD PINS ON TOP, SIDES AND BOTTOM.

12. PIPING INSULATION

A. INSULATE ALL PIPING IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED.

INSULATION SCHEDULE – PIPING:

REFRIGERANT LIQUID & SUCTION LINES (ALL): 1 INCH THICK, P–6 MATERIAL, VAPORSEAL FINISH.

COLD CONDENSATE, EQUIPMENT DRAINS BELOW 60 DEG F (ALL): 1 INCH THICK, P–1 MATERIAL, VAPORSEAL FINISH.

B. PIPING, VALVES AND FITTINGS TO BE INSULATED:

1) LOW TEMPERATURE PIPING SYSTEMS – 40 TO 100 DEG F INCLUDING:

A. CONDENSATE DRAIN PIPING.

2) LOW TEMPERATURE HOT PIPING SYSTEMS – 100 TO 250 DEG F INCLUDING:

A. LOW TEMPERATURE HOT WATER SUPPLY AND RETURN.

C. MATERIAL:

1) TYPE P–1: MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.23 K–FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY–APPLIED FIRE–RETARDANT FOIL–SKRIM–KRAFT FACING. ALL SERVICE JACKET. SIMILAR TO OWENS–CORNING 650 ASJ.

2) TYPE P–6: MINIMUM 6 LB MOLDED FOAMED PLASTIC. MAXIMUM 0.27 K–FACTOR AT 75 DEG F MEAN TEMPERATURE. MAXIMUM 0.17 PERMEANCE. SIMILAR TO ARMSTRONG ARMAFLEX II.

D. FINISH:

1) TYPE F–1: FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON.

2) TYPE F–2: WHITE VAPOR BARRIER COATING WITH 10X10 OR 20X20 MESH WHITE GLASS, POLYESTER OR NYLON CLOTH REINFORCING MEMBRANE, MINIMUM 31 MIL DRY FILM THICKNESS, SIMILAR TO FOSTER TITE–FIT, UL LABEL.

3) TYPE F–4: ALUMINUM JACKETING WITH MINIMUM 0.016 INCH WALL THICKNESS AND LONGITUDINAL JOINTS WITH LOCK SEAMS.

4) TYPE F–6: WHITE FINISHING AND INSULATING CEMENT APPLIED OVER HEXAGONAL WIRE MESH. CEMENT SIMILAR TO KEENE SUPERSLICK.

E. INSTALLATION:

1) BEFORE APPLYING INSULATION ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED.

2) ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PROVIDE 2 INCH LAMP STRIPS AT ALL SEAMS SECURED WITH ADHESIVE. USE VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE WHERE REQUIRED. STAPLES NOT PERMITTED. REFRIGERANT PIPING INSULATION SHALL HAVE MITERED FITTINGS.

3) ALL INSULATION AND VAPOR BARRIERS SHALL BE CONTINUOUS PASSING THROUGH SLEEVES, HANGERS, ETC., OR OTHER OPENINGS. PROVIDE SADDLES OR SHIELDS FOR PROTECTION.

4) INSULATION FOR STRAINERS OR OTHER FITTINGS OR ACCESSORIES REQUIRING SERVICING OR INSPECTION SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE.

13. PIPING – GENERAL REQUIREMENTS

A. COMPLETE WITH: PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, HANGERS, SUPPORTS, GUIDE, SLEEVES, AND ACCESSORIES.

B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS:

1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).

2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM).

3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).

4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSS).

C. COPPER TUBE BRAZING

1) ALL BRAZING SHALL BE DONE IN ACCORDANCE WITH ALL CODES APPLICABLE TO THE PARTICULAR SERVICE. BRAZING FILLER METALS: AWS A5.8, BCUP SERIES, COPPER–PHOSPHORUS ALLOYS FOR JOINING COPPER WITH COPPER; OR BAG–1, SILVER ALLOY FOR JOINING COPPER WITH BRONZE OR STEEL.

2) QUALIFY PROCESS AND OPERATORS IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE, SECTION IX, ?WELDING AND BRAZING QUALIFICATIONS?.

3) BRAZERS SHALL BE QUALIFIED FOR ALL REQUIRED TUBE SIZES, MATERIAL, WALL THICKNESS, AND POSITION IN ACCORDANCE WITH THE AMERICAN SOCIETY OF MECHANICAL ENGINEERING (ASME), SECTION IX, BOILER AND PRESSURE VESSEL CODE.

A. COPIES OF THE CERTIFIED BRAZER QUALIFICATION REPORTS SHALL BE MAINTAINED BY THE RESPONSIBLE BRAZING AGENCY AND THE COMPANY PERFORMING THE BRAZING, AND SHALL BE SUBMITTED TO THE OWNER AND/OR ENGINEER UPON REQUEST.

B. ALL DEFECTIVE BRAZEMENTS SHALL BE CHIPPED OUT AND REPAIRED AT NO COST TO THE OWNER, BASED ON PROCEDURE TO BE SPECIFIED AT THE TIME.

D. GASKETS

1) PIPE–FLANGE GASKET MATERIALS: SUITABLE FOR CHEMICAL AND THERMAL CONDITIONS OF PIPING SYSTEM CONTENTS. ASME B16.21, NONMETALLIC, FLAT, ASBESTOS–FREE, 1/8–INCH MAXIMUM THICKNESS UNLESS THICKNESS OR SPECIFIC MATERIAL IS INDICATED.

E. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PSI OR 150% OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.1 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST.

F. EXPANSION COMPENSATION:

1) ALL PIPING SHALL BE INSTALLED TO COMPENSATE FOR EXPANSION TO PROTECT THE BUILDING, EQUIPMENT AND PIPING SYSTEMS. PROVIDE ALL GUIDES, ANCHORS, EXPANSION LOOPS, SUPPLEMENTAL STEEL AND APPROVED TYPE EXPANSION JOINTS AS INDICATED OR REQUIRED FOR CONTROL OF EXPANSION.

G. SYSTEM FILLING:

1) SYSTEMS OR PORTIONS OF SYSTEMS TO BE TESTED SHALL HAVE PROVISIONS FOR FILLING, VENTING (AIR REMOVAL), DRAINAGE AND TEST PRESSURE CONNECTION.

2) LIQUID USED FOR TESTING SHALL BE CLEAN CITY WATER MIXED WITH CHEMICALS SPECIFIED BY THE BASE BUILDING WATER TREATMENT CONTRACTOR. THE HVAC CONTRACTOR SHALL HIRE THE SERVICES OF THE BUILDING WATER TREATMENT CONTRACTOR AND PROVIDE ALL REQUIRED LABOR. PROVIDE TEMPORARY METERING AND MIXING DEVICES AS REQUIRED. THE HVAC CONTRACTOR SHALL OBTAIN ALL REQUIREMENTS FROM THE BUILDING MANAGEMENT.

H. FLUSHING AND CLEANING AND TREATMENT:

1) AFTER COMPLETION OF HYDROSTATIC TESTS AND EMPTYING, PROVIDE LABOR FOR INITIAL FLUSHING, CLEANING, AND PASSIVATING IN ACCORDANCE WITH THE OWNER?S WATER TREATMENT SPECIFICATION. THE HVAC CONTRACTOR SHALL HIRE THE SERVICES OF THE BASE BUILDING WATER TREATMENT CONTRACTOR AND PROVIDE ALL LABOR. COORDINATE WITH THE OWNER?S WATER TREATMENT COMPANY AND PROVIDE ALL SPECIFICATION REQUIREMENTS AND REQUIRED LABOR. COORDINATE ALL REQUIREMENTS WITH BASE BUILDING MANAGEMENT FOR BASE BUILDING VENDOR.

A. PROVIDE ONE YEAR?S SUPPLY OF NECESSARY WATER TREATMENT CHEMICALS FOR NEW SYSTEM TO THE OWNER OR TENANT INCLUDING THE FOLLOWING:

B. CLOSED SYSTEM TREATMENT (HOT WATER). PROVIDE AGENTS TO REDUCE SCALE DEPOSITS, TO ADJUST PH AND TO INHIBIT CORROSION. TREATMENT SHALL NOT CONTAIN ANY CHROMATE?S OR OTHER TOXIC SUBSTANCES. USE PROPER CHEMISTRY TO PROVIDE BACTERIA COUNTS BELOW 103 COLONIES PER MILLILITER (AEROBIC & NON AEROBIC). PH LEVELS TO BE BETWEEN 7.0 AND 9.0. CORROSION RATE TO BE LESS THAN 1/2 MILS/YEAR STEEL, 1/10 MILS/YEAR COPPER.

I. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED.

J. DRAIN DOWN FOR NEW PIPING CONNECTION INTO EXISTING:

1) CONTRACTOR TO OBTAIN SCHEDULE AND COORDINATE WITH BUILDING MANAGEMENT FOR SYSTEM DRAIN DOWN AND CONNECTION INTO EXISTING BUILDING PIPING. ALL COSTS ASSOCIATED WITH DRAIN DOWN ARE TO BE INCLUDED AS PART OF BID.

K. ALL INSTRUMENTATION (PRESSURE GAUGES AND THERMOMETERS) SHALL BE RUGGED WITH THE SAME PRESSURE AND TEMPERATURE AS PIPING SYSTEM AND RATED SPECIFICALLY FOR THE SAME SERVICE AS THE PIPING. PRESSURE GAUGES ARE TO BE LIQUID FILLED WITH 1% ACCURACY. SELECT GAUGES AND THERMOMETERS SO THAT THE MID–POINT IS AT THE WORKING PRESSURE AND TEMPERATURE. INSTRUMENTS TO BE MANUFACTURED BY WEISS INSTRUMENTS OR APPROVED EQUAL.

1) PROVIDE THERMOMETERS IN PIPING AS INDICATED ON THE DRAWINGS AND AT THE INLET AND OUTLET OF EACH HYDRONIC COIL, HEAT EXCHANGER AND PIECE OF EQUIPMENT THAT INVOLVES A DIFFERENTIAL TEMPERATURE. THERMOMETERS TO BE ORGANIC LIQUID FILLED.

2) PROVIDE PRESSURE GAUGES IN PIPING AS INDICATED ON THE DRAWINGS AND AT SUCTION AND DISCHARGE OF EACH PUMP AND AT INLETS AND OUTLETS OF EACH HYDRONIC COIL, HEAT EXCHANGER AND PIECE OF EQUIPMENT THAT INVOLVES A DIFFERENTIAL PRESSURE.

A. ACCESSORY STEEL.

14. REFRIGERANT SYSTEMS

A. PROVIDE ALL REFRIGERANT PIPING REQUIRED FOR A COMPLETE REFRIGERATION SYSTEM, WITH ALL VALVES, FITTINGS AND SPECIALTIES NECESSARY FOR SATISFACTORY OPERATION IN ACCORDANCE WITH ASHRAE STANDARD 15–LATEST EDITION AND ALL AUTHORITIES HAVING JURISDICTION. REFRIGERATION SYSTEM SHALL INCLUDE ALL REQUIRED ITEMS FOR CHARGING, DRAINING AND PURGING THE SYSTEM.

B. REFRIGERANT PIPING SHALL BE HARD COOPER, TYPE L OR ACR, ASTM B88 OR ASTM B 280, BRAZED.

C. JOINTS IN REFRIGERATION PIPING SHALL BE BRAZED.

D. REFRIGERANT PIPING SHALL BE OF THE SIZE AND NUMBER OF PIPES RECOMMENDED BY THE MANUFACTURER AND AS APPROVED BY THE ENGINEER.

E. HORIZONTAL PIPING OF THE COMPRESSOR SUCTION AND DISCHARGE LINES AND THE CONDENSER DISCHARGE LINES SHALL BE PITCHED A MINIMUM OF 1/2 INCH IN 10 FEET, IN THE DIRECTION OF REFRIGERANT FLOW. EACH SUCTION GAS VERTICAL RISER SHALL BE TRAPPED AT ITS EVAPORATOR WITH A TRAP AS RECOMMENDED BY THE COMPRESSOR MANUFACTURER.

F. INSTALL REFRIGERANT PIPING TO PREVENT EXCESSIVE OIL FROM BEING TRAPPED IN THE SYSTEM. ANY ADDITIONAL RISERS OR EQUALIZER LINES REQUIRED BY THE MANUFACTURER OF EQUIPMENT FOR THE PROPER SYSTEM OPERATION SHALL BE INSTALLED AS PART OF THIS CONTRACT. PROVIDE A FULLY PIPED OIL SEPARATOR FOR EACH REFRIGERANT SYSTEM AS PER MANUFACTURER'S RECOMMENDATIONS.

G. VALVES SHALL BE DESIGNED FOR REFRIGERANT SERVICE. SHUTOFF VALVES SHALL BE BRASS PACKLESS TYPE. UNIONS, FLANGED VALVES OR FITTINGS SHALL BE PROVIDED FOR DISCONNECTING EQUIPMENT, CONTROLS, ETC. FOR MAKING REPAIRS. PIPING SHALL BE RUN IN A SINGLE LAYER, WITH EACH LINE ISOLATED FROM ANOTHER TO PREVENT RUBBING. PROVISION SHALL BE MADE FOR EXPANSION AND CONTRACTION OF PIPING. ALL PIPING PASSING THROUGH WALLS, PARTITIONS, ETC., SHALL BE FURNISHED WITH SLEEVES AS REQUIRED.

H. REFRIGERANT PIPING PASSING THROUGH RATED FLOORS OR DEMISING WALLS SHALL BE ENCLOSED IN A RIGID AND GAS–TIGHT CONTINUOUS FIRE–RESISTING PIPE DUCT OR SHAFT VENTED TO THE OUTSIDE, IN ACCORDANCE WITH ASHRAE STANDARD 15–LATEST EDITION. PIPE CONDUIT SHALL BE COPPER TUBE TYPE L WITH SOLDERED FITTINGS.

15. ELECTRICAL WORK

A. GENERAL:

1) ELECTRICAL POWER WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACT. CONTROL WIRING SHALL BE PROVIDED BY THE HVAC CONTRACT. CONTROL WIRING SHALL BE DEFINED AS ANY WIRING 120V AND BELOW INSTALLED FOR PURPOSES OTHER THAN PROVIDING PRIMARY ELECTRICAL POWER TO EQUIPMENT.

2) MOTOR STARTERS AND VARIABLE FREQUENCY DRIVES (VFD) SHALL BE FURNISHED BY THE HVAC CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. REFER TO EQUIPMENT SECTION FOR VARIABLE FREQUENCY DRIVE SPECIFICATIONS.

3) DUCT MOUNTED SMOKE DETECTORS, WHERE REQUIRED, SHALL BE PROVIDED BY AND WIRED BY THE ELECTRICAL CONTRACTOR, AND MOUNTED BY THE HVAC CONTRACTOR.

A. THIS CONTRACTOR SHALL INSTALL THE SMOKE DETECTOR SAMPLING TUBES IN THE DUCT AS COORDINATED IN THE FIELD.

B. THIS CONTRACTOR SHALL ASSIST THE ELECTRICAL CONTRACTOR IN TESTING THE DUCT–MOUNTED SMOKE DETECTION SYSTEM.

4) ALL ELECTRICAL CONTROL WIRING SHALL COMPLY WITH LOCAL ELECTRICAL CODE, ALL AUTHORITIES HAVING JURISDICTION AND THE PROJECT ELECTRICAL SPECIFICATIONS.

5) MECHANICAL CONTRACTOR TO OBTAIN QUANTITY OF CONTROLLERS REQUIRED AND COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL OPERATING REQUIREMENTS, INTERLOCKS AND CONNECTIONS FOR STARTERS.

6) THE MECHANICAL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL POINT TO POINT, COMPLETELY COORDINATED WIRING DIAGRAMS AND INDICATE ALL SOURCE POWER REQUIREMENTS AND ALL FIELD WIRING TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR.

7) WHERE NEW STARTERS ARE TO BE PROVIDED TO REPLACE EXISTING, THIS CONTRACTOR SHALL SURVEY THE EXISTING CONTROL CONNECTIONS AND PREPARE AN EXISTING CONTROL WIRING DIAGRAM PRIOR TO DEMOLITION FOR SUBMITTAL TO THE ENGINEER. THE NEW STARTERS SHALL BE PROVIDED WITH THE NECESSARY CONTACTS AND RELAYS REQUIRED TO RECONNECT THE EXISTING CONTROLS. PROVIDE ALL REQUIRED CONTACTS FOR START/STOP AND FIRE ALARM.

16. MOTORS:

A. MOTORS SHALL HAVE THE ELECTRICAL CHARACTERISTICS AS LISTED ON THE DRAWINGS. COORDINATE ALL REQUIREMENTS WITH ELECTRICAL CONTRACTOR. ALL MOTORS SHALL COMPLY WITH NEMA MG–1 STANDARD AND SHALL BE OF THE HIGH EFFICIENCY TYPE AND MEET THE 1992 EPA ENERGY EFFICIENCY ACT AND UTILITY COMPANY REBATE REQUIREMENTS.

B. IF CONTRACTOR ELECTS TO SUBSTITUTE OR INCREASE MOTOR HORSEPOWER OVER THAT SPECIFIED, THE COST OF MOTOR AND ELECTRICAL CHANGES SHALL BE BORNE BY THIS CONTRACTOR.

C. MOTORS (UNDER HVAC WORK): IN ACCORDANCE WITH NEMA, IEEE AND ANSI C50 STANDARDS:

1) STANDARD EFFICIENCY UNLESS OTHERWISE NOTED.

2) 1.15 SERVICE FACTOR INCLUDING MOTORS SERVED FROM A VFD

3) SQUIRREL CAGE INDUCTION, OPEN DRIPPROOF TYPE, 1750 RPM, NEMA TYPE B INSULATION CLASS, CONTINUOUS DUTY, EXCEPT AS NOTED.

17. MOTOR CONTROLLERS

A. SUPPLIED BY HVAC CONTRACTOR AND INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

B. ENCLOSURES:

1) PROVIDE ENCLOSURES FOR STARTERS AND VFD?S SUITABLE FOR OPERATING ENVIRONMENT. ENCLOSURE?S SHALL BE NEMA 1 VENTILATED SHEETMETAL FOR INDOOR APPLICATION, NEMA 3R WITH ADDITIONAL GASKETING WEATHER–PROOF RAINTIGHT ENCLOSURE FOR EXPOSED OUTDOOR SERVICE OR INDOOR SERVICE EXPOSED TO MOISTURE.PROVIDE DISCONNECT SWITCH ON ENCLOSURE AS REQUIRED FOR SERVICE.

C. WITH SOLID–STATE (ELECTRONIC) OVERLOAD PROTECTION. COORDINATE ALL MOTOR CONTROLLER TYPES AND SIZES WITH MOTOR TYPES AND SIZES.

D. 1/3 HP AND SMALLER: PROVIDE MANUAL STARTER EXCEPT USE MAGNETIC TYPE WHERE AUTOMATICALLY CONTROLLED.

1) MANUAL TYPE: 2–POLE TOGGLE SWITCH WITH OVERLOAD PROTECTION AND PILOT LIGHT.

E. DISCONNECT SWITCHES ARE PROVIDED BY THE ELECTRICAL CONTRACTOR IF NOT INTEGRAL WITH EQUIPMENT.

F. ACCEPTABLE MANUFACTURERS:

1) EATON/ CUTLER HAMMER.

2) SQUARE D.

3) ALLEN BRADLEY.

4) ABB

18. EQUIPMENT

A. PROVIDE ALL EQUIPMENT AND ACCESSORIES OF THE SIZES AND CAPACITIES AS SCHEDULED AND AS INDICATED ON THE DRAWINGS.

B. INSTALL EQUIPMENT IN ACCORDANCE WITH APPROVED SHOP DRAWINGS, MANUFACTURERS INSTRUCTIONS AND ALL CODES AND REGULATIONS WHICH APPLY.

C. PROVIDE EQUIPMENT SUPPORTS AND/OR MOUNTINGS AS INDICATED ON THE DRAWING, IN VIBRATION SPECIFICATION AND AS FOLLOWS:

1) FLOOR MOUNTED EQUIPMENT – PROVIDE DIMENSIONS FOR A 4 INCH CONCRETE HOUSEKEEPING PAD WITH ALL REQUIRED WATERPROOFING TO THE CONSTRUCTION MANAGER.

2) EQUIPMENT ON FLOOR STANDS – PROVIDE FLOOR STAND OF STRUCTURAL STEEL OR STEEL PIPES AND FITTINGS ATTACHED TO FLOOR.

3) ROOF MOUNTED EQUIPMENT – PROVIDE PREFABRICATED ISOLATED ROOF CURB WITH INTEGRAL VIBRATION ISOLATORS.

4) CEILING MOUNTED EQUIPMENT – PROVIDE SUPPORTS WITH APPROVED SUITABLE ANCHORS SUSPENDED DIRECTLY FROM BUILDING STEEL STRUCTURE.

5) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED TO ADEQUATELY SUPPORT THE EQUIPMENT LOAD.

6) EQUIPMENT SHALL BE INSTALLED WITH VIBRATION ISOLATION, REFER TO VIBRATION ISOLATION SECTION.

D. RIGGING

1) THIS CONTRACTOR SHALL PROVIDE ALL REQUIRED RIGGING, HOISTING AND BRACING TO INSTALL THE EQUIPMENT AS INDICATED ON THE PLANS. THIS WORK SHALL BE PERFORMED BY AN INSURED CERTIFIED LICENSED RIGGING COMPANY THAT IS EXPERIENCED IN RIGGING EQUIPMENT OF THE TYPE INDICATED FOR THE AREAS SHOWN ON THE CONSTRUCTION DOCUMENTS. THIS CONTRACTOR SHALL SUBMIT RIGGING PLANS FOR APPROVAL PRIOR TO PROCEEDING WITH THE WORK.

2) ALL PERMITS REQUIRED FROM THE AUTHORITIES AND AGENCIES INVOLVED TO PERFORM THE RIGGING ARE THE RESPONSIBILITIES OF THIS CONTRACTOR.

3) ALL STRUCTURAL SUPPORTS, MODIFICATIONS OR ADDITIONS ARE TO BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO PROCEEDING WITH THE WORK. ALL SUPPLEMENTAL STRUCTURAL SUPPORTS, ELEVATOR CHARGES /MODIFICATIONS, BRACING AND PROTECTION REQUIRED FOR THE RIG IS THE RESPONSIBILITY OF THIS CONTRACTOR.

4) THE RIGGING CONTRACTOR SHALL HIRE AND PAY FOR ALL CHARGES AND SERVICES OF THE BUILDING ELEVATOR CONTRACTOR FOR THE RIGGING OF THE EQUIPMENT.

E. AIR COOLED AC UNIT: SPLIT SYSTEM

1) PROVIDE A FACTORY FABRICATED HORIZONTAL DRAW THROUGH AIR CONDITIONING UNITS SHIPPED IN SIZES SUITABLE FOR MOVING THROUGH AVAILABLE RIGGING ACCESS. PROVIDE CAPACITIES AS INDICATED ON SCHEDULE.

2) THE AC UNIT IS FIELD SPLITTABLE OR CAN BE SHIPPED PRE–SPLIT IN THE FACTORY.

3) FOR SPLIT UNITS THE CONTRACTOR IS TO PROVIDE ALL REQUIRED REFRIGERANT VALVING, DEVICES, PIPING, CONTROLS, ETC AS PER MANUFACTURERS REQUIREMENTS FOR A FULLY OPERATIONAL SYSTEM.

4) AC UNIT TO BE MANUFACTURED BY DAIKIN, TRANE, JCI OR CARRIER.

5) COMPRESSOR(S) – THE COMPRESSOR SHALL BE A HIGH EFFICIENCY HEAVY DUTY HEAT PUMP, FULL HERMETIC TYPE. THE COMPRESSOR SHALL BE INTERNALLY PROTECTED FROM OVER–HEATING. THE COMPRESSOR SHALL HAVE AN INTEGRAL CRANKCASE HEATER AS WELL AS AN EXTERNAL DISCHARGE MUFFLER. COMPRESSOR SHALL BE VIBRATION ISOLATED WITH EXTERNAL SPRING MOUNTING.

6) EVAPORATOR COIL – THE EVAPORATOR COIL IS OF ALUMINUM FIN AND COPPER TUBE CONSTRUCTION. THE COIL IS CONSTRUCTED OF HEAVY WALL, SEAMLESS COPPER TUBES THAT ARE MECHANICALLY EXPANDED TO THE ALUMINUM FINS TO PROVIDE THE HIGHEST EFFICIENCY. ALL REFRIGERANT COILS HAVE DRAW THROUGH AIRFLOW DESIGN WITH EXTREMELY LARGE FACE AREAS AND MULTIPLE ROWS.

7) CONDENSER COIL – THE CONDENSER COIL SHALL BE OF A DRAW THROUGH AIRFLOW DESIGN. THE COIL SHALL BE MADE WITH 3/8 INCH O.D. HEAVY WALL SEAMLESS COPPER TUBES. TUBING SHALL BE MECHANICALLY EXPANDED TO ALUMINUM FINS WITH DRAWN SELF–SPACING COLLARS. ALL COLLARS SHALL HAVE NO CRACKS OR DEFECTS.

8) BLOWER ASSEMBLY – THE BLOWER ASSEMBLY SHALL BE BELT DRIVEN WITH THE ABILITY TO DELIVER UP TO 1 INCH ESP WITH THE USE OF THE STANDARD MOTOR. THE BLOWER HOUSING SHALL BE A HEAVY–DUTY GAUGE STEEL DOUBLE INLET AND PAINTED TO PREVENT IT FROM CONTAMINATES. THE BLOWER WHEEL SHALL BE MOUNTED ON A SOLID STEEL KEYED SHAFT. THE SHAFT SHALL BE MOUNTED ON RESILIENTLY MOUNTED PERMANENTLY LUBRICATED BALL BEARINGS. THE BLOWER PULLEY SHALL BE OF CAST IRON CONSTRUCTION AND KEYED TO THE BLOWER SHAFT.

9) MOTOR ASSEMBLY – THE MOTOR SHALL BE RESILIENTLY MOUNTED WITH INTERNAL PROTECTION FROM OVERHEATING. MOTOR SHALL HAVE PERMANENTLY LUBRICATED BALL BEARINGS. THE MOTOR SHALL BE MOUNTED TO AN ADJUSTABLE MOTOR FRAME POSITIONED BEHIND THE BLOWER ASSEMBLY BOLTED TO THE BOTTOM PAN. NO MOTOR SHALL BE MOUNTED UPON A BLOWER HOUSING. MOTOR PULLEY SHALL BE CAST IRON, KEYED, AND VARIABLE PITCH DESIGN TO ALLOW FOR FIELD ADJUSTMENT OF SPECIFIC AIRFLOW AND STATIC REQUIREMENTS.'

10) ELECTRICAL – THE UNIT SHALL HAVE DUAL ELECTRICAL CONTROL PANELS, ONE IN THE EVAPORATOR SECTION AND THE OTHER IN THE CONDENSER SECTION. THIS SHALL ENABLE THE UNIT IF SPLIT IN THE FIELD TO BE POWER WIRED INDEPENDENTLY. ALL COMPONENTS (FAN MOTORS, COMPRESSORS) SHALL HAVE THEIR OWN DEFINITE PURPOSE CONTACT. COMPRESSOR(S) SHALL BE PROTECTED WITH A NONADJUSTABLE HIGH AND LOW PRESSURE CONTROL WITH AUTO RESET AND LOCK OUT RELAY IN EACH REFRIGERATION CIRCUIT. THE UNIT SHALL INCORPORATE AN AIR PRESSURE DIFFERENTIAL SWITCH. THIS SHALL ENABLE THE UNIT TO SHUT DOWN IN THE EVENT OF AN EVAPORATOR MOTOR, BLOWER OR BELT FAILURE.

11) A LOW VOLTAGE TRANSFORMER WITH INTEGRAL PROTECTION SHALL BE PROVIDED TO SUPPLY 24 VAC TO THE CONTROL CIRCUIT. CLEARLY LABELED LOW VOLTAGE TERMINAL STRIPS WILL BE PROVIDED FOR FIELD WIRING OF THERMOSTAT. TERMINAL BLOCKS SHALL BE PROVIDED ON THE ELECTRICAL CONTROL BOX FOR POWER WIRING. GROUND LUGS SHALL BE AFFIXED IN BOTH THE EVAPORATOR AND CONDENSER CONTROL PANELS. ALL CONTROLS ARE EASILY ACCESSIBLE.

12) REFRIGERATION CIRCUIT – THE REFRIGERATION CIRCUIT SHALL INCLUDE HIGH AND LOW SIDE SCHRADER ACCESS VALVES, SIGHT GLASS WITH INTEGRAL MOISTURE INDICATOR, FILTER–DRYER, HIGH/LO PRESSURE SWITCHES ALL LOCATED IN THE CONDENSER SECTION OF THE UNIT AND ARE EASILY ACCESSIBLE THE REFRIGERATION CIRCUIT SHALL BE CAPABLE OF BEING FIELD SEPARATED WITH REUSABLE QUICK–CONNECTS TO PREVENT LOSS OF FACTORY CHARGE WHEN SPLIT IN THE FIELD.

13) PROVIDE R–407C OR R–410A REFRIGERANT.

14) CABINET – THE CABINET SHALL BE CONSTRUCTED OF SCRATCH RESISTANT HEAVY DUTY G90 GALVANIZED STEEL. THE CONDENSER BOTTOM PANS SHALL BE CONSTRUCTED AS FOLLOWS: AN INNER PAN AND AN OUTER PAN WITH INTEGRAL SPACERS AND INSULATION BETWEEN THE TWO, TO ENSURE A VAPOR BARRIER. THE COMPLETE UNIT SHALL BE MOUNTED ON HEAVY DUTY CHANNELS TO ACCOMMODATE HANGING RODS FOR CEILING/SLAB FLOOR MOUNTING.

15) SERVICE ACCESS – THE UNIT SHALL BE ACCESSIBLE FROM THE SIDES. ACCESS DOORS SHALL BE HELD IN PLACE BY SHEET METAL SCREWS. ACCESS TO THE BLOWER AND MOTOR SHALL BE ON ONE SIDE OF THE UNIT. ACCESS TO THE REFRIGERATION CIRCUIT INCLUDING COMPRESSOR AND SIGHT GLASS SHALL BE ON THE OPPOSITE SIDE OF THE UNIT PROVIDE CLEARANCE FOR SERVICE ACCESS AS PER MANUFACTURERS REQUIREMENTS.

16) INSULATION – ACOUSTICAL INSULATION SHALL BE A MINIMUM DENSITY OF 5 LBS. AND BE INSTALLED ON THE INTERIOR TOP, SIDE AND BOTTOM PANS AND PANELS INSULATION MUST MEET NFPA 90A AND 90B/ASTM–C1071.

17) PROVIDE UNIT MANUFACTURERS MOUNTED DDC CONTROLLER FACTORY INSTALLED. CONTROLLER TO HAVE A 4 LINE BY 20–CHARACTER LCD DISPLAY IN PLAIN ENGLISH, INCLUDING ALARMS. MANUAL CONTROL FROM THE CONTROLLER KEYPAD WITH PASSWORD ENTRY TO PROTECT THE SETTINGS FROM BEING TAMPERED WITH. ON A POWER FAILURE CONDITION, THE SYSTEM RESTARTS AUTOMATICALLY. OPERATING CONTROL PANEL SHALL BE MOUNTED IN UNIT FACE AND BE COMPLETE WITH 24 VOLT CONTROL TRANSFORMER.

18) FACTORY TESTING: ALL COMPONENTS SHALL BE INDIVIDUALLY FACTORY TESTED PRIOR TO INSTALLATION, THE UNIT SHALL BE FACTORY RUN–TESTED

19) WARRANTY – PROVIDE MANUFACTURERS STANDARD ONE LIMITED WARRANTY WITH 5 YEAR COMPRESSOR WARRANTY.

20) UNITS SHALL BE PROVIDED WITH THE FOLLOWING OPTIONS:

A. LOW AMBIENT COOLING OPERATION DOWN TO 0 DEGREES FAHRENHEIT.

B. FILTER RACK.

C. ADAPTOR INTERFACE: KRP BOARD.

F. HEATING AND VENTILATION UNIT

1) MANUFACTURERS: TRANE, DAIKIN, AAON, REZNOR, GREENHECK, CARRIER

2) UNIT DESCRIPTION: HEATING AND VENTILATION UNITS SHALL INCLUDE VARIABLE CAPACITY COMPRESSORS (0–100%), FILTERS, VARIABLE SPEED SUPPLY FANS, LOW LEAKAGE DAMPERS, HYDRONIC HEATING, SUPPLY SIDE SMOKE DETECTOR, AND UNIT CONTROLS. UNIT SHALL BE FACTORY ASSEMBLED AND TESTED INCLUDING LEAK TESTING OF THE DX COILS, PRESSURE TESTING OF THE REFRIGERATION CIRCUIT, AND RUN TESTING OF THE COMPLETED UNIT. RUN TEST REPORT SHALL BE SUPPLIED WITH THE UNIT IN THE SERVICE COMPARTMENT?S LITERATURE POCKET. LAMINATED COLOR–CODED WIRING DIAGRAM SHALL MATCH FACTORY INSTALLED WIRING AND SHALL BE AFFIXED TO THE INTERIOR OF THE CONTROL COMPARTMENT?S HINGED ACCESS DOOR. UNIT NAMEPLATE SHALL BE PROVIDED IN TWO LOCATIONS ON THE UNIT, AFFIXED TO THE EXTERIOR OF THE UNIT AND AFFIXED TO THE INTERIOR OF THE CONTROL COMPARTMENT?S HINGED ACCESS DOOR.

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LOGIN: Arena, David

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Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID
04/10/2019	⚠1 ADDENDUM #2

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Project

TOWN OF STRATFORD
2725 Main Street
Stratford, CT 06614

Mechanical Upgrades:

Eli Whitney School
1130 Huntington Rd.
Stratford, CT

Drawing Title

MECHANICAL SPECIFICATIONS

Issued 03/05/2019	Drawing No. M-401
Scale NTS	
Job No. 183171–000	

3) CONSTRUCTION:

A. CABINET: GALVANIZED STEEL, PHOSPHATIZED, AND FINISHED WITH AN AIR–DRY PAINT COATING WITH REMOVABLE ACCESS PANELS. STRUCTURAL MEMBERS SHALL BE 16 GAUGE WITH ACCESS DOORS AND REMOVABLE PANELS OF MINIMUM 20 GAUGE.

B. UNITS CABINET SURFACE SHALL BE TESTED 1000 HOURS IN SALT SPRAY TEST IN COMPLIANCE WITH ASTM B117.

C. CABINET CONSTRUCTION SHALL ALLOW FOR ALL SERVICE/ MAINTENANCE FROM ONE SIDE OF THE UNIT.

D. CABINET TOP COVER SHALL BE ONE PIECE CONSTRUCTION OR WHERE SEAMS EXITS, IT SHALL BE DOUBLE–HEMMED AND GASKET–SEALED.

E. ACCESS PANELS: WATER– AND AIR–TIGHT PANELS WITH HANDLES SHALL PROVIDE ACCESS TO FILTERS, HEATING SECTION, RETURN AIR FAN SECTION, SUPPLY AIR FAN SECTION, EVAPORATOR COIL SECTION, AND UNIT CONTROL SECTION.

F. DOWNFLOW UNIT'S BASE PANS SHALL HAVE A RAISED 1 1/8 INCH HIGH LIP AROUND THE SUPPLY AND RETURN OPENINGS FOR WATER INTEGRITY.

G. INSULATION: PROVIDE 1/2 INCH THICK COATED FIBERGLASS INSULATION ON ALL EXTERIOR PANELS IN CONTACT WITH THE RETURN AND CONDITIONED AIR STREAM.

H. PROVIDE OPENINGS EITHER ON SIDE OF UNIT OR THRU THE BASE FOR POWER, CONTROL AND GAS CONNECTIONS.

I. THE BASE OF THE UNIT SHALL HAVE PROVISIONS FOR FORKLIFT AND CRANE LIFTING.

4) FANS AND MOTORS

A. PROVIDE EVAPORATOR FAN SECTION WITH FORWARD CURVED, DOUBLE WIDTH, DOUBLE INLET, CENTRIFUGAL TYPE FAN.

B. PROVIDE SELF–ALIGNING, GREASE LUBRICATED, BALL OR SLEEVE BEARINGS WITH PERMANENT LUBRICATION FITTINGS.

C. PROVIDE UNITS 12 1/2 TONS AND ABOVE WITH BELT DRIVEN, SUPPLY FANS WITH ADJUSTABLE MOTOR SHEAVES.

D. FANS SHALL BE PERMANENTLY LUBRICATED AND HAVE INTERNAL THERMAL OVERLOAD PROTECTION.

E. OUTDOOR FANS SHALL BE DIRECT DRIVE, STATICALLY AND DYNAMICALLY BALANCED, DRAW THROUGH IN THE VERTICAL DISCHARGE POSITION.

F. PROVIDE SHAFTS CONSTRUCTED OF SOLID HOT ROLLED STEEL, GROUND AND POLISHED, WITH KEY–WAY, AND PROTECTIVELY COATED WITH LUBRICATING OIL.

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G.

5) HYDRONIC HEATING

A. COMPLETELY ASSEMBLED AND FACTORY INSTALLED HEATING SYSTEM SHALL BE INTEGRAL TO UNIT, UL OR CSA APPROVED SPECIFICALLY FOR OUTDOOR APPLICATIONS FOR USE DOWNSTREAM FROM REFRIGERANT COOLING COILS. THREADED CONNECTION WITH PLUG OR CAP PROVIDED.

B. HEATING SECTION SHALL BE FACTORY RUN TESTED PRIOR TO SHIPMENT.

C. HYDRONIC HEATING COILS – COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS SPACED NO CLOSER THAN 0.1, RATED FOR A MINIMUM WORKING PRESSURE OF 200 PSIG AND A MAXIMUM ENTERING–WATER TEMPERATURE OF 220 DEG F. INCLUDE MANUAL AIR VENT AND DRAIN VALVE.

D. BLOWER SHALL BE CENTRIFUGAL TYPE FAN WITH BUILT– IN THERMAL OVERLOAD PROTECTION ON FAN MOTOR.

6) OUTDOOR AIR SECTION

A. PROVIDE 100% RETURN AIR.

B. PROVIDE DUAL ENTHALPY ECONOMIZER.

C. PROVIDE ADJUSTABLE MINIMUM POSITION CONTROL LOCATED IN THE ECONOMIZER SECTION OF THE UNIT.

D. PROVIDE SPRING RETURN MOTOR FOR OUTSIDE AIR DAMPER CLOSURE DURING UNIT SHUTDOWN OR POWER INTERRUPTION.

7) EXHAUST/RETURN SECTION

A. PROVIDE A FACTORY SUPPLIED FIELD INSTALLED POWER EXHAUST ASSEMBLY THAT SHALL ASSIST THE BAROMETRIC RELIEF DAMPER IN THE ECONOMIZER IN RELIEVING BUILDING PRESSURIZATION.

8) FILTERS

A. UNIT SHALL INCLUDE 2 INCH THICK, PLEATED PANEL FILTERS WITH AN ASHRAE EFFICIENCY OF 85% AND A MERV RATING OF 13, UPSTREAM OF THE COOLING COIL.

9) ROOF CURB

A. CONTRACTOR SHALL PROVIDE ROOF CURB ADAPTER, HEAVY GAUGE ZINC COATED STEEL WITH ALL WELDED CONSTRCUTION. CUSTOM FABRICATED TO FIT OVER EXISTING ROOF CURB WITH AIR AND WATER PROOF GASKETING.

B. CURB SHALL BE MANUFACTURED IN ACCORDANCE WITH THE NATIONAL ROOFING CONTRACTORS ASSOCIATION GUIDELINES.

10) CONTROLS: CONTROLS SHALL BE FACTORY INSTALLED AND PROVIDED.

A. PROVIDE FACTORY–WIRED ROOF TOP UNITS WITH 24 VOLT CONTROL CIRCUIT WITH CONTROL TRANSFORMERS, CONTACTOR PRESSURE LUGS OR TERMINAL BLOCK FOR POWER WIRING. CONTRACTOR TO PROVIDE DISCONNECT DEVICE. UNITS SHALL HAVE SINGLE POINT POWER CONNECTIONS. FIELD WIRING OF ZONE CONTROLS TO BE NEC CLASS II.

B. PROVIDE MICROPROCESSOR UNIT–MOUNTED CONTROL WHICH WHEN USED WITH AN ELECTRONIC ZONE SENSOR PROVIDES PROPORTIONAL INTEGRAL ROOM CONTROL. THIS UCM SHALL PERFORM ALL UNIT FUNCTIONS BY MAKING ALL HEATING, COOLING AND VENTILATING DECISIONS THROUGH RESIDENT SOFTWARE LOGIC.

C. PROVIDE FACTORY–INSTALLED INDOOR EVAPORATOR DEFROST CONTROL TO PREVENT COMPRESSOR SLUGGING BY INTERRUPTING COMPRESSOR OPERATION.

D. PROVIDE AN ANTI–CYCLE TIMING AND MINIMUM ON/OFF BETWEEN STAGES TIMING IN THE MICROPROCESSOR.

E. ECONOMIZER PREFERRED COOLING (IF SUPPLIED WITH ECONOMIZER) – COMPRESSOR OPERATION IS INTEGRATED WITH ECONOMIZER CYCLE TO ALLOW MECHANICAL COOLING WHEN ECONOMIZER IS NOT ADEQUATE TO SATISFY ZONE REQUIREMENTS. COMPRESSORS ARE ENABLED IF SPACE TEMPERATURE IS RECOVERING TO COOLING SETPOINT AT A RATE OF LESS THAN 0.2 DEGREES PER MINUTE. COMPRESSOR LOW AMBIENT LOCKOUT OVERRIDES THIS FUNCTION.

F. PROVIDE PROGRAMMABLE ELECTRONIC MICROCOMPUTER BASED ZONE CONTROL.

(1) ZONE CONTROL SHALL INCORPORATE:

(2) AUTOMATIC CHANGEOVER FROM HEATING TO COOLING.

(3) SET–UP FOR AT LEAST 2 – SETS OF SEPARATE HEATING AND COOLING TEMPERATURES PER DAY.

(4) INSTANT OVERRIDE OF SETPOINT FOR CONTINUOUS OR TIMED PERIOD FROM ONE HOUR TO 31 DAYS.

(5) SWITCH SELECTION FEATURES INCLUDING FAHRENHEIT DISPLAY, 12 OR 24 HOUR CLOCK, KEYBOARD DISABLE, REMOTE SENSOR, FAN ON–AUTO.

G. ZONE SENSOR DISPLAY SHALL BE CAPABLE OF:

(1) TIME OF DAY.

(2) ACTUAL ROOM TEMPERATURE.

(3) PROGRAMMED TEMPERATURE.

(4) PROGRAMMED TIME.

(5) DURATION OF TIMED OVERRIDE.

(6) DAY OF WEEK.

(7) SYSTEM MODE INDICATION: HEATING, COOLING, LOW BATTERY FAN ON.

H. PROVIDE REMOTE TEMPERATURE SENSOR CAPABILITY.

I. PROVIDE MIXED AIR SENSOR IN SUPPLY AIR TO CLOSE OUTSIDE AIR DAMPER.

19. AUTOMATIC CONTROLS: GENERAL REQUIREMENTS

A. WORK INCLUDED

1) FURNISH A COMPLETE STAND–ALONE DIRECT DIGITAL CONTROL (DDC) SYSTEM IN ACCORDANCE WITH THIS SPECIFICATION SECTION. THIS INCLUDES ALL SUPERVISORY CONTROLLERS, LOGIC CONTROLLERS, AND ALL INPUT/OUTPUT DEVICES. ITEMS OF WORK INCLUDED ARE AS FOLLOWS:

A. PROVIDE A SUBMITTAL THAT MEETS THE REQUIREMENTS BELOW FOR APPROVAL.

B. PROVIDE POWER FOR PANELS AND CONTROL DEVICES FROM A SOURCE DESIGNATED BY THE ELECTRICAL CONTRACTOR.

C. PROVIDE MISCELLANEOUS CONTROL WIRING FOR HVAC AND RELATED SYSTEMS REGARDLESS OF VOLTAGE.

D. COORDINATE INSTALLATION SCHEDULE WITH THE MECHANICAL CONTRACTOR AND GENERAL CONTRACTOR.

E. FURNISH, MOUNT, AND WIRE ALL ASSOCIATED PANELS AND DEVICES FOR THE SYSTEM TO BE COMPLETELY OPERATIONAL REGARDLESS OF FUNCTION OR VOLTAGE, UNLESS OTHERWISE STATED.

F. PROVIDE ENGINEERING AND TECHNICIAN LABOR TO PROGRAM AND COMMISSION SOFTWARE FOR EACH SYSTEM AND OPERATOR INTERFACE. SUBMIT COMMISSIONING REPORTS FOR APPROVAL.

G. ALL PRIMARY AND SECONDARY DDC CONTROLLERS SHALL COMMUNICATE USING THE PROTOCOLS AND NETWORK STANDARDS AS DEFINED BY THE LATEST VERSION OF THE ANSI/ASHRAE STANDARD 135 – BACNET. USE OF A PROPRIETARY PROTOCOL ON ANY PART OF THE NETWORK IS PROHIBITED.

H. THE ATC CONTROL WORK IN THIS PROJECT SHOULD BE STANDALONE WITH THE CAPABILITY FOR FURTHER BMS TIE–IN.

B. DEFINITIONS:

1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

6) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

7) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

C. SUBMITTALS

1) ONE (1) SUBMITTAL PACKAGE SHALL BE PROVIDED FOR THE PROJECT THAT INCLUDES INFORMATION FOR CONTROLS FOR ALL SYSTEMS BEING PROVIDED AS PART OF THE PROJECT. PARTIAL SUBMITTALS ARE NOT ACCEPTABLE AND SHALL NOT BE REVIEWED BY THE ENGINEER. FOR EXAMPLE, IT IS NOT ACCEPTABLE TO SUBMIT A CONTROL VALVE SCHEDULE AS PART OF ONE PACKAGE AND CONTROL DIAGRAMS AS PART OF A LATER PACKAGE.

2) PRODUCT DATA: INCLUDE MANUFACTURER'S TECHNICAL LITERATURE FOR EACH CONTROL DEVICE INDICATED, LABELED WITH SETTING OR ADJUSTABLE RANGE OF CONTROL. INDICATE DIMENSIONS, CAPACITIES, PERFORMANCE CHARACTERISTICS, ELECTRICAL CHARACTERISTICS, FINISHES FOR MATERIALS, AND INSTALLATION AND STARTUP INSTRUCTIONS FOR EACH TYPE OF PRODUCT INDICATED.

3) SHOP DRAWINGS: DETAIL EQUIPMENT ASSEMBLIES AND INDICATE DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

A. SCHEMATIC FLOW DIAGRAMS SHOWING FANS, PUMPS, COILS, DAMPERS, VALVES, THERMOSTATS AND CONTROL DEVICES.

B. WIRING DIAGRAMS: POWER, SIGNAL, AND CONTROL WIRING.

C. ARCHITECTURE DRAWING INCLUDING ALL COMMUNICATION WIRING, NETWORK DEVICES, ETC. INDICATE TYPE OF CABLING AND NUMBER OF CONDUCTORS.

D. ARCHITECTURAL FLOOR PLANS INDICATING PROPOSED LOCATIONS OF ALL WALL–MOUNTED DEVICES (I.E., DDC UNITS, CONTROL PANELS, SENSORS, THERMOSTATS, ETC.) AND MECHANICAL DRAWINGS INDICATING PROPOSED LOCATIONS OF ALL TEMPERATURE, FLOW AND PRESSURE TRANSMITTERS.

E. SYMBOL AND ABBREVIATION LIST FOR CONTROL DIAGRAMS.

F. POINTS LIST INCLUDING HARDWIRED AND SOFTWARE POINTS.

G. DETAILS OF CONTROL PANEL INTERIOR, INCLUDING CONTROLLERS, RELAYS, TERMINAL BLOCKS, AND LABELING OF DEVICES, ETC.

H. SCHEDULE OF VALVES INCLUDING THE VALVE SIZE, MODEL NUMBER, FLOW, DESIGN PRESSURE DROP, ACTUAL PRESSURE DROP, DESIGN CV, CALCULATED CV, VALVE BODY PRESSURE RATING, ACTUATOR, CLOSE–OFF PRESSURE RATING, LEAKAGE, FLOW CHARACTERISTICS AND LOCATION.

I. A COMPLETE BILL OF MATERIALS OF EQUIPMENT TO BE USED INDICATING QUANTITY, MANUFACTURER, MODEL NUMBER AND TAG NUMBER.

J. MANUFACTURER?S TECHNICAL CUT SHEETS WHICH INCLUDE A TABLE OF CONTENTS AND AN ASSOCIATED SHEET NUMBERING SYSTEM FOR ALL PAGES. MODEL NUMBER SHALL BE CIRCLED OR POINTED WITH AN ARROW.

4) FIELD QUALITY–CONTROL TEST REPORTS.

5) OPERATION AND MAINTENANCE DATA.

6) SUBMIT ON WIRING DIAGRAMS AND CONTROL DIAGRAMS FOR ALL EQUIPMENT LISTED HEREIN REGARDLESS OF WHETHER THE CONTROLS ARE PACKAGED, PROVIDED BY OTHERS, ETC. IT IS THE INTENT OF THIS SPECIFICATION THAT THIS CONTRACTOR SHALL PROVIDE THE OWNER WITH COMPLETE AND FINAL O & M MANUALS THAT INCLUDE CONTROLS FOR ALL EQUIPMENT REGARDLESS OF WHO PROVIDED IT.

D. QUALITY ASSURANCE

1) INSTALLER QUALIFICATIONS: A QUALIFIED INSTALLER WHO IS AN AUTHORIZED REPRESENTATIVE OF THE AUTOMATIC CONTROL SYSTEM MANUFACTURER FOR BOTH INSTALLATION AND MAINTENANCE OF UNITS REQUIRED FOR THIS PROJECT.

2) COMPLY WITH ALL CURRENT GOVERNING CODES, ORDINANCES, AND REGULATIONS INCLUDING UL, NFPA, THE LOCAL BUILDING CODE, NEC, ETC.

3) MATERIALS AND EQUIPMENT SHALL BE THE CATALOGUED PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN PRODUCTION AND INSTALLATION OF AUTOMATIC TEMPERATURE CONTROL SYSTEMS AND SHALL BE MANUFACTURER'S LATEST STANDARD DESIGN THAT COMPLIES WITH THE SPECIFICATION REQUIREMENTS.

4) THE BMS CONTRACTOR SHALL HAVE A MINIMUM OF TEN (10) YEARS OF EXPERIENCE IN THE INSTALLATION AND MAINTENANCE OF BMS SYSTEMS SIMILAR IN SIZE AND COMPLEXITY TO THIS PROJECT, BE CERTIFIED–TO–INSTALL, AND BE A DIRECT REPRESENTATIVE OF AN APPROVED CONTROL SYSTEM MANUFACTURER,

20. AUTOMATIC CONTROLS: GENERAL REQUIREMENTS

A. WORK INCLUDED

1

1) FURNISH A COMPLETE DISTRIBUTED DIRECT DIGITAL CONTROL (DDC) SYSTEM IN ACCORDANCE WITH THIS SPECIFICATION SECTION. THIS INCLUDES ALL SUPERVISORY CONTROLLERS, LOGIC CONTROLLERS, AND ALL INPUT/OUTPUT DEVICES. ITEMS OF WORK INCLUDED ARE AS FOLLOWS:

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2) COMPLY WITH ALL CURRENT GOVERNING CODES, ORDINANCES, AND REGULATIONS INCLUDING UL, NFPA, THE LOCAL BUILDING CODE, NEC, ETC.

3) MATERIALS AND EQUIPMENT SHALL BE THE CATALOGUED PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN PRODUCTION AND INSTALLATION OF AUTOMATIC TEMPERATURE CONTROL SYSTEMS AND SHALL BE MANUFACTURER'S LATEST STANDARD DESIGN THAT COMPLIES WITH THE SPECIFICATION REQUIREMENTS.

4) THE BMS CONTRACTOR SHALL HAVE A MINIMUM OF TEN (10) YEARS OF EXPERIENCE IN THE INSTALLATION AND MAINTENANCE OF BMS SYSTEMS SIMILAR IN SIZE AND COMPLEXITY TO THIS PROJECT, BE CERTIFIED–TO–INSTALL, AND BE A DIRECT REPRESENTATIVE OF AN APPROVED CONTROL SYSTEM MANUFACTURER,

21. AUTOMATIC CONTROLS PRODUCTS

A. MANUFACTURERS

1) MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

3

A. HONEYWELL

B. JOHNSON CONTROLS, INC.

2) THE BMS CONTRACTOR SHALL BE AN INDEPENDENT CONTRACTOR NOT AFFILIATED WITH THE MECHANICAL CONTRACTOR.

3

3) THE MECHANICAL CONTRACTOR SHALL INCLUDE THE FACILITY CONTROLS CONTRACTOR AS PART OF THEIR BASED BID.

B. CONTROL PANELS

1) FULLY ENCLOSED, STEEL–RACK–TYPE CABINET WITH LOCKING DOORS OR LOCKING REMOVABLE BACKS. MATCH FINISH OF PANELS AND PROVIDE LAMINATED AS–BUILT WIRING DIAGRAMS, FLOW DIAGRAMS, ETC. RELATED TO THE SYSTEM BEING CONTROLLED INSIDE THE ASSOCIATED CABINET. EACH CONTROL PANEL SHALL BE CLEARLY AND PERMANENTLY LABELED WITH THE CONTROLLER DESIGNATION AND INDICATION OF THE MECHANICAL EQUIPMENT SERVED.

2) UNITIZE CABINET WITH SUITABLE BRACKETS FOR WALL OR FLOOR MOUNTING, LOCATED ADJACENT TO EACH SYSTEM UNDER AUTOMATIC CONTROL. PROVIDE COMMON KEYING FOR ALL PANELS.

3) FABRICATE PANELS OF FURNITURE–QUALITY STEEL OR EXTRUDED–ALUMINUM ALLOY, TOTALLY ENCLOSED, WITH HINGED DOORS AND KEYED LOCK AND WITH MANUFACTURER'S STANDARD SHOP–PAINTED FINISH. ALL PANELS SHALL HAVE COMMON KEYING.

4) PRIMARY CONTROL PANEL: PROVIDE MINIMUM NEMA 1 RATING FOR INDOOR APPLICATION AND NEMA 4X RATING FOR OUTDOOR APPLICATION OR THE APPROPRIATE NEMA RATING FOR APPLICATION. ELECTRICAL PIPING AND WIRING SHALL BE PENETRATED THROUGH THE BOTTOM OF THE PANEL WITH 4 INCHES NIPPLES AND 4 INCHES WIRING TROUGH.

5) SECONDARY CONTROL PANEL: PROVIDE MINIMUM NEMA 1 RATING FOR INDOOR APPLICATION.

6) SIZE CONTROL PANEL ENCLOSURES FOR TEN PERCENT (10%) SPARE MOUNTING CAPACITY FOR FUTURE EXPANSION.

7) ONLY ONE CONTROLLER SHALL BE ALLOWED IN A CONTROL PANEL WITH EXPANSION MODULES IF EXTRA POINTS ARE NEEDED. THE BMS VENDOR SHALL UTILIZE THE LARGEST CONTROLLER AVAILABLE IN THE PRODUCT LINE TO ACCOMMODATE THE POINTS REQUIRED. IF MAXED OUT, ONLY THEN SHOULD A SECOND CONTROLLER BE INSTALLED WITHIN THE PANEL.

8) CONTROL PANEL INTERNAL COMPONENTS:

A. PROVIDE IDENTIFICATION SLEEVES AT EACH TERMINATION AT THE TERMINAL STRIP.

B. ALL CONTROL PANELS SHALL BE PROVIDED WITH DIN RAIL MOUNTED SCREW TERMINAL BLOCKS. FIELD WIRING SHALL BE CONNECTED TO THE SCREW TERMINAL BLOCKS. IT IS NOT ACCEPTABLE TO TERMINATE ANY FIELD WIRING DIRECTLY TO THE DDC CONTROLLER OR ANY PANEL DEVICES SUCH AS RELAY AND TRANSDUCERS. THE SCREW TERMINAL BLOCKS LOCATED/ATTACHED TO THE DDC CONTROLLER ALONE DOES NOT COMPLY WITH THIS REQUIREMENT. TERMINAL BLOCKS SHALL BE RATED FOR 300 VOLTS, MEDIUM DUTY. PROVIDE PHOENIX FEED–THROUGH TERMINAL BLOCK UT 2,5 OR PRE–APPROVED EQUAL.

C. ALL CONTROL DEVICES SUCH AS RELAYS, TRANSFORMERS, TRANSDUCERS, POWER SUPPLIES, ASSOCIATED I/O DEVICES, ETC SHALL BE INSTALLED INSIDE THE PANEL, NOT AT THE STARTER OR ELECTRICAL JUNCTION BOX.

D. ALL PANEL WIRINGS SHALL IN BE INSTALLED IN PANDUIT AND WIRING DUCT. THIS SHALL INCLUDE BUT NOT BE LIMITED TO WIRING FROM THE DDC CONTROLLER TO THE TERMINAL BLOCK, BETWEEN DDC CONTROLLER AND RELAY (AND OTHER PANEL MOUNTED CONTROL DEVICES), POWER WIRING FOR THE CONTROLLER, COMMUNICATION, ETC.

E. MOUNTING ANY CONTROL DEVICES ON THE BACK OF THE CONTROL PANEL ENCLOSURE DOOR IS NOT ACCEPTABLE.

F. UTILIZING WIRE NUTS IN THE CONTROL PANEL IS ALSO NOT ACCEPTABLE.

9) POWER WIRING AND COMMUNICATION WIRING SHALL BE PROVIDED IN SEPARATE CONDUITS WITH SEPARATE HOT, NEUTRAL, AND GROUND WIRE RUNS AND SEPARATE BREAKERS.

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Revisions

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Mechanical Upgrades:

Eli Whitney School
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Drawing Title

MECHANICAL SPECIFICATIONS

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10) ALL CONTROL PANELS SHALL SATISFY UL 508A.

11) COORDINATE INSTALLATION OF THE CONTROL PANELS WITH THE ENGINEER/ARCHITECT. COORDINATE POWER FOR THE PANELS WITH THE ELECTRICAL CONTRACTOR.

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C. BMS NETWORK/ARCHITECTURE

1) THE BMS SYSTEM SHALL USE A CLIENT/SERVER ARCHITECTURE BASED ON A MODULAR PC NETWORK, UTILIZING INDUSTRY STANDARD OPERATING SYSTEMS, NETWORKS AND PROTOCOLS.

2) THE SYSTEM SHALL ALLOW THE DISTRIBUTION OF SYSTEM FUNCTIONS SUCH AS MONITORING AND CONTROL AND GRAPHICAL USER INTERFACE ETC. ACROSS THE NETWORK TO ACHIEVE MAXIMUM FLEXIBILITY AND PERFORMANCE.

3) THE DESIGN OF THE BMS SHALL NETWORK PERSONAL COMPUTER OPERATOR WORKSTATIONS, PRIMARY CONTROL PANELS AND SECONDARY CONTROL PANELS. THE NETWORK ARCHITECTURE SHALL CONSIST OF MULTIPLE NETWORK LEVELS. PROVIDE A PEER-TO-PEER PRIMARY NETWORK TO CONNECT THE PC OPERATOR WORKSTATION(S) AND ALL PRIMARY CONTROL PANELS IN THE BUILDING FOR GLOBAL SYSTEM OPERATION. PROVIDE SECONDARY NETWORKS TO CONNECT FROM EACH PRIMARY CONTROL PANEL TO THE SECONDARY CONTROL PANELS OF ASSOCIATED TERMINAL EQUIPMENT.

4) PRIMARY CONTROL PANELS MAY BE CONNECTED TO THE PRIMARY NETWORK VIA ROUTERS IF THIS FOLLOWS THE STANDARD ARCHITECTURE OF A SPECIFIED MANUFACTURER. PROVIDE NETWORK OR SUPERVISORY CONTROLLERS IF REQUIRED ACCORDING TO MANUFACTURER'S STANDARD ARCHITECTURE LAYOUT TO ACHIEVE NETWORK FUNCTIONALITY. QUANTITY AND LOCATIONS OF ROUTERS, NETWORK CONTROLLERS, AND SUPERVISORY CONTROLLERS TO BE COORDINATED WITH ENGINEER.

5) THE BMS DESIGN SHALL ALLOW THE CO-EXISTENCE OF CURRENT AND FUTURE PRIMARY CONTROL PANELS AND PERSONAL COMPUTER OPERATOR WORKSTATIONS ON THE SAME NETWORK.

6) THE BMS CONTRACTOR SHALL PROVIDE NEW SUPERVISORY CONTROLLERS/ROUTERS AS REQUIRED TO CONNECT TO ALL NEW CONTROLLERS BEING INSTALLED AS PART OF THIS PROJECT, WHILE STILL KEEPING WITH ALL REQUIREMENTS SUCH AS SPARE CAPACITY REQUIREMENTS, ETC.

7) THE NETWORK SHALL NOT BE UTILIZED TO SEND DATA REQUIRED BY A CONTROL ALGORITHM FROM ONE CONTROLLER TO ANOTHER. THE DATA SHALL BE A DIRECT INPUT TO THE CONTROLLER CONTAINING THE CONTROL ALGORITHM. IF MULTIPLE CONTROLLERS REQUIRE THE SAME PIECE OF DATA FOR A CONTROL ALGORITHM, THE DATA SHALL BE AN INPUT TO EACH CONTROLLER.

D. PRIMARY CONTROL PANEL HARDWARE

1) ASHRAE 135 COMPLIANCE: PRIMARY CONTROL PANELS SHALL USE THE LATEST VERSION OF BACNET/ASHRAE 135 PROTOCOL AND COMMUNICATE USING ISO 8802-3 (ETHERNET) DATALINK/PHYSICAL LAYER PROTOCOL.

2) PROVIDE ALL NECESSARY HARDWARE FOR A COMPLETELY INDEPENDENT CONTROLLER, AND INSTALL ALL HARDWARE IN A PRIMARY CONTROL PANEL.

3) ALL PRIMARY CONTROL PANELS SHALL BE INSTALLED WITH 10% SPARE POINTS (OF EACH TYPE) AND 10% SPARE MEMORY CAPACITY FOR FUTURE CONNECTIONS.

4) EACH PRIMARY CONTROL PANEL SHALL AT A MINIMUM, BE 32BIT, STAND-ALONE, MULTI-TASKING, MULTI-USER, REAL-TIME 48MHZ DIGITAL CONTROL MICROPROCESSOR MODULE APPROPRIATE FOR NETWORK FUNCTION WITH PORTABLE COMPUTER AND PRINTER CONNECTION PORTS.

5) CONTROLLER SHALL HAVE A MINIMUM OF 32 MB RAM, 1 MB OF FLASH, AND 16K EPROM OR EEPROM. CONTROLLER SHALL BE PROVIDED WITH BATTERY BACKUP CAPABLE OF SUPPORTING ALL RAM, CLOCK FUNCTIONS, DDC DATABASE AND OPERATING PROGRAMS WITHIN THE CONTROLLER FOR A MINIMUM OF 72 HOURS IN THE EVENT OF POWER FAILURE OR POWER INTERRUPTION (IF INFORMATION IS NOT STORED IN NON-VOLATILE MEMORY).

6) PROVIDE ALL NECESSARY SOFTWARE FOR A COMPLETE OPERATING SYSTEM AS REQUIRED. ALL SOFTWARE SHALL RESIDE IN EACH PRIMARY CONTROL PANEL. PRIMARY CONTROL PANELS SHALL NOT BE DEPENDENT UPON ANY HIGHER LEVEL COMPUTER OR ANOTHER CONTROLLER FOR OPERATION.

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E. SECONDARY CONTROL PANEL HARDWARE

1) ASHRAE 135 COMPLIANCE: SECONDARY CONTROL PANELS SHALL USE THE LATEST VERSION OF BACNET/ASHRAE 135 PROTOCOL OVER MS/TP.

2) EACH SECONDARY CONTROL PANEL SHALL OPERATE AS A STAND-ALONE CONTROLLER CAPABLE OF PERFORMING ITS USER SELECTABLE CONTROL ROUTINES INDEPENDENTLY OF ANY OTHER CONTROLLER IN THE SYSTEM.

3) EACH SECONDARY CONTROL PANEL SHALL, AT A MINIMUM, BE A MICROPROCESSOR-BASED, MULTI-TASKING, STAND-ALONE, REAL-TIME DIGITAL CONTROL MICROPROCESSOR MODULE, LOCAL DIGITAL INPUT/OUTPUT STATUS, AND A PORTABLE COMPUTER CONNECTION PORT.

4) CONTROLLERS SHALL INCLUDE ALL MEMORY AND POINT INPUTS AND OUTPUTS NECESSARY TO PERFORM THE SPECIFIED CONTROL SEQUENCES. AS A MINIMUM, 50% OF THE POINT OUTPUTS SHALL BE OF THE UNIVERSAL TYPE; THAT IS, THE OUTPUTS MAY BE UTILIZED EITHER AS MODULATING OR TWO-STATE, ALLOWING FOR ADDITIONAL SYSTEM FLEXIBILITY. IN LIEU OF UNIVERSAL OUTPUTS, PROVIDE A MINIMUM OF 50% SPARE OUTPUTS OF EACH TYPE VIA ADDITIONAL POINT TERMINATION BOARDS OR CONTROLLERS. ANALOG OUTPUTS SHALL BE INDUSTRY STANDARD SIGNALS SUCH AS 24 VAC FLOATING CONTROL, ALLOWING FOR INTERFACE TO A VARIETY OF MODULATING ACTUATORS. TERMINAL EQUIPMENT CONTROLLERS UTILIZING PROPRIETARY CONTROL SIGNALS AND ACTUATORS SHALL NOT BE ACCEPTABLE.

5) ALL DATABASES AND PROGRAMS SHALL BE STORED IN NON-VOLATILE EEPROM, EPROM AND PROM. CONTROLLER SHALL HAVE A MINIMUM OF 16K EPROM OR EEPROM.

6) PROVIDE ALL NECESSARY SOFTWARE FOR A COMPLETE OPERATING SYSTEM AS REQUIRED. ALL SOFTWARE SHALL RESIDE IN EACH SECONDARY CONTROL PANEL. SECONDARY CONTROL PANELS SHALL NOT BE DEPENDENT UPON ANY HIGHER LEVEL COMPUTER OR ANOTHER CONTROLLER FOR OPERATION.

7) LIMIT THE NUMBER OF SECONDARY CONTROLS TO 60 OR AS REQUIRED BY THE MANUFACTURER.

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F. WEB BASED OPERATOR INTERFACE

1) OPERATOR INTERFACE SHALL BE PROVIDED FOR COMMAND ENTRY, INFORMATION MANAGEMENT, NETWORK ALARM MANAGEMENT, AND DATABASE MANAGEMENT FUNCTIONS. ALL REAL-TIME CONTROL FUNCTIONS SHALL BE RESIDENT IN THE DDC CONTROLLERS TO FACILITATE GREATER FAULT TOLERANCE AND RELIABILITY.

2) EACH WORKSTATION OR WEB SERVER SHALL CONSIST OF THE FOLLOWING: INDUSTRY-STANDARD HARDWARE SHALL MEET OR EXCEED DDC SYSTEM MANUFACTURER'S RECOMMENDED SPECIFICATIONS AND SHALL MEET REQUIREMENTS INCLUDED HEREIN. HARD DISK SHALL HAVE SUFFICIENT MEMORY TO STORE SYSTEM SOFTWARE, ONE (1) YEAR OF DATA FOR TRENDED POINTS AND A SYSTEM DATABASE AT LEAST TWICE THE SIZE OF THE EXISTING DATABASE AT SYSTEM ACCEPTANCE. CONFIGURE COMPUTERS AND NETWORK CONNECTIONS IF MULTIPLE COMPUTERS ARE REQUIRED TO MEET SPECIFIED MEMORY AND PERFORMANCE.

3) OPERATING SYSTEM. WEB SERVER SHALL HAVE AN INDUSTRY-STANDARD PROFESSIONAL-GRADE OPERATING SYSTEM. ACCEPTABLE SYSTEMS INCLUDE MICROSOFT WINDOWS XP PRO, RED HAT LINUX OR SUN SOLARIS.

4) SYSTEM GRAPHICS. OPERATOR INTERFACE SHALL BE GRAPHICALLY BASED AND SHALL INCLUDE AT LEAST ONE (1) GRAPHIC PER PIECE OF EQUIPMENT OR OCCUPIED ZONE, GRAPHICS FOR EACH CHILLED WATER AND HOT WATER SYSTEM AND GRAPHICS THAT SUMMARIZE CONDITIONS ON EACH FLOOR OF EACH BUILDING INCLUDED IN THIS CONTRACT. PROVIDE LINKS ON EACH GRAPHIC TO PDF FILES OF THE ASSOCIATED SEQUENCE OF OPERATION, FLOW DIAGRAM, AND WIRING DIAGRAM.

G. SENSORS

1) ALL ELECTRONIC SENSORS SHALL BE VIBRATION AND CORROSION RESISTANT FOR WALL, IMMERSION, OR DUCT MOUNTING AS REQUIRED.

2) TEMPERATURE SENSORS USED IN DUCT OR SPACE SENSING APPLICATIONS SHALL BE THERMISTORS. TEMPERATURE SENSORS SHALL HAVE THE FOLLOWING CHARACTERISTICS.

A. ACCURACY: PLUS OR MINUS 0.5 DEGF.

B. WIRE: TWISTED, SHIELDED-PAIR CABLE.

C. INSERTION ELEMENTS IN DUCTS: SINGLE POINT; USE WHERE NOT AFFECTED BY TEMPERATURE STRATIFICATION OR WHERE DUCTS ARE SMALLER THAN 9SQ FT. (1 SQ M). THE LENGTH OF THE SENSOR SHALL BE A MINIMUM OF ONE-THIRD OF THE WIDTH OF THE DUCT WITH A MAXIMUM LENGTH OF EIGHTEEN (18) INCHES. PROVIDE DUCT MOUNTED METAL HOUSING WITH CONDUIT ENTRANCE.

D. AVERAGING ELEMENTS IN DUCTS: USE WHERE PRONE TO TEMPERATURE STRATIFICATION OR WHERE DUCTS ARE LARGER THAN 9SQ FT (1 SQ M); LENGTH AS REQUIRED. THE LENGTH OF THE SENSOR SHALL BE TWELVE (12) FEET MINIMUM OR ONE (1) LINEAR FOOT PER EVERY FOUR (4) SQ FT OF CUT CROSS SECTION, WHICHEVER IS GREATER. PROVIDE DUCT MOUNTED METAL HOUSING WITH CONDUIT ENTRANCE AND MOUNTING CLIPS.

E. PROVIDE ONE (1) AVERAGING TEMPERATURE SENSOR FOR EACH PREHEAT OR HEATING COIL SECTION IN AN AIR HANDLING UNIT. THE SENSOR SHALL BE INSTALLED ON THE DISCHARGE SIDE OF EACH PREHEAT COIL.

F. SPACE SENSORS:

(1) SET-POINT ADJUSTMENT AND INDICATION: EXPOSED

(2) LCD DISPLAY FOR TEMPERATURE READING

(3) OCCUPANCY OVERRIDE WITH AN ADJUSTABLE TIME PERIOD FROM 1/2 TO 3 HOURS.

(4) SPACE SENSORS PROVIDED IN EXISTING FACILITIES SHALL MATCH EXISTING SITE STANDARD.

(5) PROVIDE A COMMUNICATION PORT FOR CONNECTION OF A LAPTOP OR OTHER PORTABLE INTERFACE DEVICE.

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4) STATIC-PRESSURE TRANSMITTER: NONDIRECTIONAL SENSOR WITH SUITABLE RANGE FOR EXPECTED INPUT, AND TEMPERATURE COMPENSATED.

A. ACCURACY: 1% OF FULL SCALE WITH REPEATABILITY OF 0.1%.

B. OUTPUT: 4 - 20MA.

C. BUILDING STATIC-PRESSURE RANGE: 0-0.25" WG (0-62 PA).

D. DUCT STATIC-PRESSURE RANGE: 0-5" WG (0-1243 PA).

E. PROVIDE A SETRA M264 OR PRE-APPROVED EQUAL.

F. THESE SENSORS SHALL BE USED FOR CONTROL OF FAN VFDS, MONITORING OF FILTER DP, ETC.

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H. DAMPER ENDSWITCHES

1) PROVIDE A NON-MERCURY, SPDT SWITCH FOR MOUNTING ON DAMPER SHAFT. SWITCH MAKES AT 20° ABOVE HORIZONTAL. PROVIDE JOHNSON CONTROLS TS-475 SERIES OR PRE-APPROVED EQUAL.

I. EQUIPMENT OPERATION SENSORS AS FOLLOWS:

1) STATUS INPUTS FOR FANS: DIFFERENTIAL-PRESSURE SWITCH WITH ADJUSTABLE RANGE OF 0 TO 5 INCHES WG.

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J. LEAK DETECTOR: LEAK DETECTOR SHALL HAVE MOUNTING FEET WITH LEGS ADJUSTABLE UP TO 1 ½", GOLD-PLATED WATER DETECTION PROBES, ADJUSTABLE HEIGHT, A GREEN LED TO INDICATE POWER, A RED LED TO INDICATE WATER DETECTED, SPDT ALARM CONTACTS. THE ENCLOSURE SHALL BE CAST ALUMINUM, WEATHERPROOF WITH ADJUSTABLE LEGS. THE LEAK DETECTOR SHALL OPERATE BETWEEN 11 AND 27 VAC/DC. PROVIDE KELE WD-1B.

K. WALL MOUNTED REMOTE ANNUNCIATOR. THE REMOTE ANNUNCIATOR SHALL BE EQUIPPED WITH AN ALARM LED, A HORN, AND A "SILENCE" PUSH-BUTTON FOR THE HORN. THE REMOTE ANNUNCIATOR SHALL BE GOLDLINES MODEL RAM OR PREAPPROVED EQUAL.

L. CURRENT SENSING RELAY: PROVIDE AND INSTALL CURRENT SENSORS FOR ALL MOTOR STATUS POINTS. CURRENT SENSOR SHALL BE SPLIT CORE AND SIZED FOR EXPECTED AMPERAGE. UNIT SHALL BE UL LISTED. PROVIDE STATUS LEDS FOR CURRENT SENSED BELOW SETPOINT AND CURRENT SENSED ABOVE SETPOINT. THE CURRENT SENSOR SHALL BE FIELD CALIBRATED TO DETECT BELT LOSS, COUPLING SHEAR AND MECHANICAL FAILURE. THE CURRENT SENSOR OUTPUT SHALL BE N.O., SOLID STATE AND RATED FOR 1.0A AT 30 VAC/DC. CURRENT SENSOR SHALL BE MANUFACTURED BY HAWKEYE OR PRE-APPROVED EQUAL.

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M.

N. CONTROL RELAYS: MECHANICAL RELAY: THE CONTROL RELAY SHALL BE RATED FOR 24 VAC OR 24VDC; MAXIMUM CONTACT RATING OF 10 AMP AT 30 VDC OR 250 VAC. OUTPUTS SHALL BE TRUE FORM C TYPE CONTACTS; SOLID STATE RELAYS ARE NOT ACCEPTABLE.

O. CONTROL TRANSFORMERS SHALL BE UL LISTED. FURNISH CLASS 2 CURRENT-LIMITING TYPE OR FURNISH OVER-CURRENT PROTECTION IN PRIMARY AND SECONDARY CIRCUITS FOR CLASS 2 SERVICE IN ACCORDANCE WITH NEC REQUIREMENTS. LIMIT CONNECTED LOADS TO 80% OF RATED CAPACITY.

P. THERMOSTATS

1) ELECTRIC, SOLID-STATE, MICROCOMPUTER-BASED ROOM THERMOSTAT WITH REMOTE SENSOR.

A. AUTOMATIC SWITCHING FROM HEATING TO COOLING.

B. PREFERENTIAL RATE CONTROL TO MINIMIZE OVERSHOOT AND DEVIATION FROM SET POINT.

C. SET UP FOR FOUR (4) SEPARATE TEMPERATURES PER DAY.

D. INSTANT OVERRIDE OF SET POINT FOR CONTINUOUS OR TIMED PERIOD FROM 1 HOUR TO 31 DAYS.

E. SHORT-CYCLE PROTECTION.

F. PROGRAMMING BASED ON EVERY DAY OF WEEK.

G. SELECTION FEATURES INCLUDE 'F OR 'C DISPLAY, 12- OR 24-HOUR CLOCK, KEYBOARD DISABLE, REMOTE SENSOR AND FAN ON-AUTO.

H. BATTERY REPLACEMENT WITHOUT PROGRAM LOSS.

I. 0-10 VDC ANALOG OUTPUT AND MULTI SPEED FAN CONTROLS.

2) ELECTRIC LOW-LIMIT DUCT THERMOSTAT: SNAP-ACTING, SINGLE-POLE, SINGLE-THROW, MANUAL- OR AUTOMATIC-RESET SWITCH THAT TRIPS IF TEMPERATURE SENSED ACROSS ANY 12 INCHES OF BULB LENGTH IS EQUAL TO OR BELOW SET POINT. SETPOINT SHALL BE ADJUSTABLE.

A. BULB LENGTH: MINIMUM 20 FEET.

B. QUANTITY: ONE THERMOSTAT FOR EVERY 20 SQ. FT. OF COIL SURFACE.

C. PROVIDE ONE (1) FREEZESTAT FOR EACH COOLING COIL IN AN AIR HANDLING UNIT.

D. PROVIDE JCI A70 SERIES OR PRE-APPROVED EQUAL.

Q. AUTOMATIC CONTROL VALVES

1) ALL AUTOMATIC CONTROL VALVES SHALL MEET THE FOLLOWING REQUIREMENTS:

A. FULLY PROPORTIONING.

B. CAPABLE OF OPERATING AT VARYING RATES OF SPEED TO CORRESPOND TO THE EXACT DICTATES OF THE CONTROLLERS AND VARIABLE LOAD REQUIREMENTS.

C. BODY PRESSURE RATING AND CONNECTION TYPE CONSTRUCTION SHALL CONFORM TO PIPING AND FITTINGS IN WHICH THE VALVE IS TO BE INSTALLED AND TO THE VALVE SCHED?ULES.

D. ISOLATION VALVE SHALL BE LINE SIZE, FULL PORT BALL VALVE WITH STAINLESS STEEL BALL AND STEM. ISOLATION VALVE 4" AND LARGE SHALL BE BUTTERFLY VALVES.

E. CONTROL VALVES 2" AND SMALLER SHALL HAVE SCREWED CONNECTIONS.

F. CONTROL VALVES LARGER THAN 2 1/2" SHALL HAVE FLANGED CONNECTIONS.

2) WATER CONTROL VALVES: HOT WATER

A. TWO-POSITION VALVES SHALL BE QUICK OPENING TYPE WITH THE FOLLOWING CHARACTERISTICS:

(1) VALVES SHALL HAVE REPLACEABLE SEAT, PLUG, OR DISC.

(2) VALVES SHALL BE LINE SIZE.

(3) VALVE BODY SHALL BE BRONZE, CAST IRON, FORGED BRASS, OR RED BRASS.

(4) BALL VALVE SHALL HAVE STAINLESS STEEL STEM, STAINLESS STEEL BALL, AND PTFE SEATS.

(5) GLOBE VALVE SHALL HAVE STAINLESS STEEL STEM AND SINGLE STAINLESS STEEL SEAT.

(6) THE PRESSURE DROP SHALL NOT EXCEED 10-20% OF THE PIPING SYSTEM PRESSURE DIFFERENTIAL, LEAVING THE OTHER 80-90% FOR THE LOAD AND PIPING CONNECTIONS.

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(7) THREE-WAY VALVE

i. VALVE ACTUATOR AND TRIM SHALL PROVIDE CLOSE-OFF (DIFFERENTIAL) PRESSURE RATINGS GREATER THAN OR EQUAL TO 150% OF THE TOTAL SYSTEM (PUMP) HEAD.

B. MODULATING CONTROL VALVES SHALL HAVE THE FOLLOWING CHARACTERISTICS:

(1) VALVE SHALL BE ONE SIZE BELOW PIPE SIZE.

(2) VALVE SHALL HAVE REPLACEABLE SEAT, PLUG, OR DISC.

(3) EQUAL PERCENTAGE FLOW CHARACTERISTIC (CHARACTERIZED BALL OR GLOBE TYPE VALVES).

(4) VALVE BODY SHALL BE BRONZE, CAST IRON, FORGED BRASS OR RED BRASS.

(5) BALL VALVE SHALL HAVE STAINLESS STEEL STEM, STAINLESS STEEL BALL, AND PTFE SEATS.

(6) GLOBE VALVE SHALL HAVE STAINLESS STEEL STEAM AND SINGLE STAINLESS STEEL SEAT.

C. THREE-WAY VALVE

(1) CALCULATE CV BASED UPON MAXIMUM DESIGN FLOW AND A PRESSURE DROP EQUAL TO THE PRESSURE DROP THROUGH THE COIL WITH A MAXIMUM OF 5 PSI (35 KPA).

(2) VALVE ACTUATOR AND TRIM SHALL PROVIDE CLOSE-OFF (DIFFERENTIAL) PRESSURE RATINGS GREATER THAN OR EQUAL TO 150% OF THE TOTAL SYSTEM (PUMP) HEAD.

3) PROVIDE ONE (1) CONTROL VALVE FOR EACH PREHEAT OR HEATING COIL AT A MINIMUM.

4) CONTROL VALVES 4" AND LARGER SHALL BE BUTTERFLY VALVES FOR ISOLATION APPLICATIONS AND GLOBE VALVES FOR MODULATING APPLICATIONS.

5) CONTROL VALVES SHALL BE BELIMO, HONEYWELL, JOHNSON CONTROLS, SIEMENS OR PRE-APPROVED EQUAL.

6) ALL VALVE ACTUATORS SHALL MEET THE FOLLOWING REQUIREMENTS:

A. ALL VALVE ACTUATION SHALL BE ELECTRIC. PNEUMATIC ACTUATION IS NOT ACCEPTABLE.

B. VALVE ACTUATOR SHALL BE BY SAME MANUFACTURER AS VALVE BODY UNLESS PRE-APPROVED.

C. VALVE ACTUATORS SHALL:

(1) PROVIDE SMOOTH MODULATION AT DESIGN FLOW AND PRESSURE CONDITIONS.

(2) BE QUIET IN OPERATION.

(3) BE SIZED TO CLOSE AGAINST A DIFFERENTIAL PRESSURE EQUAL TO THE DESIGN PUMP HEAD PLUS 15%. WHERE PRESSURE AND FLOW COMBINATIONS EXCEED RATINGS FOR COMMERCIAL VALVES AND ACTUATORS, INDUSTRIAL CLASS VALVES AND ACTUATORS SHALL BE PROVIDED.

(4) BE CAPABLE OF OPERATING IN SEQUENCE WITH OTHER VALVES AND/OR DAMPER ACTUATORS WHEN REQUIRED BY THE SEQUENCE OF OPERATION.

D. VALVE ACTUATORS SHALL FAIL-SAFE IN EITHER THE NORMALLY OPEN OR NORMALLY CLOSED POSITION IN THE EVENT OF POWER FAILURE, SIGNAL FAILURE OR COMPRESSED AIR FAILURE. FAIL SAFE POSITIONS ARE AS FOLLOWS:

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(1) PREHEAT VALVES NORMALLY OPEN

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8) ELECTRIC VALVE ACTUATION

A. ACTUATOR SHALL HAVE ELECTRONIC, PROPORTIONAL CONTROL AND SHALL BE DIRECT-COUPLED WITH SPRING RETURN.

B. ACTUATORS SHALL BE EQUIPPED WITH A PERMANENT MANUAL OVERRIDE HAND WHEEL AND VISUAL AND ELECTRONIC STROKE INDICATORS.

C. OPERATING VOLTAGE: 24VAC; INPUT SIGNAL: 0-10VDC, 4 - 20MA; POWER CONSUMPTION: 18VA MAXIMUM (VALVES 2" AND UNDER), 28VA MAXIMUM (VALVES 2-1/2" - 4"); SPRING RETURN TIME: 15 SECONDS MAXIMUM;

D. SPRING RETURN POSITION SHOULD BE FIELD ADJUSTABLE WITH A SWITCH.

E. NOMINAL FORCE: 225LB MINIMUM (VALVES 2? AND UNDER), 610LB. (VALVES 2-1/2"-4")

F. STROKE: 3/4" (20MM) MAXIMUM (VALVES 2" AND UNDER), 1-1/2" (VALVES 2-1/2"-4").

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R.

S. DAMPER ACTUATION

1) ALL DAMPER ACTUATION SHALL BE ELECTRIC. PNEUMATIC ACTUATION IS NOT ACCEPTABLE.

2) ALL DAMPER ACTUATORS SHALL MEET THE FOLLOWING REQUIREMENTS:

A. ALL DAMPER ACTUATORS SHALL HAVE SUFFICIENT POWER TO OVERCOME FRICTION OF DAMPER LINKAGE AND AIR PRESSURE ACTING ON LOUVERS AND TO OPERATE THE DAMPER SMOOTHLY THROUGHOUT THE ENTIRE DAMPER RANGE.

B. ACTUATORS SHALL BE SIZED WITH A TORQUE GREATER THAN 150% OF THE DESIGN DAMPER TORQUE.

C. ACTUATORS SHALL HAVE MOUNTING ARRANGEMENT FOR LOCATION OUTSIDE OF THE AIR STREAM. THE DAMPER ACTUATORS SHALL BE MOUNTED ON THE DAMPER EXTENSION SO THAT IT IS NOT BURNED IN THE WALL CONSTRUCTION.

3) DAMPER ACTUATORS SHALL FAIL-SAFE IN EITHER THE NORMALLY OPEN OR NORMALLY CLOSED POSITION IN THE EVENT OF POWER FAILURE, SIGNAL FAILURE OR COMPRESSED AIR FAILURE. FAIL SAFE POSITIONS ARE AS FOLLOWS:

A. OUTSIDE AIR DAMPERS NORMALLY CLOSED

B. RETURN AIR DAMPERS NORMALLY OPEN

C. EXHAUST AIR DAMPERS NORMALLY CLOSED

D. ISOLATION DAMPERS NORMALLY CLOSED

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4) INCREMENTAL ELECTRONIC ACTUATOR FOR TERMINAL EQUIPMENT DAMPER ACTUATION

A. ACTUATORS SHALL BE PROPORTIONAL, ELECTRONIC, DIRECT-COUPLED ACTUATORS USED FOR MODULATING SERVICE. ACTUATORS SHALL BE EQUIPPED WITH METAL HOUSINGS AND VISUAL STROKE INDICATORS.

B. ACTUATORS SHALL BE EQUIPPED WITH A PERMANENT MANUAL ADJUSTMENT. SPRING RETURN POSITION SHOULD BE FIELD ADJUSTABLE WITH A SWITCH.

C. MINIMUM TORQUE: 35" LB; OPERATING VOLTAGE: 24VAC; POWER CONSUMPTION: 1.5VA MAXIMUM; SPRING RETURN TIME: 20 SEC MAXIMUM.

5) ELECTRIC DAMPER ACTUATION

A. PROVIDE PROPORTIONAL, ELECTRONIC, DIRECT-COUPLED SPRING RETURN ACTUATORS FOR ALL AUTOMATIC DAMPERS USED FOR MODULATING SERVICE. EACH ACTUATOR SHALL BE EQUIPPED WITH A BRUSHLESS DC MOTOR, SELF CENTERING SHAFT COUPLING, METAL HOUSING, PERMANENT MANUAL OVERRIDE, VISUAL STROKE INDICATORS AND BUILT IN ADJUSTABLE START AND SPAN CONTROLS WITH THE FOLLOWING SPECIFICATIONS:

(1) OPERATING VOLTAGE: 24VAC; INPUT SIGNAL: 0-10VDC, 4 - 20MA (MODULATING), ON/OFF (2-POSITION); POWER CONSUMPTION: 9 VA MAXIMUM.

(2) SPRING RETURN TIME: 15 SECONDS MAXIMUM. SPRING RETURN POSITION SHOULD BE FIELD ADJUSTABLE WITH A SWITCH.

(3) MINIMUM TORQUE: 133" LB.

6) DAMPER ACTUATORS SHALL BE BELIMO OR PRE-APPROVED EQUAL.

22. AUTOMATIC CONTROLS EXECUTION

A. INSTALLATION

1) CONNECT AND CONFIGURE EQUIPMENT AND SOFTWARE TO ACHIEVE SEQUENCE OF OPERATION SPECIFIED.

2) VERIFY LOCATION OF THERMOSTATS, HUMIDISTATS, AND OTHER EXPOSED CONTROL SENSORS WITH PLANS AND ROOM DETAILS BEFORE INSTALLATION. LOCATE ALL 60 INCHES ABOVE THE FLOOR OR AS OTHERWISE REQUIRED BY ADA.

3) INSTALL AVERAGING ELEMENTS IN DUCTS AND PLENUMS IN CROSSING OR ZIGZAG PATTERN.

4) INSTALL DAMPER MOTORS ON OUTSIDE OF DUCT IN WARM AREAS, NOT IN LOCATIONS EXPOSED TO OUTDOOR TEMPERATURES.

5) WATER LINE MOUNTED SENSORS SHALL BE REMOVABLE WITHOUT SHUTTING DOWN THE SYSTEM IN WHICH THEY ARE INSTALLED.

6) FOR DUCT STATIC PRESSURE SENSORS, THE HIGH PRESSURE PORT SHALL BE CONNECTED TO A METAL STATIC PRESSURE PROBE INSERTED INTO THE DUCT POINTING UPSTREAM. THE LOW PRESSURE PORT SHALL BE LEFT OPEN TO THE PLENUM AREA AT THE POINT THAT THE HIGH PRESSURE PORT IS TAPPED INTO THE DUCTWORK.

7) AVERAGING TEMPERATURE SENSORS (I.E. FREEZESTATS, MIXED AIR TEMPERATURE SENSOR, ETC.) SHALL BE PROVIDED WITH FASTENERS OR MOUNTING CLIPS TO PREVENT SHEARING DUE TO VIBRATIONS IN THE DUCTWORK.

B. ELECTRICAL WIRING AND CONNECTION INSTALLATION

1) INSTALL, CONNECT AND WIRE THE ITEMS INCLUDED UNDER THIS SECTION. THIS WORK INCLUDES PROVIDING REQUIRED CONDUIT, WIRE, FITTINGS AND RELATED WIRING ACCESSORIES.

2) ALL EXPOSED WIRING AND WIRING IN MECHANICAL EQUIPMENT ROOMS SHALL BE INSTALLED IN CONDUIT.

3) PLENUM RATED CABLE SHALL BE ACCEPTABLE IN HUNG CEILINGS, WALLS, AND RAISED FLOORS.

■ Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID
04/10/2019	△ADDENDUM #2

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■ Project

TOWN OF STRATFORD
2725 Main Street
Stratford, CT 06614

Mechanical Upgrades:

Eli Whitney School
1130 Huntington Rd.
Stratford, CT

■ Drawing Title

MECHANICAL SPECIFICATIONS

Issued 03/05/2019	Drawing No. M-403
Scale NTS	
Job No. 183171-000	

4) ALL WIRING LOCATED OUTSIDE SHALL BE INSTALLED IN RIGID CONDUIT, SEAL TITE, OR EMT WITH COMPRESSION FITTINGS.

5) FASTEN FLEXIBLE CONDUCTORS, BRIDGING CABINETS AND DOORS, ALONG HINGE SIDE; PROTECT AGAINST ABRASION. TIE AND SUPPORT CONDUCTORS.

6) NUMBER–CODE OR COLOR–CODE CONDUCTORS FOR FUTURE IDENTIFICATION AND SERVICE OF CONTROL SYSTEM, EXCEPT LOCAL INDIVIDUAL ROOM CONTROL CABLES.

7) WIRES AND CABLES SHALL BE AS FOLLOWS:

A. SINGLE CONDUCTOR (120VAC): TYPE THWN 12AWG STRANDED COPPER WITH 600V INSULATION

8) PRIMARY AND SECONDARY COMMUNICATIONS NETWORK CABLING

A. CABLE SHALL BE OF TYPE RECOMMEND BY THE DDC SYSTEM MANUFACTURER AND 20AWG AT A MINIMUM.

B. CABLE SHALL BE SHIELDED.

9) ROOM SENSOR CABLING

A. CABLE SHALL CONSIST OF COPPER CONDUCTORS NOT LESS THAN NO. 24 AWG.

10) CABLES FOR 120VAC WIRING AND LOW LEVEL SIGNAL WIRING (I.E., 4 – 20MA ANALOG) SHALL ALWAYS BE RUN IN SEPARATE RACEWAYS.

C. FIELD QUALITY CONTROL

1) OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER UNIT OPERATION. REMOVE MALFUNCTIONING UNITS, REPLACE WITH NEW UNITS, AND RETEST.

2) TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT, AND RETEST.

3) ADJUST, CALIBRATE, AND FINE TUNE CIRCUITS AND EQUIPMENT TO ACHIEVE SEQUENCE OF OPERATION SPECIFIED.

D. TRAINING

1) THE BMS CONTRACTOR SHALL PROVIDE COMPETENT INSTRUCTORS TO GIVE FULL INSTRUCTION TO DESIGNATED PERSONNEL IN THE ADJUSTMENT, OPERATION, AND MAINTENANCE OF THE SYSTEM INSTALLED RATHER THAN A GENERAL TRAINING COURSE.

2) PROVIDE EIGHT (8) HOURS OF TRAINING FOR OWNER'S OPERATING AND MAINTENANCE PERSONNEL. ALL TRAINING SHALL BE ON–SITE TRAINING. VIDEOTAPE ALL SESSIONS AND EDIT EACH SESSION TO 1–HOUR DVDS. TURN OVER TWO (2) COPIES EACH UNEDITED AND EDITED DVD TO THE OWNER. TRAINING SHALL INCLUDE:

A. EXPLANATION OF DRAWINGS, OPERATORS AND MAINTENANCE MANUALS.

B. WALK–THROUGH OF THE JOB TO LOCATE ALL CONTROL COMPONENTS.

C. OPERATOR WORKSTATION AND PERIPHERALS.

D. DDC CONTROLLER OPERATION/FUNCTION.

E. OPERATOR CONTROL FUNCTIONS INCLUDING GRAPHIC GENERATION, IF DESIGN INCLUDES COLOR GRAPHICS AND FIELD PANEL PROGRAMMING.

F. EXPLANATION OF ADJUSTMENT, CALIBRATION AND REPLACEMENT PROCEDURES.

E. RECORD DOCUMENTATION

1) OPERATION AND MAINTENANCE MANUALS

A. THREE (3) COPIES OF THE OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER'S REPRESENTATIVE UPON COMPLETION OF THE PROJECT. THE ENTIRE OPERATION AND MAINTENANCE MANUAL SHALL BE FURNISHED ON COMPACT DISC MEDIA AND INCLUDE THE FOLLOWING FOR THE BMS PROVIDED:

(1) TABLE OF CONTENTS.

(2) AS–BUILT SYSTEM RECORD DRAWINGS. RECORD DRAWINGS SHALL REPRESENT THE AS–BUILT CONDITION OF THE SYSTEM AND INCORPORATE ALL INFORMATION SUPPLIED WITH THE APPROVED SUBMITTAL.

(3) MANUFACTURERS PRODUCT DATA SHEETS OR CATALOG PAGES FOR ALL PRODUCTS INCLUDING SOFTWARE.

(4) SYSTEM OPERATOR'S MANUALS.

(5) ARCHIVE COPY OF ALL SITE–SPECIFIC DATABASES AND SEQUENCES.

(6) BMS NETWORK DIAGRAMS.

(7) INTERFACES TO ALL THIRD–PARTY PRODUCTS AND WORK BY OTHER TRADES.

2) THE OPERATION AND MAINTENANCE MANUAL CD SHALL BE SELF–CONTAINED AND INCLUDE ALL NECESSARY SOFTWARE REQUIRED TO ACCESS THE PRODUCT DATA SHEETS. A LOGICALLY ORGANIZED TABLE OF CONTENTS SHALL PROVIDE DYNAMIC LINKS TO VIEW AND PRINT ALL PRODUCT DATA SHEETS. VIEWER SOFTWARE SHALL PROVIDE THE ABILITY TO DISPLAY, ZOOM AND SEARCH ALL DOCUMENTS.

F. ON–SITE ASSISTANCE

1) OCCUPANCY ADJUSTMENTS: WITHIN ONE YEAR OF DATE OF SUBSTANTIAL COMPLETION, PROVIDE UP TO THREE PROJECT–SITE VISITS, WHEN REQUESTED BY OWNER, TO ADJUST AND CALIBRATE COMPONENTS AND TO ASSIST OWNER'S PERSONNEL IN MAKING PROGRAM CHANGES AND IN ADJUSTING SENSORS AND CONTROLS TO SUIT ACTUAL CONDITIONS.

23. SEQUENCES OF OPERATIONS

A. GENERAL

1) ALL SAFETY DEVICES SHALL BE HARDWIRED TO THE STARTER AND SHALL HAVE A SECOND CONTACT FOR MONITORING VIA THE BMS.

2) A FAILURE ALARM, AS INCLUDED IN THE POINT LIST, SHALL INDICATE THE TYPE OF EQUIPMENT THAT HAS FAILED (PUMP, FAN, VALVE, ETC.) INCLUDING THE SPECIFIC DESIGNATION OF THE PIECE OF EQUIPMENT (E.G., SUPPLY FAN SF–1). IT IS NOT ACCEPTABLE TO GENERATE A GENERAL FAILURE ALARM.

3) ALARMING DEVICES SUCH AS FREEZESTATS, PRESSURE SAFETIES, ETC. SHALL BE WIRED SO THE CONTACTS OPEN IN THE ALARM CONDITION. ALL ALARM POINTS SHALL BE ANNUNCIATED AT THE BMS AUDIBLY AND VISUALLY. ALL ALARM POINTS ASSOCIATED WITH VARYING VALUES SHALL BE PROVIDED WITH ADJUSTABLE LIMITS.

4) FREEZESTATS SHALL BE AUTOMATIC RESET TYPE AND SHALL BE INSTALLED WITH TIME DELAY AND LATCHING RELAYS. A FREEZESTAT MUST SEE A FREEZE CONDITION FOR A PERIOD OF 180 SECONDS (ADJ.) PRIOR TO SHUTTING DOWN AN AIR HANDLING UNIT. ONCE THE FREEZESTAT HAS BEEN ACTIVATED, MANUAL RESET AT THE BMS PANEL SHALL BE REQUIRED TO ALLOW THE SYSTEM TO RESTART.

5) AIR PRESSURE SWITCHES SHALL BE MANUAL RESET TYPE AND A MANUAL RESET AT THE SWITCH SHALL BE REQUIRED TO ALLOW THE SYSTEM TO RESTART.

6) ALL SETPOINTS INCLUDING SETPOINTS INTERNAL TO CONTROL ALGORITHMS SHALL BE ADJUSTABLE FROM ALL BMS OPERATOR INTERFACES. ALL COMMANDS SHALL BE OVERRIDEABLE FROM ALL BMS OPERATOR INTERFACES. ALL CONTROL POINTS SHALL BE ADJUSTABLE OR OVERRIDEABLE FROM THE SAME GRAPHIC PAGE THAT DISPLAYS THE POINTS.

2 7)

8) ALL POINTS REQUIRED BY THE SEQUENCE OF OPERATION INCLUDING, BUT NOT LIMITED TO, THE POINTS LISTED IN THE SEQUENCES OF OPERATION BELOW, AS WELL AS ALL OF THE POINTS' ASSOCIATED VALUES, SHALL BE CONNECTED TO THE BMS AND AVAILABLE TO THE BMS OPERATORS ON ALL OPERATOR WORKSTATIONS AND ALL OPERATOR INTERFACE DEVICES AS PART OF A GRAPHICAL DISPLAY THAT DEPICTS THE MECHANICAL SYSTEM CONTROLLED.

9) ALL VALVES, DAMPERS, CONTROLLERS, CONTROL DEVICES, ETC. EXPOSED TO OUTSIDE AIR CONDITIONS SHALL BE SPECIFICALLY DESIGNED FOR OUTSIDE AIR CONDITIONS INCLUDING, BUT NOT LIMITED TO, NEMA 4X ENCLOSURES, WEATHERPROOF ENCLOSURES AND ALL OTHER WEATHER PRECAUTIONS RECOMMENDED BY THE MANUFACTURER.

10) ALL ALARMS ASSOCIATED WITH EQUIPMENT THAT IS DISABLED SHALL BE INHIBITED.

11) WHEN THE MOTOR CONTROLLER IS EQUIPPED WITH AN HOA, THE MOTORS SHALL ONLY BE CONTROLLED BY THE BMS WHEN THE HOA SWITCH IS IN THE AUTO POSITION.

12) FREEZESTATS, PRESSURE SAFETIES, INTERLOCKED DAMPERS, ETC. SHALL BE WIRED TO SHUTDOWN MOTORS WHEN THE HOA SWITCH IS IN BOTH THE HAND AND AUTO POSITIONS. IT SHALL NOT BE POSSIBLE TO OVERRIDE THESE OR ANY OTHER SAFETY DEVICES OR ANY FIRE ALARM SYSTEM CONTROL FUNCTIONS, EXCEPT IN THE CASE OF AN ENGINEERED SMOKE CONTROL SYSTEM IN WHICH CASE FREEZE PROTECTION SAFETIES SHALL BE OVERRIDDEN.

2 13)

14) THE POINT LISTS ARE PROVIDED FOR CONVENIENCE AND ARE NOT INTENDED TO BE ALL–INCLUSIVE. ALL POINTS REQUIRED TO PROVIDE THE SEQUENCE OF OPERATION SHALL BE INCLUDED AS IF LISTED.

2 B. TIE–IN TO EXISTING BMS

1) PROVIDE A SEAMLESS TIE–IN TO THE EXISTING BMS. THE TIE–IN SHALL INCLUDE DIRECT DIGITAL CONTROL (DDC), HISTORICAL DATA COLLECTION, ARCHIVING AND ALARM, ENERGY AND INFORMATION MANAGEMENT FOR ALL CONTROL POINTS SPECIFIED HEREIN.

2) TIE–IN TO EXISTING SITE BMS OF ALL DDC EQUIPMENT AND POINTS AS SPECIFIED IN THIS SECTION AND AS REQUIRED IN ALL OTHER REFERENCED SECTIONS AS REQUIRED TO COMPLETE THE SEQUENCES OF OPERATION OUTLINED BELOW. TIE–IN SHALL BE MADE VIA AN EXTENSION OF THE EXISTING BMS.

3) PROVIDE NEW COLOR GRAPHICS FOR ALL NEW SYSTEMS SPECIFIED IN THIS CONTRACT.

4) REVISIONS TO ALL EXISTING BMS WORKSTATIONS AS REQUIRED TO INCORPORATE THE ADDITIONAL CONTROL COMPONENTS PROVIDED UNDER THIS SECTION. REVISIONS SHALL INCLUDE, BUT ARE NOT LIMITED TO, REVISED GRAPHICS, UPDATE OF ADDITIONAL FIRMWARE AND/OR SOFTWARE AS REQUIRED TO ACCOMMODATE NEW POINTS.

C. SPLIT AIR CONDITIONING UNIT (TYPICAL FOR FCU–1/ACCU–1; SERVICE: LOUNGE)

1) GENERAL

2 A. THE UNIT SHALL BE PROVIDED WITH MANUFACTURER PROVIDED CONTROLS. COORDINATE WITH THE AC UNIT MANUFACTURER FOR ALL FIELD INSTALLATION REQUIREMENTS.

B. THE AC UNITS SHALL BE FURNISHED WITH PACKAGED MICROPROCESSOR CONTROLLERS.

C. THE UNIT SHALL OPERATE AS PER THE MANUFACTURER PROVIDED SEQUENCE OF OPERATION.

D. THE AC UNIT SHALL BE CONTROLLED VIA FACTORY PROVIDED THERMOSTAT.

E. THE UNIT SHALL BE INDEXED ON BASED UPON A TIME OF DAY SCHEDULE OR MANUAL COMMAND THROUGH THE THERMOSTAT.

2) THE ATC CONTRACTOR SHALL:

A. MOUNT AND WIRE ALL CONTROL COMPONENTS THAT ARE SHIPPED WITH THE AC UNIT THAT ARE NOT FACTORY INSTALLED. COORDINATE WITH THE AC UNIT MANUFACTURER FOR ALL FIELD INSTALLATION REQUIREMENTS.

B. FURNISH, MOUNT AND WIRE ANY ADDITIONAL COMPONENTS NOT PROVIDED BY THE AC UNIT MANUFACTURER TO ACHIEVE A COMPLETELY OPERATIONAL SYSTEM. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, A

2 LEAK DETECTOR AND MOTORIZED DAMPER ACTUATORS (OUTSIDE AIR, RETURN AIR).

C. PROVIDE INTERLOCK WIRING BETWEEN THE FCU–1 UNIT AND THE CONDENSER ACCU–1.

D. PROVIDE A LIQUID LEAK DETECTOR FOR THE AIR CONDITIONING UNIT. THE LEAK DETECTOR SHALL BE INSTALLED AT THE LOWEST POINT OF THE DRAIN PAN. UPON DETECTION OF WATER, THE UNIT?S COMPRESSOR SHALL STOP. THE AC UNIT SHALL STOP.

E. FURNISH CONDENSATE HIGH LEVEL SWITCH TO SHUT DOWN THE AC UNIT UPON A HIGH WATER LEVEL.

2 3) ENABLED/DISABLED MODE

A. UPON A COMMAND TO START, THE OUTDOOR AIR DAMPER/RETURN AIR DAMPER SHALL OPEN. WHEN THE OUTDOOR AIR DAMPER IS IN ITS FULLY OPEN POSITION, AS SENSED BY A DAMPER END SWITCH, THE AC UNIT SHALL BE ENERGIZED. THE OUTDOOR AIR DAMPER END SWITCH SHALL BE HARDWIRE INTERLOCKED TO THE CONDENSER FAN. IN THE OCCUPIED MODE, THE AC UNIT SUPPLY FAN RUNS CONTINUOUSLY.

B. THE THERMOSTAT SHALL CYCLE THE COMPRESSORS AS NECESSARY TO MAINTAIN THE SPACE TEMPERATURE.

C. UPON A COMMAND TO STOP, THE COMPRESSOR SHALL BE CYCLED OFF, THE SUPPLY FAN SHALL BE STOPPED AND THE OUTDOOR AIR DAMPER SHALL BE CLOSED.

4) PROVIDE THE FOLLOWING POINTS HARDWIRED TO THE BMS:

A. ALL POINTS AVAILABLE VIA INTEGRATION (BACNET) TO THE FCU.

B. DI – LEAK DETECTOR STATUS (ONE (1) FOR EACH UNIT).

5) PROVIDE THE FOLLOWING POINTS IN ADDITION TO THE HARDWIRED POINTS INDICATED ABOVE:

PART 1 –

A. HIGH AND LOW SPACE TEMPERATURE ALARMS.

B. COMMON ALARM.

C. AC UNIT FAILURE.

D. LEAK DETECTED ALARM.

D. HEATING AND VENTILATORS (BASE SCOPE: HV–1 & HV–2)

2 PART 2 –

1) GENERAL

A. THE UNITS SHALL BE PROVIDED WITH MANUFACTURER PROVIDED CONTROLS. COORDINATE WITH THE UNIT MANUFACTURER FOR ALL FIELD INSTALLATION REQUIREMENTS.

B. THE HEATING, COOLING, DAMPERS, SUPPLY FAN, ETC SHALL BE CONTROLLED VIA THE UNIT?S MANUFACTURER PROVIDED CONTROLS. THE BMS SHALL BE CAPABLE OF STARTING AND STOPPING THE UNIT VIA HARDWIRE INTERLOCK. THE UNIT SHALL BE INDEXED ON BASED UPON A TIME OF DAY SCHEDULE, START TIME OPTIMIZATION PROGRAM OR MANUAL COMMAND.

C. THE UNIT SHALL OPERATE AS PER THE MANUFACTURER PROVIDED SEQUENCE OF OPERATION. THE SEQUENCE OF OPERATION SHALL INCLUDE WARM–UP, COOL–DOWN, OCCUPIED, UNOCCUPIED, SETUP AND SETBACK MODES AT A MINIMUM.

2) THE ATC CONTRACTOR SHALL

PART 3 –

A. MOUNT AND WIRE ALL CONTROL COMPONENTS THAT ARE SHIPPED WITH THE UNIT THAT ARE NOT FACTORY INSTALLED. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, A WALL–MOUNTED TEMPERATURE SENSOR.

B. FURNISH, MOUNT AND WIRE ANY ADDITIONAL COMPONENTS NOT PROVIDED BY THE UNIT MANUFACTURER TO ACHIEVE A COMPLETELY OPERATIONAL SYSTEM.

C. CONNECT THE HV UNIT TO THE BMS VIA BACNET INTERFACE. COORDINATE POINTS LIST WITH THE EQUIPMENT MANUFACTURER.

D. PROVIDE CONTROLS FOR FAN VFDS (SUPPLY & RETURN).

PART 4 –

3) SAFETIES

A. A HIGH DISCHARGE AIR PRESSURE SWITCH LOCATED DOWNSTREAM OF THE SUPPLY FAN AND UPSTREAM OF THE CLOSEST DAMPER SHALL STOP THE SUPPLY FAN WHEN DUCT PRESSURE EXCEEDS DESIGN.

B. A LOW SUCTION AIR PRESSURE SWITCH LOCATED UPSTREAM OF THE RETURN/EXHAUST FAN AND DOWNSTREAM OF THE CLOSEST DAMPER SHALL STOP THE SUPPLY AND RETURN/EXHAUST FANS WHEN DUCT PRESSURE DECREASES BELOW DESIGN.

C. FREEZESTATS INSTALLED DOWNSTREAM OF THE HEATING COIL SHALL DISABLE THE UNIT UPON SENSING A TEMPERATURE BELOW 38°F (ADJ.) FOR A PERIOD OF 180 SECONDS (ADJ.). ONCE THE FREEZESTAT HAS BEEN ACTIVATED, MANUAL RESET AT THE BMS PANEL SHALL BE REQUIRED TO ALLOW THE SYSTEM TO RESTART.

4) OCCUPIED MODE

A. THE H AND V UNIT SHALL BE STARTED BASED UPON A START TIME OPTIMIZATION PROGRAM, TIME OF DAY SCHEDULE, OR MANUAL COMMAND AND RUN CONTINUOUSLY.

B. UPON A COMMAND TO START, THE OUTSIDE AIR DAMPER AND ALL ASSOCIATED ISOLATION DAMPERS AND FIRE/SMOKE DAMPERS LOCATED AT THE UNIT SHALL OPEN. OUTSIDE AIR DAMPER, ISOLATION DAMPERS AND FIRE/SMOKE DAMPERS SHALL BE HARDWIRE INTERLOCKED TO THE SUPPLY FAN STARTER BY THE BMS CONTRACTOR. HARDWIRED DAMPER END SWITCHES ON ALL 2–POSITION DAMPERS SHALL ENERGIZE THE SUPPLY FAN STARTER WHEN ALL ASSOCIATED DAMPERS ARE IN THEIR FULLY OPEN POSITION.

C. IN THE OCCUPIED MODE, THE SUPPLY FAN RUNS CONTINUOUSLY.

D. SUPPLY AND RETURN FAN VARIABLE FREQUENCY DRIVES SHALL START UNLOADED AND SLOWLY RAMP UP TO SPEED AS REQUIRED. IN THE OCCUPIED MODE, THE SUPPLY AND RETURN FANS RUN CONTINUOUSLY. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL BE CONTROLLED TO MAINTAIN THE SUPPLY STATIC PRESSURE SETPOINT, AS SENSED AT A POINT 2/3 DOWNSTREAM OF THE SUPPLY FAN. THE RETURN FAN VARIABLE FREQUENCY DRIVE SHALL BE CONTROLLED BY TRACKING THE SUPPLY FAN VFD WITH AN OFFSET. THE OFFSET SHALL BE DETERMINED DURING BALANCING.

E. THE HOT WATER HEATING VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. CONFIGURE THE INITIAL SETPOINT TO 65 DEGF (ADJ.). REFER TO THE MECHANICAL SCHEDULE FOR THE DESIGN SETPOINTS.

5) UNOCCUPIED MODE

A. THE SUPPLY FAN SHALL REMAIN OFF. ALL 2–POSITION DAMPERS SHALL CLOSE. THE HOT WATER HEATING VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN A HEATING COIL DISCHARGE AIR TEMPERATURE OF 45°F (ADJ.).

2 6) PROVIDE THE FOLLOWING POINTS HARDWIRED TO THE BMS:

A. DI – FREEZESTAT STATUS (FOR EACH).

B. DI – SUPPLY FAN HIGH DISCHARGE PRESSURE SWITCH STATUS.

C. DI – SUPPLY FAN STATUS (VIA CURRENT SENSING RELAY).

D. DO – SUPPLY FAN COMMAND (ENABLE/DISABLE).

E. DI – RETURN FAN STATUS (VIA CURRENT SENSING RELAY).

F. DO – RETURN FAN COMMAND (ENABLE/DISABLE).

7) PROVIDE THE FOLLOWING SOFTWARE POINTS VIA BACNET INTERFACE AT MINIMUM IN ADDITION TO THE HARDWIRED POINTS INDICATED ABOVE:

PART 5 –

A. RETURN AIR TEMPERATURE.

B. DISCHARGE AIR TEMPERATURE.

C. OUTDOOR AIR TEMPERATURE.

D. SPACE AIR TEMPERATURE.

E. OUTDOOR ENTHALPY, HIGH/LOW.

F. DIRTY FILTER INDICATION.

G. AIRFLOW VERIFICATION.

H. UNIT STATUS.

I. ALL TIME SCHEDULES.

J. ACTIVE ALARMS WITH TIME AND DATE.

K. PREVIOUS ALARMS WITH TIME AND DATE.

L. OPTIMAL START

M. SUPPLY FAN AND EXHAUST FAN SPEED.

PART 6 –

N. SYSTEM OPERATING HOURS.

(1) FAN

(2) EXHAUST FAN

(3) COOLING

(4) INDIVIDUAL COMPRESSOR

(5) HEATING

(6) ECONOMIZER

(7) TENANT OVERRIDE

O. CONTROLS MODE

(1) OFF MANUAL

(2) AUTO

(3) HEAT

(4) FAN ONLY

P. OCCUPANCY MODE

(1) AUTO

(2) OCCUPIED

(3) UNOCCUPIED

(4) TENANT OVERRIDE

PART 7 –

8) UNIT OPERATION CHANGEOVER CONTROL

(1) RETURN AIR TEMPERATURE

(2) SPACE TEMPERATURE

(3) NETWORK SIGNAL

PART 8 –

9) COOLING AND HEATING CHANGE–OVER TEMPERATURE WITH DEADBAND

PART 9 –

10) SUPPLY RESET OPTIONS

(1) RETURN AIR TEMPERATURE

(2) OUTDOOR AIR TEMPERATURE

(3) SPACE TEMPERATURE

(4) AIRFLOW (VAV)

(5) NETWORK SIGNAL

(6) EXTERNAL (0–10 VDC)

(7) EXTERNAL (0–20 MA)

PART 10 –

11) TEMPERATURE ALARM LIMITS

(1) HIGH SUPPLY AIR TEMPERATURE

(2) LOW SUPPLY AIR TEMPERATURE

(3) HIGH RETURN AIR TEMPERATURE

PART 11 –

12) NIGHT SETBACK AND SETUP SPACE TEMPERATURE.

13) BUILDING STATIC PRESSURE.

14) ECONOMIZER CHANGEOVER

A. ENTHALPY

B. DRY BULB TEMPERATURE

15) CURRENTLY TIME AND DATE

16) TENANT OVERRIDE TIME

17) OCCUPIED/UNOCCUPIED TIME SCHEDULE

18) ADJUSTABLE SET POINTS

19) SERVICE MODE

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LOGIN: Arena, David

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Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID
04/10/2019	2 ADDENDUM #2

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Project

TOWN OF STRATFORD
2725 Main Street
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Mechanical Upgrades:

Eli Whitney School
1130 Huntington Rd.
Stratford, CT

Drawing Title

MECHANICAL SPECIFICATIONS

Issued 03/05/2019	Drawing No. M-404
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ADDENDUM #1

HVAC Upgrades:
Eli Whitney Elementary School

1130 Huntington Road
Stratford, CT 06614

TOWN PROJECT NUMBER: 2019-016

ISSUED: 3/15/2019

PROJECT TEAM

Architect / Project Manager

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The work shall be carried out in accordance with the following supplemental instructions and in accordance with the Contract Documents.

DRAWING CHANGES

1. Electrical Drawings ("E-???")

The following drawings were not included in initial set of bid drawings and are now being issued with Addendum 1:

- E-000 Electrical Cover Sheet
- E-100 Electrical Attic Floor Plan – Demolition
- E-101 Electrical Roof Floor Plan – Demolition
- E-200 Electrical 2nd Floor Plan – Power
- E-201 Electrical Attic Floor Plan – Power
- E-202 Electrical Roof Floor Plan – Power
- E-300 Electrical Details
- E-400 Electrical Specifications
- E-401 Electrical Specifications
- E-402 Electrical Specifications

2. Drawings M-202 & M-300

Drawings revised to note equipment curb replacement for HV-1 and HV-2. All work related to HV-2 remains Add Alternate #1.

***** END OF ADDENDUM #1 *****

ELECTRICAL SYMBOLS LIST

POWER

SYMBOL	DESCRIPTION
S^3_a	SINGLE POLE SWITCH a = CONTROLLING OUTLET 'a' 2 = DOUBLE POLE 3 = THREE-WAY 4 = FOUR-WAY D = DOOR K = KEY OPERATED MO = MOMENTARY CONTACT T = TIME SWITCH P = PILOT LIGHT
$\$_T$	DISCONNECT SWITCH – TOGGLE TYPE WITH THERMAL OVERLOAD – 277V HP RATED
$\$_m$	DISCONNECT SWITCH – TOGGLE TYPE MOTOR RATED, 20A, 1P, U.O.N.
D A 450	WALL DIMMER – TYPE 'A' NUMBER INDICATES WATTAGE RATING
OS	OCCUPANCY SENSOR, CEILING MOUNTED
OS	OCCUPANCY SENSOR, WALL MOUNTED
PC	PHOTO CONTROL SWITCH
T	TRANSFORMER
	20A, 125V DUPLEX RECEPTACLE – FLUSH WALL MOUNTED CONTROLLED FROM WALL SWITCH 'a'
	20A, 125V QUADRUPLEX RECEPTACLE – FLUSH WALL MOUNTED
	20A, 125V ISOLATED GROUND, DUPLEX RECEPTACLE, FLUSH FLOOR MOUNTED
	20A, 125V DUPLEX RECEPTACLE – FLUSH WALL MOUNTED, GFI TYPE
	20A, 125V EMERGENCY DUPLEX RECEPTACLE – FLUSH WALL MOUNTED
	20A, 125V DUPLEX RECEPTACLE – FLUSH WALL MOUNTED, WITH TWO (2) INTEGRALLY POWERED USB PORTS
	20A, 125V EMERGENCY DUPLEX RECEPTACLE – FLUSH WALL MOUNTED, WITH TWO (2) INTEGRALLY POWERED USB PORTS
	20A, 125V QUADRUPLEX RECEPTACLE – FLUSH WALL MOUNTED, WITH FOUR (4) INTEGRALLY POWERED USB PORTS
	SINGLE RECEPTACLE – FLUSH WALL MOUNTED
	20A, 125V DUPLEX RECEPTACLE – SURFACE MOUNTED
	20A, 125V SURGE SUPRESSION DUPLEX RECEPTACLE – FLUSH WALL MOUNTED
	20A, 125V DUPLEX RECEPTACLE – FLUSH FLOOR MOUNTED
	20A, 125V QUADRUPLEX RECEPTACLE – FLUSH FLOOR MOUNTED
A	SPECIAL PURPOSE RECEPTACLE – FLUSH WALL MOUNTED A = TYPE
B A	PLUG-IN SURFACE METAL RACEWAY – LETTER INDICATES TYPE – WITH SPECIAL PURPOSE RECEPTACLES WHERE INDICATED
5, 3, 1	HOMERUN-NUMERAL WHERE USED INDICATES CIRCUIT NUMBER FOR REFERENCE ONLY. 2#12+1#12G-3/4"C FOR ONE CKT. HOMERUN, U.O.N. 4#12+1#12G-3/4"C FOR TWO CKT. HOMERUN, U.O.N. 6#12+1#12G-3/4"C FOR THREE CKT. HOMERUN, U.O.N.
1	HOMERUN – NUMERAL WHERE USED INDICATES CIRCUIT NUMBER FOR REFERENCE ONLY
	MOTOR CONTROLLER
100/3	COMBINATION MOTOR CONTROLLER AND DISCONNECT SWITCH SWITCH AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED
30/3	UNFUSED DISCONNECT SWITCH SWITCH AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED
100/60/3	FUSED DISCONNECT SWITCH; SWITCH AMPS/FUSE AMPS/ # OF POLES, VOLTAGE RATING AS REQUIRED
100/60 CB	ENCLOSED CIRCUIT BREAKER TRIP AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED NA = NON-AUTOMATIC
	SURFACE MOUNTED LIGHTING PANELBOARD
	FLUSH MOUNTED LIGHTING PANELBOARD
	SURFACE MOUNTED POWER PANELBOARD
	FLUSH MOUNTED POWER PANELBOARD
	SURFACE MOUNTED POWER DISTRIBUTION PANELBOARD
J	CEILING MOUNTED JUNCTION BOX
J	FLUSH WALL MOUNTED JUNCTION
J	FLUSH FLOOR MOUNTED JUNCTION BOX
	PULLBOX
P	POWER POLE
x x x	EXISTING CONDUIT TO BE REMOVED
	EXISTING CONDUIT/EQUIPMENT TO REMAIN
	NEW CONCEALED CONDUIT
	NEW EXPOSED CONDUIT
	NEW UNDERGROUND/IN SLAB CONDUIT
	NEW EMERGENCY CONDUIT
	CONDUIT TURNING UP
	CONDUIT TURNING DOWN
	CONDUIT STUB-UP WITH FLEXIBLE EQUIPMENT CONNECTION
	FLEXIBLE EQUIPMENT CONNECTION
	CAPPED CONDUIT
K	PUSH BUTTON K = KEY OPERATED H = HOLD UP P = PANIC

NEW EQUIPMENT DESIGNATIONS

EDPH-1-NA1

- EQUIPMENT No. IF MORE THAN 1 IN SAME LOCATION
- CLOSET DESIGNATION
- FLOOR OR AREA
- VOLTAGE: H=480/277V; L=208/120V
- P=POWER, L=LIGHTING/APPLIANCES
- D=DISTRIBUTION (OPTIONAL)
- E=EMERGENCY (OMITTED IF NORMAL)

DRAWING INDEX

DRAWING NO.	DRAWING TITLE
E-000	ELECTRICAL COVER SHEET
E-100	ELECTRICAL ATTIC FLOOR PLAN – DEMOLITION
E-101	ELECTRICAL ROOF PLAN – DEMOLITION
E-200	ELECTRICAL 2ND FLOOR PLAN – POWER
E-201	ELECTRICAL ATTIC FLOOR PLAN – POWER
E-202	ELECTRICAL ROOF PLAN – POWER
E-300	ELECTRICAL DETAILS
E-400	ELECTRICAL SPECIFICATIONS
E-401	ELECTRICAL SPECIFICATIONS
E-402	ELECTRICAL SPECIFICATIONS

ABBREVIATIONS

+	SPECIAL MOUNTING HEIGHT. COORDINATE LOCATION WITH ARCHITECTURAL ELEVATIONS
1P	SINGLE POLE
2P	TWO POLE
3P	THREE POLE
A	AMPERE
AFF	ABOVE FINISHED FLOOR
AIC	AMPERE INTERRUPTING CAPACITY
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
CAB	CABINET
C	CONDUIT
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CKT	CIRCUIT
CLG	CEILING
CTL	CONTROL
CONN	CONNECTED
CONT	CONTINUATION
CU	COPPER
DEG	DEGREE
°C	DEGREE CELSIUS
°F	DEGREE FAHRENHEIT
DIA	DIAMETER
DISC	DISCONNECT
DIV	DIVISION
DN	DOWN
DP	DISTRIBUTION PANEL BOARD
DWG	DRAWING
(E)	EXISTING TO REMAIN
EA	EACH
EC	ELECTRICAL CONTRACTOR
ELEC	ELECTRICAL
EM	EMERGENCY
EQUIP	EQUIPMENT
(ER)	EXISTING TO BE REMOVED
(ERR)	EXISTING TO BE REMOVED & RELOCATED
EXIST,EX	EXISTING
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FAP	FIRE ALARM ANNUNCIATOR PANEL
FDR	FEEDER
FIXT	FIXTURE
FL	FLOOR
FLA	FULL LOAD AMPERES
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
G	GROUND
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
HP	HORSE POWER
HZ	HERTZ
IG	ISOLATED GROUND
INCAND	INCANDESCENT
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWH	KILOWATT HOUR
LTG	LIGHTING
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL
MLO	MAIN LUG ONLY
MTD	MOUNTED
N	NEUTRAL
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
P	POLE
ø	PHASE
PNL	PANEL
PWR	POWER
(RE)	RELOCATED EXISTING
RECEPT,REC	RECEPTACLE
(RRO)	EXISTING TO BE REMOVED AND RETURN TO OWNER
SCHED,SCH	SCHEDULE
SPEC	SPECIFICATION
SPKR	SPEAKER
SW	SWITCH
SYS	SYSTEMS
TRANSF,XFMR	TRANSFORMER
UON	UNLESS OTHERWISE NOTED
V	VOLT OR VOLTAGE

ELECTRICAL DEMOLITION NOTES

1. THE CONTRACTOR SHALL INCLUDE IN THEIR BID ALL COSTS ASSOCIATED WITH REMOVALS AND RELOCATIONS OF ELECTRICAL WORK AS DESCRIBED IN THE SPECIFICATIONS WITH ALLOWANCES FOR EXPECTED OR UNFORESEEN DIFFICULTIES WHEN CONCEALED WORK HAS BEEN OPENED. NO CLAIMS FOR ADDITIONAL WORK ASSOCIATED WITH DEMOLITION WILL BE ACCEPTED, EXCEPT IN CERTAIN CASES CONSIDERED JUSTIFIABLE BY THE ARCHITECT.
2. THE CONTRACTOR SHALL REMOVE AND/OR RELOCATE ALL EXISTING ELECTRICAL WORK WHICH INTERFERES WITH THE NEW ARCHITECTURAL AND ELECTRICAL LAYOUTS IN FULL COORDINATION WITH THE ARCHITECT'S DEMOLITION PLANS. ALL SYSTEMS WHICH ARE NO LONGER REQUIRED TO FUNCTION SHALL BE DE-ENERGIZED AND DISCONNECTED AT THE SOURCE OF POWER SUPPLY.
3. THE CONTRACTOR SHALL PERFORM DEMOLITION AND REMOVAL WORK WITH MINIMUM INTERFERENCE WITH FUNCTIONING ELECTRICAL SYSTEMS. ALL AFFECTED SYSTEMS SHALL BE RECONNECTED AND RESTORED.
4. DEMOLITION AND REMOVAL WORK SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER. THE CONTRACTOR SHALL PATCH, REPAIR OR OTHERWISE RESTORE ANY DAMAGED INTERIOR OR EXTERIOR BUILDING SURFACE TO ITS ORIGINAL CONDITION.
5. THE CONTRACTOR SHALL REMOVE ALL ELECTRICAL OUTLETS, SWITCHES AND OTHER DEVICES, COMPLETE WITH ASSOCIATED WIRING, CONDUITS, ETC., FROM PARTITIONS THAT ARE TO BE REMOVED. WHERE THE REMOVAL OF THESE ITEMS DISRUPTS EXISTING WIRING THAT IS TO REMAIN, THE CONTRACTOR SHALL INSTALL JUNCTION BOXES AND OTHER DEVICES AND PROVIDE BYPASS CONNECTIONS NECESSARY TO MAKE CIRCUITS AFFECTED CONTINUOUS AND READY FOR OPERATION. OTHERWISE, WIRING SHALL BE REMOVED BACK TO THE NEAREST ELECTRICAL JUNCTION BOX THAT IS TO REMAIN OR TO PANELBOARD.
6. ALL RACEWAYS WHICH BECOME EXPOSED DURING THE ALTERATION WORK SHALL BE REMOVED AND REROUTED CONCEALED BEHIND FINISHED SURFACES.
7. ALL UNUSED OUTLET BOXES OR CAPPED FLOOR OUTLETS SHALL BE PROVIDED WITH MATCHING BLANK COVERS.
8. EXISTING PANEL DIRECTORIES AFFECTED BY THE ALTERATION WORK SHALL BE MODIFIED TO REFLECT THE BRANCH CIRCUIT WIRING CHANGES.
9. PORTIONS OF FEEDER RUNS TO BE REMOVED OR ABANDONED AS A RESULT OF DEMOLITION WORK, BUT WHICH ARE REQUIRED TO REMAIN ENERGIZED, SHALL BE CUT AT CONVENIENT LOCATIONS, REROUTED AND RECONNECTED. NEW FEEDER EXTENSIONS SHALL MATCH EXISTING ONES IN ALL RESPECTS, CABLE TYPE, CONDUCTOR AMPACITY, CONDUIT SIZES, ETC.
10. THE CONTRACTOR SHALL NOTIFY THE OWNER AT THE APPROPRIATE TIME OF THE PROJECTED DEMOLITION AND PHASING SCHEDULE SO THAT REMOVAL OR RELOCATION OF AFFECTED UTILITIES MAY BE CARRIED OUT IN COORDINATION WITH THE PROJECT REQUIREMENTS. THE CONTRACTOR SHALL FOLLOW CLOSELY THE ARCHITECT'S DEMOLITION AND PHASING SCHEDULE AND PROCEED IN THE SPECIFIED SEQUENCE.
11. ALL EXISTING MATERIAL AND EQUIPMENT IN USABLE CONDITION, WHICH IS TO BE REMOVED UNDER THIS CONTRACT, SHALL REMAIN THE PROPERTY OF THE OWNER OR SHALL BE DISPOSED OF BY THE ELECTRICAL CONTRACTOR, AS DIRECTED BY THE OWNER.
12. ARRANGE TO WORK CONTINUOUSLY, INCLUDING OVER TIME, IF REQUIRED, TO ASSURE THAT SYSTEMS WILL BE SHUT DOWN ONLY DURING THE TIME ACTUALLY REQUIRED TO MAKE THE NECESSARY CONNECTIONS TO THE EXISTING SYSTEMS.
13. THE SHUTDOWN OF EXISTING BUILDING ELECTRICAL SERVICES SHALL BE COORDINATED WITH THE OWNER. MAKE ARRANGEMENTS AT LEAST 5 BUSINESS DAYS PRIOR TO A SHUTDOWN.

ELECTRICAL GENERAL NOTES

1. GENERAL NOTES, SYMBOL LIST AND DETAILS ARE APPLICABLE TO ALL ELECTRICAL DRAWINGS.
2. ALL WORK IS NEW UNLESS OTHERWISE NOTED.
3. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. FOLLOW DRAWINGS IN LAYING OUT WORK AND CHECK DRAWINGS OF OTHER TRADES TO VERIFY SPACE CONDITIONS. MAINTAIN HEADROOM AND SPACE CONDITIONS.
4. SECURE ALL SUPPORTS TO BUILDING STRUCTURE UTILIZING TOGGLE BOLTS (HOLLOW MASONRY), EXPANSION SHIELDS OR INSERTS (CONCRETE AND BRICK), MACHINE SCREWS (METAL), BEAM CLAMPS (FRAMEWORK), WOOD SCREWS (WOOD) OR PAN THRU STRAPS (METAL DECK). NAILS, RAWL PLUGS AND WOOD PLUGS ARE NOT PERMITTED. WHERE REQUIRED BY STRUCTURE, PROVIDE THRU BOLTS AND FISH PLATES. SUPPORT HORIZONTAL RUNS OF METALLIC RACEWAYS NOT MORE THAN 10 FT APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
5. PASS RACEWAYS OVER WATER, STEAM OR OTHER PIPING WHEN PULL BOXES ARE NOT REQUIRED. NO RACEWAY WITHIN 3 INCHES OF STEAM OR HOT WATER PIPES OR APPLIANCES (EXCEPT PIPE CROSSINGS WHERE RACEWAY SHALL BE AT LEAST 1 INCH FROM PIPE COVERS).
6. CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREAD OF FIELD THREADED RACEWAYS WITH GRAPHITE BASE PIPE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.
7. HORIZONTAL OR CROSS RUNS IN PARTITIONS AND WALLS ARE NOT PERMITTED. DO NOT RUN CONDUIT IN PRECAST ROOF SLABS, IN 2 INCH SLABS OR IN TERRAZZO FLOOR FINISH.
8. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10 FT LONG IN WHICH WIRING IS NOT INSTALLED: FURNISH FISH WIRE.
9. SET BOXES SQUARE AND TRUE WITH BUILDING FINISH. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRONS.
10. VERIFY LOCATIONS OF OUTLETS AND SWITCHES IN FINISHED ROOMS WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISH. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS AND MECHANICAL EQUIPMENT, VARIATIONS IN FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILINGS AND THE LIKE. CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSE TO OWNER.
11. LOCATIONS INDICATED FOR LOCAL WALL SWITCHES ARE SUBJECT TO MODIFICATIONS AT OR NEAR DOORS. COORDINATE WITH ARCHITECT AND INSTALL SWITCH ON SIDE OPPOSITE HINGE. VERIFY FINAL HINGE LOCATIONS IN FIELD PRIOR TO SWITCH OUTLET INSTALLATION.
12. COVERS OF JUNCTION AND PULLBOXES SHALL BE READILY ACCESSIBLE.
13. PROVIDE PULLBOXES WHERE INDICATED, WHERE REQUIRED BY CODE AND WHEREVER NECESSARY TO FACILITATE PULLING OF WIRE. COORDINATE PULLBOX LOCATIONS WITH OTHER TRADES.
14. EMPTY RACEWAY RUNS: PROVIDE PULLBOXES EVERY 100 FT AND AS INDICATED. COORDINATE LOCATIONS WITH OTHER TRADES.
15. JUNCTION AND PULLBOXES: LOCATE GENERALLY NOT EXPOSED IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT.
16. SUPPORT PANEL, JUNCTION AND PULLBOXES INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON RACEWAYS.
17. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.
18. CONNECT CONDUIT TO MOTOR CONDUIT TERMINAL BOXES WITH FLEXIBLE CONDUIT (MINIMUM 18 IN. LENGTH AND 50% SLACK). DO NOT TERMINATE IN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
19. PROVIDE 2#14 INDICATING PILOT LIGHT WIRES FROM PILOT LIGHT IN CONTROLLER TO LOAD SIDE OF DISCONNECT SWITCH. RUN WIRES IN BRANCH CIRCUIT CONDUIT AND INCREASE CONDUIT SIZE AS REQUIRED.
20. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32°F (0C). PROVIDE CABLE SUPPORTS FOR WIRE IN RISER CONDUITS AS REQUIRED BY CODE.
21. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF NORMAL AND EMERGENCY CIRCUITS. COMMON BOXES: PROVIDE BARRIERS BETWEEN EMERGENCY AND NORMAL WIRING.
22. HEIGHTS OF OUTLETS FROM FINISHED FLOOR TO CENTERLINE OF OUTLET:

RECEPTACLES AND TELEPHONES:	
GENERALLY	1'-6"
OVER WORK BENCHES	3'-6"
WALL SWITCHES	4'-0"
WALL FIXTURES	7'-0"
MOTOR CONTROLLERS	5'-0"
GONGS AND HORNS	7'-6"
FIRE ALARM STATIONS	4'-0"
CLOCKS	7'-6"
STROBE LIGHTS	6'-8" TO BOTTOM

EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE REQUIREMENTS, AS NOTED OR DIRECTED.

CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND CONFIRMING ALL MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DRAWINGS.

23. WIRE COLOR CODING: AS PER CODE. WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION FOR OVERLAP COLOR TAPING OF CONDUCTORS (MINIMUM LENGTH 6") IN ACCESSIBLE LOCATIONS. COLOR CODING, ONCE SELECTED, MUST BE USED CONSISTENTLY FOR THE ENTIRE PROJECT.
24. INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM. INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS: ONLY WITH WRITTEN CONSENT OF OWNER. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES. ALARM AND EMERGENCY SYSTEMS ARE NOT TO BE INTERRUPTED.
25. FIRESTOPPING SHALL BE INSTALLED WHENEVER WIRING OR RACEWAYS CROSS FIRE RATED CONSTRUCTION.
26. TO THE BEST OF THE APPLICANT'S KNOWLEDGE, BELIEF AND PROFESSIONAL. JUDGEMENT, THESE PLANS ARE IN COMPLIANCE WITH THE CONNECTICUT ENERGY CONSERVATION CODE.

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Project

TOWN OF STRATFORD
2725 Main Street
Stratford, CT 06614

Mechanical Upgrades:

Eli Whitney School
1130 Huntington Rd.
Stratford, CT

Drawing Title

ELECTRICAL COVER SHEET

Issued	03/05/2019
Scale	NTS
Job No.	183171-000
Drawing No.	E-000

SAVE DATE:1/23/2019 3:06 PM
PLOT DATE: 3/4/2019 5:26 PM
LOGIN: Arena, David
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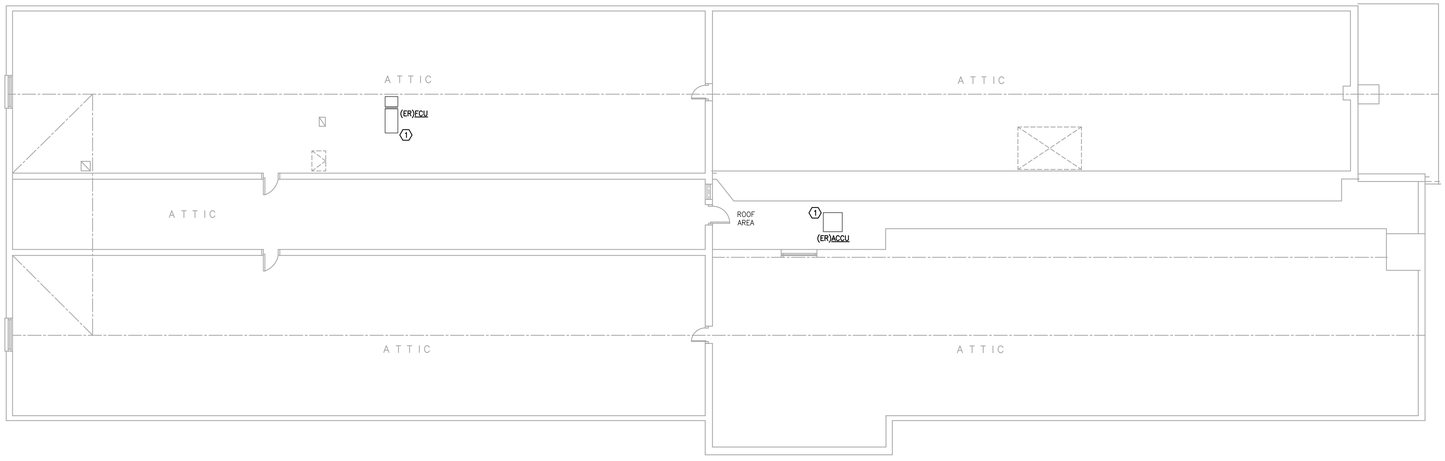
GENERAL NOTES:

1. COORDINATE ALL WORK WITH MECHANICAL CONTRACTOR

KEY NOTES:

(1) DISCONNECT EXISTING HVAC EQUIPMENT FOR REMOVAL (BY OTHERS). EXISTING CIRCUIT WIRING TO REMAIN FOR RE-USE



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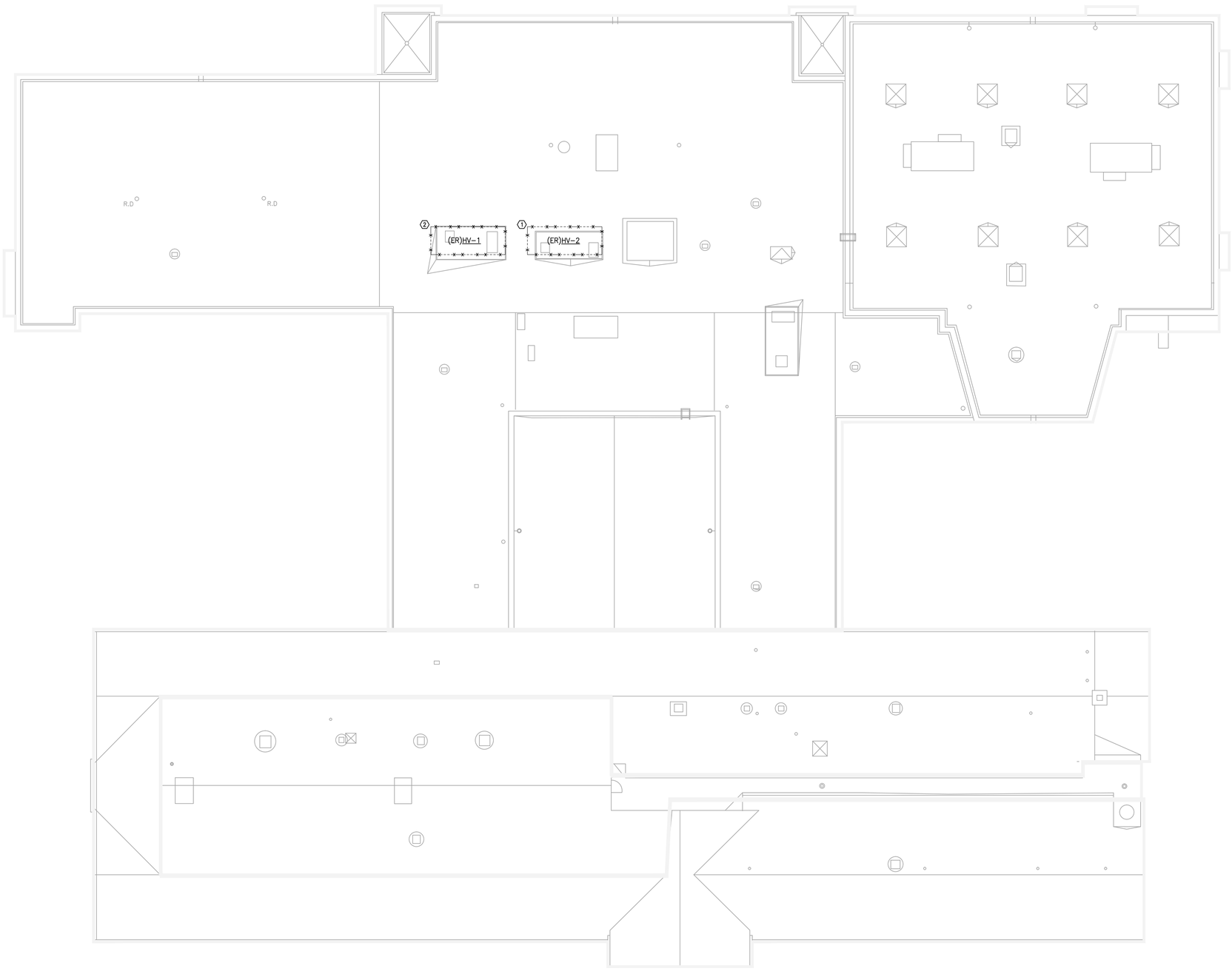
Drawing Title

ELECTRICAL
ATTIC FLOOR
PLAN - DEMOLITION

Issued 03/05/2019	Drawing No. E-100
Scale 3/32"=1'-0"	
Job No. 183171-000	



GENERAL NOTES:

1. COORDINATE ALL WORK WITH MECHANICAL CONTRACTOR

KEY NOTES:

(1) DISCONNECT EXISTING HVAC EQUIPMENT FOR REMOVAL (BY OTHERS). EXISTING CIRCUIT WIRING TO REMAIN FOR RE-USE.

(2) DISCONNECT EXISTING HVAC EQUIPMENT FOR REMOVAL (BY OTHERS). REMOVE ASSOCIATED CIRCUIT WIRING COMPLETELY BACK TO SOURCE.

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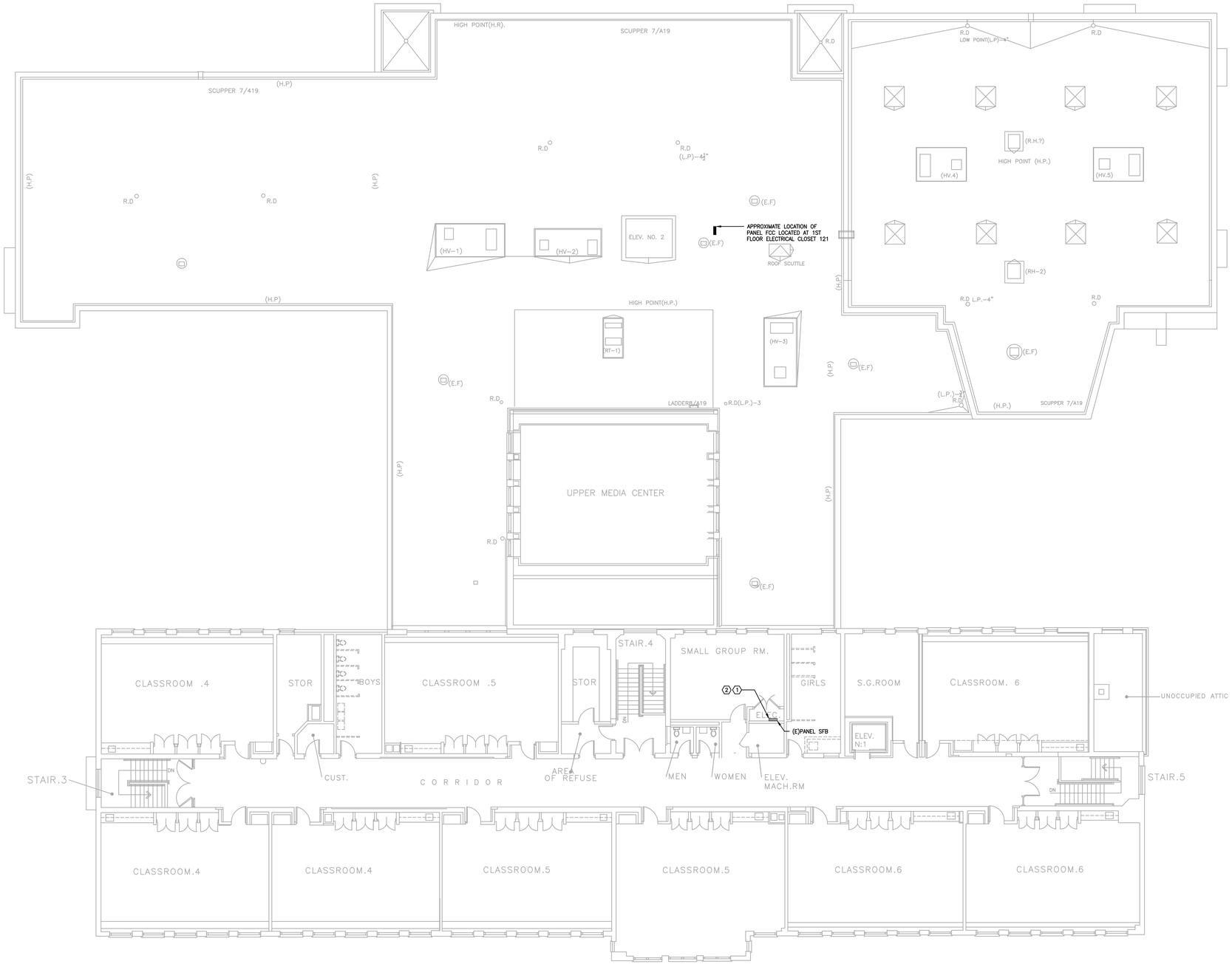
Drawing Title

ELECTRICAL ROOF PLAN - DEMOLITION

Issued: 03/05/2019	Drawing No.: E-101
Scale: 3/32"=1'-0"	
Job No.: 183171-000	

KEY NOTES:

1. ELECTRICAL PANEL CURRENTLY ENERGIZING EXISTING UNITS FCU-1 AND ACCU-1. SEE DRAWING E-202 FOR ADDITIONAL INFORMATION
2. REMOVE EXISTING 2P-40A CIRCUIT BREAKER CURRENTLY ENERGIZING EXISTING UNIT ACCU-1 AND REPLACE WITH NEW 2P-30A CIRCUIT BREAKER.



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Drawing Title

ELECTRICAL
2ND FLOOR PLAN -
POWER

Issued 03/05/2019	Drawing No. E-200
Scale 3/32"=1'-0"	
Job No. 183171-000	

GENERAL NOTES:

1. COORDINATE ALL WORK WITH MECHANICAL CONTRACTOR

KEY NOTES:

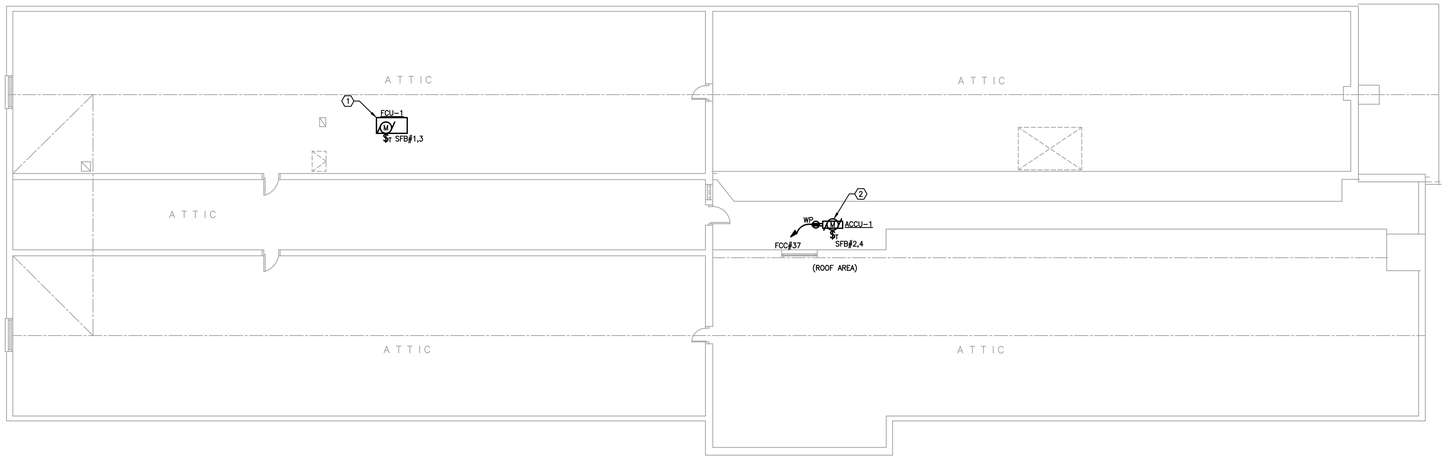
(1) NEW HVAC UNIT. CONNECT TO EXISTING CIRCUIT MADE AVAILABLE AFTER DEMOLITION.

(2) REMOVE EXISTING 2P-40A CIRCUIT BREAKER AT PANEL SFB, CURRENTLY ENERGIZING EXISTING UNIT AND PROVIDE NEW 2P-30A CIRCUIT BREAKER. CONNECT NEW HVAC UNIT TO EXISTING WIRING MADE AVAILABLE AFTER DEMOLITION

ABBREVIATION

SFB#1 = EXISTING PANEL SFB, CIRCUIT 1

FCC#1 = EXISTING PANEL FCC, CIRCUIT 1



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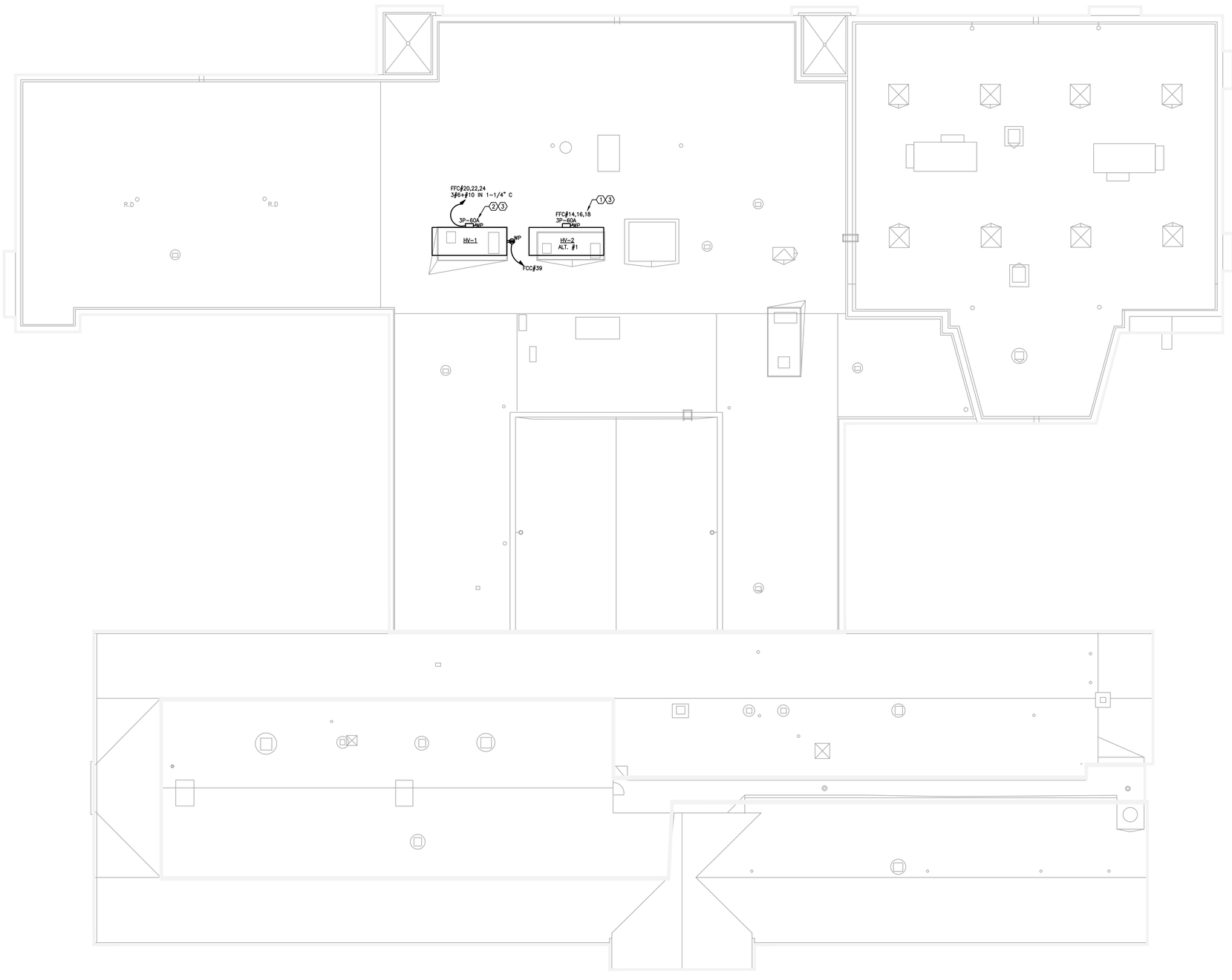
Drawing Title

ELECTRICAL
ATTIC FLOOR
PLAN - POWER

Issued 03/05/2019	Drawing No. E-201
Scale 3/32"=1'-0"	
Job No. 183171-000	



GENERAL NOTES:

1. COORDINATE ALL WORK WITH MECHANICAL CONTRACTOR
2. REFER TO DRAWING E-200 FOR ELECTRICAL PANEL LOCATIONS

KEY NOTES:

(1) NEW HVAC UNIT. CONNECT TO EXISTING CIRCUIT MADE AVAILABLE AFTER DEMOLITION

(2) REMOVE EXISTING 3P-40A CIRCUIT BREAKER AT PANEL FCC CURRENTLY ENERGIZING EXISTING UNIT AND PROVIDE NEW 3P-60A CIRCUIT BREAKER. PROVIDE NEW CIRCUIT WIRING AS INDICATED.

(3) UPON REMOVAL OF EXISTING HVAC UNIT, ELECTRICAL CONTRACTOR SHALL TEST EXISTING DUCT-DETECTOR AND PROVIDE NEW AS REQUIRED. RECONNECT TO EXISTING FIRE ALARM SYSTEM AS REQUIRED. FIRE ALARM SYSTEM IS BY FIRELITE AND MAIN FACP IS LOCATED IN 1ST FLOOR ELECTRICAL CLOSET 121.

ABBREVIATION

FCC#1 = EXISTING PANEL FCC, CIRCUIT 1

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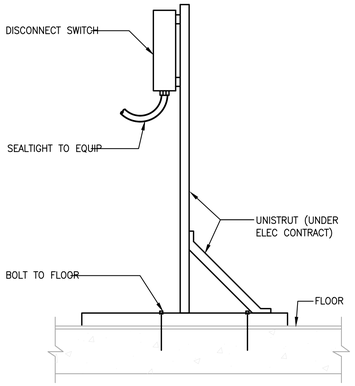
Stratford, CT

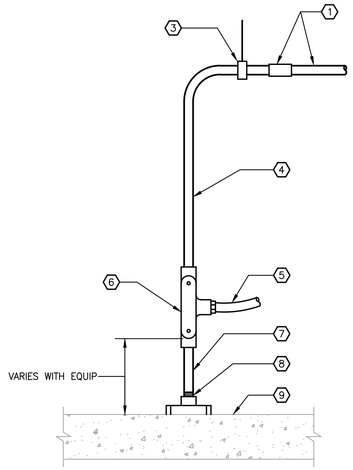
Drawing Title

ELECTRICAL ROOF PLAN - POWER

Issued 03/05/2019	Drawing No. E-202
Scale 3/32"=1'-0"	
Job No. 183171-000	



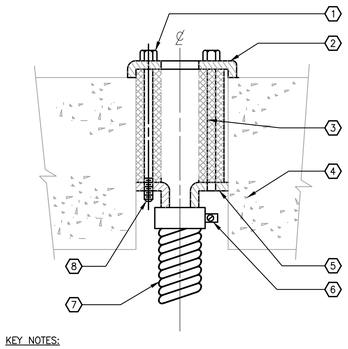
TYPICAL METHOD OF MOUNTING FLOOR MOUNTED DISCONNECT SWITCHES



KEY NOTES:

1. RACEWAY.
2. RIGID STEEL ADAPTER.
3. SUPPORT.
4. RIGID STEEL VERTICAL DROP (¾" MIN).
5. SEALTIGHT FLEX TO MOTOR (½" MIN).
6. CAST TEE CONDULET.
7. RIGID STEEL CONDUIT.
8. THREADED FLOOR FLANGE BOLTED TO FLOOR SLAB.
9. FLOOR.

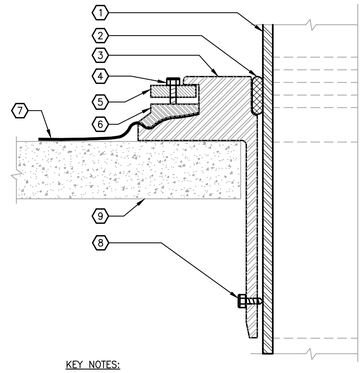
TYPICAL METHOD OF INSTALLING OVERHEAD CONDUIT DROPS FOR MOTOR CONNECTIONS



KEY NOTES:

1. STEEL CLAMPING SCREW.
2. STEEL UPPER PLATE.
3. FIRESTOP GROMMET.
4. CONCRETE FLOOR/WALL.
5. STEEL LOWER PLATE.
6. STAINLESS STEEL CLAMP.
7. FLEXIBLE METAL CONDUIT (OR CONDUIT).
8. CORE DRILLED HOLE.

FLOOR/WALL FIRE-RATED FITTING



KEY NOTES:

1. RIGID STEEL CONDUIT.
2. CAULKING/PACKING.
3. CAST IRON SLEEVE FITTING.
4. BRONZE BOLT.
5. PRESSURE RING.
6. CLAMP RING.
7. FLASHING OR ROOFING.
8. SET SCREW.
9. ROOF STRUCTURE.

ROOF SLEEVE:
SET SCREW, WATERTIGHT

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Drawing Title

ELECTRICAL DETAILS

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1. GENERAL:

A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THE CONTRACT DOCUMENTS.

B. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIAL WHICH VIOLATES ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.

C. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.

D. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS, PULL BOXES AND RISES OF RUNS. THE CONTRACTOR SHALL INCLUDE ALL COSTS AND MATERIAL FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.

E. FOR LOCATIONS AND QUANTITIES OF EQUIPMENT REFER TO FLOOR PLANS, DETAILS, SCHEDULES AND DIAGRAMS. WHERE THERE ARE DISCREPANCIES BETWEEN THESE DRAWINGS, THE GREATER OF EACH QUANTITY OR COST OR EQUIPMENT SPECIFICATIONS SHALL BE USED.

F. CONNECTIONS TO COMBINATION FIRE SMOKE DAMPERS ARE DIAGRAMMATIC. THE SYMBOL MAY REPRESENT MORE THAN ONE CONNECTION BASED ON DUCT SIZE, CONFIGURATION AND ACTUATOR MAKE AND MODEL AS SELECTED BY MECHANICAL INSTALLER AND/OR CONTRACTOR. ELECTRICAL INSTALLER AND/OR CONTRACTOR SHALL INCLUDE ALL CONNECTIONS AND WIRING AS REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM. COORDINATE WITH MECHANICAL CONTRACTOR.

G. CONNECTIONS TO MOTORIZED WINDOW SHADES ARE DIAGRAMMATIC. CONTRACTOR SHALL INCLUDE AS PART OF BASE BID AT A MINIMUM IF DETAILS AND OR WIRING IS NOT SPECIFICALLY SHOWN OR NOTED 4#12 IN 3/4? CONDUIT FROM A CENTRAL CONTROL PANEL FOR EVERY TWO FEET OF WINDOW. A 120V POWER CONNECTION SHALL BE INCLUDED TO THE CENTRAL CONTROL PANEL AS WELL AS 4#12, 3/4? CONDUIT FROM CENTRAL CONTROL PANEL TO EACH ROOM ENTRY DOORS.

H. INSTALL WORK TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES THAT INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.

I. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL CAREFULLY REVIEW SITE CONDITIONS AS NECESSARY TO INCLUDE ALL REASONABLE MATERIAL AND LABOR TO EXECUTE WORK.

J. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES, AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES, AND ONLY WITH WRITTEN CONSENT OF OWNER. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION, INCLUDING MAINTENANCE OF WIRING CONTINUITY AS REQUIRED.

K. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.

L. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR ON THE EXTERIOR.

M. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL. ALL PENETRATIONS THROUGH NEW AND EXISTING RATED FIRE AND SMOKE PARTITIONS AND/OR FLOORS SHALL BE COMPLETELY SEALED USING MATERIALS AND METHODS DESCRIBED IN SUBSEQUENT "FIRE STOPPING" SPECIFICATIONS SECTIONS.

N. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THE BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF CONDUIT AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AS REQUIRED. ALL ROOFING WORK SHALL BE EXECUTED BY THE BUILDINGS APPROVED ROOFING COMPANY RETAINED BY THIS CONTRACTOR.

O. PROVIDE 4-INCH HIGH CONCRETE EQUIPMENT PADS FOR ALL FLOOR-MOUNTED EQUIPMENT.

P. ALL EXISTING MATERIALS, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.

Q. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS, EXCEPT WHERE NOTED OTHERWISE. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK DURING OVERTIME HOURS AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

R. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.

S. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS. REFURBISHED OR RECONDITIONED ELECTRICAL EQUIPMENT SHALL NOT BE UTILIZED AND WILL NOT BE ACCEPTED.

T. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE BUILDING, EQUIPMENT, ETC., WHICH AFFECT OR ARE AFFECTED BY THIS WORK, AND THE ACCESS TO SUCH SPACES HAVE BEEN MADE, AND THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INDICATE ANY DISCREPANCIES BETWEEN THE CONTRACT DRAWINGS AND ACTUAL FIELD CONDITIONS PRIOR TO SUBMITTAL OF BID. LATER CLAIMS SHALL NOT BE MADE FOR LABOR; EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING FEEDERS AND EQUIPMENT (SIZES, CLEARANCES, ETC.), CONDITIONS RELATIVE TO THE PROJECT AND INSTALLERS MEANS AND METHODS.

U. INSURANCE SHALL BE IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

V. AS A CONDITION OF CONTRACTOR'S USE OF THESE SPECIFICATIONS, CONTRACTOR AGREES (I) TO NAME AKF AS ADDITIONAL INSURED ON CONTRACTOR'S INSURANCE POLICIES WHEREVER PERMITTED, (II) TO PROVIDE AKF, UPON REQUEST, WITH A CERTIFICATE OF INSURANCE AND COPIES OF SPECIFIC ENDORSEMENTS TO CONTRACTOR'S INSURANCE POLICIES EVIDENCING SAID ADDITIONAL INSURED STATUS, AND (III) TO WAIVE ALL RIGHTS OF RECOVERY AGAINST AKF BY WAY OF SUBROGATION, ASSIGNMENT, OR OTHERWISE WITH REGARD TO INSURED CLAIMS.

W. ALL WORK SHALL BE DONE WHEN AND AS DIRECTED BY THE CLIENT OR THE CLIENT?S APPOINTED REPRESENTATIVE AND IN A MANNER SATISFACTORY TO THE BUILDING OWNER. WORK SHALL BE PERFORMED SO AS TO CAUSE LIMITED TO NO INCONVENIENCE OR DISTURBANCE TO OTHER BUILDING OCCUPANTS AND ADJACENT SPACES NOT INCLUDED AS PART OF THE SCOPE OF WORK.

X. THE FINAL ACCEPTANCE SHALL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS, AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVALS.

2. SCOPE OF WORK:

A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMITY WITH THE APPLICABLE VERSIONS OF THE NATIONAL ELECTRICAL CODE, NATIONAL ELECTRICAL SAFETY CODE, APPLICABLE BUILDING CODE, BUILDING STANDARDS AND ALL APPLICABLE INDUSTRY, NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS, HEREIN SPECIFIED, AS APPLICABLE AND REQUIRED.

B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLEMENTED OR SPECIFIED HEREIN.

C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED, FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION INCLUDING BUT NOT LIMITED TO THE BUILDING DEPARTMENT AND FIRE DEPARTMENT, OBTAIN PERMITS AND LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL ASSOCAITED FEES. THE CONTRACTOR SHALL ARRANGE FOR INSPECTIONS AND TESTS OF ALL WORK AS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION AND PAY ALL FEES ASSOCIATED WITH SAME. THE CONTRACTOR SHALL FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES AND PERMIT SIGN-OFFS AS EVIDENCE OF COMPLETION AND ACCEPTANCE BY THE AUTHORITIES HAVING JURISDICTION.

3. SHOP DRAWINGS

A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, CONTRACTOR SHALL PROVIDE COMPLETE SETS OF COORDINATED SHOP DRAWINGS OF EQUIPMENT, INDICATING CAPACITY, WIRING, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED:

1) PROJECT NAME AND LOCATION

2) NAME OF ARCHITECT AND ENGINEER

3) ITEM IDENTIFICATION

4) APPROVAL STAMP OF PRIME CONTRACTOR

C. SUBMISSIONS:

1) ALL SUBMITTALS SHALL BE IN ELECTRONIC FORMAT. ALL CATALOG CUTS SHALL BE COMPLETE WITH ALL OPTIONS, DETAILS, MODEL NUMBERS AND PARTS CLEARLY IDENTIFIED. GENERIC SHOP DRAWINGS WILL NOT BE ACCEPTED.

D. SUBMIT SHOP DRAWINGS AND WIRING DIAGRAMS FOR THE FOLLOWING:

1) SWITCHES, VACANCY SENSORS, DAYLIGHT SENSORS, ETC.

2) DISCONNECT AND SAFETY SWITCHES

3) FUSES

4) CIRCUIT BREAKERS

5) RACEWAYS

6) WIRE AND CABLE

7) WALL SWITCHES, DIMMERS AND SENSORS

8) INSERTION RECEPTACLES

9) CONTACTORS AND MOMENTARY CONTACT SWITCHES

10) SURFACE METAL RACEWAY

11) LIGHTING FIXTURES AND EXIT SIGNS

12) FIRE ALARM EQUIPMENT, DEVICES, WIRING DIAGRAMS AND OPERATIONS MATRIX

13) LIGHTING DIMMING AND CONTROL SYSTEMS

14) ELECTRIFIED FURNITURE SYSTEM

15) MOTORIZED SHADES AND CONTROL SYSTEMS

16) TEST PROCEDURES AND REPORTS.

4. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

B. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER AND BE SUBMITTED IN ELECTRONIC FORMAT.

C. AS-BUILT DRAWINGS SHALL BE PROVIDED IN ELECTRONIC FORMAT (LATEST VERSION OF AUTOCAD OR BIM AS APPLICABLE) INDICATING THE INSTALLED CONDITIONS OF THE WORK. "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE OWNER AFTER COMPLETION OF THE INSTALLATION.

5. INSPECTIONS / TESTING

A. INDEPENDENT 3RD PARTY TESTING AND/OR INSPECTIONS AS WELL AS SYSTEMS START-UP, SHALL BE PROVIDED BY THIS CONTRACTOR WHO SHALL RETAIN SERVICES OF THE TESTING AGENCY, INSPECTOR OR MANUFACTURERS AUTHORIZED ACCREDITED REPRESENTATIVE.

6. GENERAL PROVISIONS FOR ELECTRICAL WORK:

A. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

B. DEFINITIONS:

1) "PROVIDE": TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3) "FURNISH": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "WIRING": RACEWAY, FITTINGS, WIRE, WIRING CONNECTIONS, BOXES AND RELATED ITEMS.

6) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

C. GENERAL

1) THE DRAWINGS SHOW THE APPROXIMATE LOCATION OF ALL APPARATUS. THE EXACT LOCATIONS OF WHICH ARE SUBJECT TO THE APPROVAL OF THE OWNER WHO RESERVES THE RIGHT TO MAKE ANY REASONABLE CHANGES IN THE LOCATION WITHOUT EXTRA COST. WHILE THE GENERAL RUN OF CONDUIT AND CABLES MAY BE INDICATED ON THE DRAWINGS, IT IS NOT INTENDED THAT THE EXACT ROUTING OR LOCATIONS OF CONDUIT & CABLES BE DETERMINED THEREFROM. WHERE CONTRACTOR UTILIZES EQUIPMENT THAT IS PHYSICALLY LARGER OR HAS A CONFIGURATION DIFFERENT THAN THE MANUFACTURER UTILIZED AS THE BASIS OF DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR ANY COSTS ASSOCIATED WITH UTILIZING SUBSTITUTE MANUFACTURERS IF ADDITIONAL WORK OR WIRING IS REQUIRED AS A RESULT OF ITS APPROVAL.

2) THE ELECTRICAL INSTALLER/CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED BENDS, OFFSETS, PULL AND SPLICE BOXES AND CLEARING OF OBSTRUCTIONS THAT EXIST AND ARE CREATED. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE WITH EXISTING CONDITIONS AND OTHER TRADES AS REQUIRED TO MAINTAIN HEADROOM, CLEARANCES, CEILING HEIGHTS, ACCESS, OPENINGS AND PASSAGEWAYS.

3) THE INSTALLER/CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH ALL TRADES AS IT AFFECTS EXECUTION OF WORK. NO CLAIMS FOR CONTRACT EXTRAS ASSOCIATED WITH CONFLICTS WILL BE REVIEWED OR APPROVED FOR WORK THAT WAS EXECUTED PRIOR TO COORDINATION.

4) WIRE ALL FIXTURES, DEVICES, ETC., TO RESPECTIVE PANELS AND CONTROLS AS SHOWN ON PLANS IN SYMBOL FORM.

5) THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEAN-UP AND REMOVAL FROM THE SITE OF RESULTING DEBRIS.

6) PROVIDE SEPARATE SYSTEMS AND ENCLOSURES FOR 208/120 AND 480/277 VOLT POWER, CONTROL WIRING, AND FOR EMERGENCY, LEGALLY REQUIRED, OPTIONAL STANDBY AND NORMAL POWER. COMMON PULL BOXES AND JUNCTION BOXES ARE NOT ACCEPTABLE UNLESS OTHERWISE NOTED.

7) LOCATIONS INDICATED FOR LOCAL SWITCHES & OTHER LIGHTING CONTROLS ARE SUBJECT TO RELOCATION AS REQUIRED BY ARCHITECT AND/OR OWNER. AT OR NEAR DOORS, INSTALL AT INSIDE ON OPPOSITE SIDE OF HINGE. VERIFY FINAL DOOR HINGE LOCATION IN FIELD WITH ARCHITECT PRIOR TO WIRING DEVICE INSTALLATION.

8) HEIGHTS OF OUTLETS FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS SHALL CONFORM TO ADA REQUIREMENTS AND ARCHITECTURAL DRAWINGS.

9) ERECT WALL RECEPTACLE AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO WALL CONSTRUCTION BY ADJUSTABLE STRAP IRONS (GROUT IN MASONRY). VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES AND WHERE VOLTAGE EXCEEDS 150 VOLTS TO GROUND. PROVIDE BARRIERS BETWEEN NORMAL AND EMERGENCY SWITCHES INSTALLED IN A COMMON OUTLET BOX.

10) PANEL BOXES AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE INDEPENDENT OF CONDUIT. PROVIDE FLOOR-TO-CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT WIRING. ADD BOX VOLUME WHERE REQUIRED.

D. TEMPORARY LIGHT AND POWER: PROVIDE TEMPORARY LIGHT AND POWER SYSTEMS AT EARLIEST POSSIBLE DATE WITHIN THE CONSTRUCTION AREAS FOR THE REQUIREMENTS OF ALL TRADES AS SPECIFIED BY GENERAL CONTRACTOR OR CONSTRUCTION MANAGER. MAINTAIN SYSTEM DURING WORKING HOURS OF ALL TRADES. PROVIDE ALL REQUIRED MAINTENANCE, INCLUDING LAMPS AND SOCKETS. SYSTEM REMOVAL OR CONNECTION TO PERMANENT DISTRIBUTION SHALL BE INCLUDED AS REQUIRED.

E. QUALITY ASSURANCE

1) QUALITY AND GAUGE OF MATERIALS: NEW, BEST OF THEIR RESPECTIVE KINDS, FREE FROM DEFECTS AND LISTED BY UNDERWRITERS LABORATORIES, INC., OR OTHER NATIONALLY APPROVED TESTING AGENCY AND BEARING THEIR LABEL. MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.

2) ELECTRICAL CHARACTERISTICS:

a) SERVICE: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.

b) DISTRIBUTION: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.

3) HEIGHTS OF OUTLETS: CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND CONFIRMING ALL FINAL MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DRAWINGS.

a) FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS FOR:

- RECEPTACLES: 1 FT-6 IN.

- WALL SWITCHES: 3 FT-10 IN.

- MOTOR CONTROLLERS: 5 FT-0 IN.

b) EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.

F. PRODUCT DELIVERY, STORAGE AND HANDLING

1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CRATED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES AND TO ACCOMMODATE RESTRICTIONS ASSOCIATED WITH BUILDING ELEVATORS.

2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS SHALL BE PERMITTED. CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.

G. MATERIALS

1) NAMEPLATES: PROVIDE BLACK LAMICOID SHEET WITH 3/4 IN. WHITE LETTERING, FASTENED WITH EPOXY CEMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE. NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.

2) CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG, INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.

3) INSERTS AND SUPPORTS:

a) INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.

- SINGLE ROD: SIMILAR TO ANVIL INTERNATIONAL FIG. 281.

- MULTI-ROD: SIMILAR TO MASON INDUSTRIES SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.

- CLIP FORM NAILS FLUSH WITH INSERTS.

- MAXIMUM LOADING 75 PERCENT OF RATING.

b) SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY), CANTILEVER BRACKETS OR OTHER MEANS. SUBMIT FOR REVIEW.

c) GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS.

d) WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.

H. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AFTER FABRICATION. UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC BASED PRIMER FOR: OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. ZINC BASED PRIMER WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD-APPLIED ZINC BASED PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.

I. BRUSH, CLEAN, REMOVE DEBRIS AND REPAIR ALL WORK PRIOR TO CONCEALING AND INSTALLATION ACCEPTANCE.

J. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT.

K. PROVIDE ACCESS DOORS WHEN CONCEALED ELECTRICAL EQUIPMENT REQUIRES ACCESS. ALL ACCESS DOOR FINAL LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECT PRIOR TO INSTALLATION.

7. DEMOLITION

A. "SELECTIVE DEMOLITION": IS HEREBY DEFINED TO INCLUDE BUT IS NOT NECESSARILY LIMITED TO THE REMOVAL OF THE FOLLOWING EXISTING MATERIALS, ITEMS AND EQUIPMENT.

1) REFER TO ARCHITECTURAL/ELECTRICAL DEMOLITION PLANS AND RELATED NOTES FOR EXTENT OF DEMOLITION.

2) REFER TO EXISTING DRAWINGS AND SITE CONDITIONS FOR ALL REMOVAL OF WORK NECESSARY FOR COMPLETION OF NEW WORK AS SHOWN. EACH BIDDER SHALL CAREFULLY EXAMINE THE PREMISES AND DOCUMENTS DURING THE BIDDING PERIOD AND ASCERTAIN THE EXTENT OF REMOVAL OF EXISTING WORK. IF ADDITIONAL WORK IS NOTED BY THE CONTRACTOR, CALL IT TO THE ATTENTION OF THE ARCHITECT PRIOR TO SUBMITTING BID. BY SUBMITTING A BID, THE CONTRACTOR WILL HAVE DEEMED TO HAVE MADE SUCH EXAMINATION, TO ACCEPT SUCH CONDITIONS, AND TO HAVE MADE ALLOWANCES IN PREPARING HIS BID.

3) ITEMS OF SALVAGE SHALL BE CAREFULLY REMOVED WITHOUT DAMAGE; NAILS AND OTHER FASTENERS REMOVED THAT ARE NOT INTEGRAL TO THEIR CONSTRUCTION; AND STORED AND PROTECTED AT LOCATIONS DIRECTED BY THE OWNER. IDENTIFY AND TAG ALL SALVAGE MATERIALS REGARDING LOCATION IN EXISTING BUILDING AND RELATIONSHIP OF PARTS.

4) ALL DEMOLISHED AND/OR REMOVED MATERIALS NOT REQUIRED BY OWNER TO BE RETAINED OR TURNED OVER TO THE OWNER SHALL BE REMOVED FROM THE PREMISES, AND SHALL BE PROPERLY DISPOSED OF IN A LEGAL MANNER, OFF-SITE.

5) CARE MUST BE TAKEN NOT TO DISTURB EXISTING WIRING, WHICH IS NOT AFFECTED BY DEMOLITION. RESTORE ALL CIRCUITS AND EQUIPMENT DISRUPTED OR DISTURBED BY THE REMOVAL OF ONLY PARTS OF EXISTING SYSTEMS. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED.

6) ALL RACEWAYS TO BE ABANDONED SHALL BE REWORKED AS DEFINED WITHIN THE DEMOLITION NOTES. WHERE IT IS IMPRACTICAL TO REMOVE RACEWAY BACK TO SOURCE, DISCONNECT WIRING AT LOAD (EQUIPMENT) AND AT LINE SIDE, CUT AND CAP, FLUSH TO SURFACE. REMOVE CONDUCTORS FROM EXISTING RACEWAYS TO BE REWIRED. CLEAN RACEWAY AS REQUIRED PRIOR TO REWIRING.

7) ALL REQUIRED WORK FOR TIE-IN TO THE EXISTING EQUIPMENT SHALL BE ACCOMPLISHED AFTER HOURS, THE EXACT DAY AND TIME SHALL BE DIRECTED BY OWNER, AND AT NO ADDITIONAL CHARGE.

8. CUTTING AND PATCHING

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF THE EXISTING AND NEW CONSTRUCTION WORK, WHICH MAY BE REQUIRED FOR THE PROPER INSTALLATION OF THE ELECTRICAL WORK. ALL PATCHING SHALL BE OF THE SAME MATERIALS, WORKMANSHIP, AND FINISH, AND SHALL ACCURATELY MATCH ALL SURROUNDING WORK.

B. CORE BORING OF CONCRETE FLOORS AND/OR WALLS IF REQUIRED, SHALL BE PROVIDED BY THE ELECTRICAL INSTALLER/CONTRACTOR.

9. COORDINATION

A. THE CONTRACTOR SHALL VERIFY FINAL LOCATIONS OF ALL ELECTRICAL DEVICES AND EQUIPMENT WITH OTHER TRADES AND ARCHITECT. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS, AND MECHANICAL EQUIPMENT, VARIATIONS IN FIRE PROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILINGS, AND THE LIKE, AND CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSES TO THE OWNER

10. EQUIPMENT PROVIDED BY OTHERS

A. THE CONTRACTOR SHALL FURNISH AND INSTALL WIRING FOR EQUIPMENT FURNISHED BY OTHERS, AS SHOWN ON DRAWINGS. COORDINATE WITH ALL

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Drawing Title

ELECTRICAL SPECIFCATIONS

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OTHER TRADES OR DETAILS FOR INSTALLATION. THE TERM "WIRING" AS USED HERE-IN, INCLUDES, BUT IS NOT LIMITED TO, FURNISHING AND INSTALLING CONDUIT, WIRE, JUNCTION BOXES, DISCONNECTS AND MAKING CONNECTIONS. CONTRACTOR SHALL CHECK ARCHITECTURAL, MECHANICAL, FIRE PROTECTION, PLUMBING AND LOW VOLTAGE SYSTEMS. DRAWINGS AND SPECIFICATIONS FOR EQUIPMENT TO BE PROVIDED BY OTHERS. INSTALLER/CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER WIRING AND NECESSARY ELECTRICAL ADJUSTMENTS TO EQUIPMENT TO CONFORM TO SPECIFIED REQUIREMENTS OF THE EQUIPMENT.

11. LOW-VOLTAGE DISTRIBUTION EQUIPMENT:

A. PROVIDE COMPLETE EQUIPMENT INCLUDING BUT NOT LIMITED TO: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS, ETC.

B. ALL EQUIPMENT SHALL BE NEW AND CONFORM TO NEMA, ANSI AND IEEE STANDARDS AS WELL AS JURISDICTIONAL CODE REQUIREMENTS. EQUIPMENT SHALL BE LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) FOR USE INTENDED. ?RECOGNIZED? PRODUCTS SHALL NOT BE UTILIZED. IN ADDITION, REMANUFACTURED, RECONDITIONED OR USED PRODUCTS SHALL NOT BE UTILIZED.

C. DISCONNECT SWITCHES SHALL BE FUSED OR NONFUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY AND HORSEPOWER RATED FOR MOTOR LOADS. DISCONNECT SWITCHES UTILIZED IN ELEVATOR MACHINE ROOMS SHALL BE NEMA 4 BUSMANN POWER MODULE SWITCH WITH FIRE SAFETY INTERFACE RELAY, FIRE ALARM VOLTAGE MONITORING RELAY, CONTROL POWER TRANSFORMER, KEY-TO-TEST SWITCH AND PILOT LIGHT OR APPROVED EQUAL BY EATON.

TOGGLE TYPE SWITCHES SHALL BE NONFUSED, LOAD BREAK, UTILIZED WITH A MAXIMUM RATING OF 20 AMPS AT 600 VOLTS AND 30 AMPS AT 240 VOLTS. TWO-POLE SWITCHES SHALL BE SIMILAR TO LEVITON MS 302. THREE-POLE SWITCHES SHALL BE SIMILAR TO LEVITON MS 303.

D. FUSES:

1) CIRCUITS 0 TO 600 AMPERES SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMAN LOW-PEAK DUAL-ELEMENT TIME-DELAY LPN-RK (AMP) SP (250V) /LPS-RK (AMP) SP (600V) OR LPJ (AMP) SP (600V) (UL CLASS RK1 OR CLASS J IN RESTRICTED SPACE ONLY), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 200,000 AMPERES RMS SYMMETRICAL.

2) ALL FUSES SHALL BE PROVIDED BY SAME MANUFACTURER.

3) PROVIDE 1 SPARE MATCHING FUSE FOR EACH SET OF 3 AND A MINIMUM OF 3 SPARE PER SIZE AND TYPE.

E. CIRCUIT BREAKERS: MOLDED CASE BREAKERS SHALL BE THERMAL-MAGNETIC, QUICK-MAKE-QUICK-BREAK, BOLT-ON TYPE, MANUALLY OPERATED WITH INSULATED TRIP-FREE HANDLE. ALL BREAKERS 250 AMPS AND ABOVE SHALL INCLUDE LSI ELECTRONIC TRIP UNITS UNLESS OTHERWISE NOTED. MULTI-POLE TYPE BREAKERS SHALL CONTAIN INTERNAL TRIP BAR. TERMINALS SHALL BE SUITABLE FOR COPPER OR ALUMINUM CABLE. PROVIDE INTERCHANGEABLE TRIP FOR 225A FRAME AND ABOVE. FURNISH AUXILIARY DEVICES WHERE REQUIRED FOR SHUNT TRIPPING, OPEN AND CLOSE MOTOR OPERATOR AND ALARM INDICATION. PROVIDE ARC-FAULT TYPE CIRCUIT BREAKERS AS REQUIRED IN DWELLING UNITS. ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED. FRAMES AIC SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED: ALL BREAKERS SERVING MECHANICAL EQUIPMENT SHALL BE HACR RATED. PROVIDE 30mA GROUND FAULT BREAKERS FOR ALL ELECTRICAL HEAT TRACING CIRCUITS.

1) 120 VOLTS, 100-AMP FRAME: 10,000 AMPS MINIMUM.

2) OVER 225 AMP FRAME: 65,000 AMPS MINIMUM

3) CIRCUIT BREAKERS TO BE INSTALLED IN EXISTING PANEL BOARDS SHALL BE OF THE SAME MANUFACTURER, TYPE AND AIC RATING AS PRESENTLY IN USE.

4) ALL CIRCUIT BREAKERS SERVING COMMERCIAL KITCHEN EQUIPMENT MOUNTED BENEATH A HOOD SHALL INCLUDE SHUNT TRIP FEATURE.

5) ALL 120V 15 AND 20 AMP CIRCUIT BREAKERS SERVING BRANCH CIRCUITS IN DWELLING UNITS AS DEFINED BY NEC 210.12 SHALL BE LISTED ARC FAULT CIRCUIT INTERRUPTER.

6) PANEL SCHEDULES FOR EXISTING PANELS IDENTIFIED ON PLANS INDICATE FINAL CIRCUIT BREAKER ARRANGEMENT ASSOCIATED WITH PROJECT. CONTRACTOR SHALL PROVIDE NEW BREAKERS AS REQUIRED TO PROVIDE BREAKER TYPE, SIZE AND ARRANGEMENT SHOWN AND AS REQURIED TO FACILITATE WORK. REMOVE AND REPLACE ANY BREAKERS WHICH ARE OF DIFFERENT MANUFACTURER. FURINISH AND INSTALL NEW PANEL INTERIOR IF EXISTING CANNOT BE RE-USED. ALL EXISTING SINGLE POLE 15 AMP CIRCUIT BREAKERS SHALL BE REPLACED WITH NEW SINGLE POLE 20 AMP CIRCUIT BREAKERS.

F. BALANCE THE LOAD OVER PHASES TO WITHIN +10% WHEN NEW CIRCUITS ARE ADDED TO NEW OR EXISTING PANELS. LOADING SHALL BE BALANCED WITH ALL LAMPS OPERATING EQUIPMENT IN OPERATION AFTER THE SPACE IS OCCUPIED.

G. PROVIDE MULTI-CABLE LUGS WHERE REQUIRED. DOUBLE LUGGING SHALL NOT BE PERMITTED.

H. MOUNTING HEIGHT SHALL BE A MAXIMUM OF 6 FT-6 IN. FROM FLOOR TO TOP SWITCH UNIT.

I. UPDATE DIRECTORIES ON EXISTING PANELBOARDS WHERE CIRCUITING IS CHANGED.

J. TESTS: OPEN AND CLOSE LOAD BREAK SWITCHING DEVICES UNDER LOAD.

12. RACEWAYS:

A. PROVIDE RACEWAYS COMPLETE WITH BOXES, FITTINGS AND ACCESSORIES. CONDUIT OR TUBING SIZES REFERRED TO IN SPECIFICATIONS AND ON DRAWINGS ARE NOMINAL DIAMETERS. MINIMUM DIAMETER SHALL BE 3/4 IN. RACEWAYS SHALL RUN CONCEALED, EXCEPT AS NOTED.

B. MATERIALS

1) RACEWAYS:

a) RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED, THREADED.

b) ELECTRICAL METALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADLESS.

c) FLEXIBLE METAL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.

d) WIREWAYS: WIRE SHALL BE AS NOTED, MINIMUM NO. 16 GAUGE STEEL WITH GROUND CONTINUITY. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.

e) SURFACE METAL RACEWAY: SIZE AS NOTED. BASE 0.04 IN., COVER 0.25 IN. MATERIAL SHALL BE STEEL. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.

f) RIGID ALUMINUM CONDUIT. FULL-WEIGHT PIPE, THREADED

g) LIQUIDTIGHT FLEXIBLE METAL CONDUIT: SUNLIGHT RESISTANT OUTER JACKET WITH A FLEXIBLE METAL CORE.

2) FITTINGS AND ACCESSORIES:

a) RIGID STEEL: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.

b) ELECTRICAL METALLIC TUBING: COMPRESSION TYPE OR DOUBLE SETSCREWS. GALVANIZED RIGID STEEL ELBOWS, 2 IN. OR LARGER.

c) FLEXIBLE METAL CONDUIT: ANGLE WEDGE TYPE WITH INSULATED THROAT.

d) BUSHINGS: METALLIC INSULATED TYPE.

e) FOR RIGID ALUMINUM CONDUIT, PROVIDE NON-SPLIT, THREADED COPPER FREE ALUMINUM ALLOY OR HOT DIPPED GALVANIZED.

f) LIQUIDTIGHT FLEXIBLE METAL CONDUIT: LIQUID-TIGHT WITH SEALING RING AND INSULATED THROAT.

g) EXPLOSION PROOF TYPE-COMPLYING WITH THE CLASS AND TYPE OF SPACE.

3) BOXES:

a) OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES. BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL FOR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTACLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH RAISED COVERS AND FIXTURE STUDS WHERE REQUIRED. WITHOUT FIXTURE OR DEVICE: FURNISH BLANK COVER. OFFSET BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.

b) JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE.

c) FLOOR BOX TYPES SHALL COORDINATED WITH ARCHITECT AND BE SUITABLE FOR CONDUIT, DEVICES NOTED AND FLOOR TYPE UNLESS OTHERWISE INDICATED ON DRAWINGS. RAISED OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH ABOVE FLOOR FITTING. FLUSH OUTLETS UTILIZING CONDUIT RUN IN OR CHOPPED IN SLAB SHALL BE HUBBELL #B2414 SERIES WITH FLUSH FLOOR FITTING. INCREASE SIZE TO SUIT AS NECESSARY. PROVIDE RACEWAYS ONLY AS HEREIN SPECIFIED, EXCEPT AS NOTED. RACEWAYS SHALL BE RUN CONCEALED, EXCEPT AS NOTED.

4) PROVIDE RACEWAY SUPPORT UTILIZING CEILING TRAPEZE, STRAPHANGERS, OR WALL BRACKETS. PROVIDE U-BOLTS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND CONNECTED TO ACCEPTABLE SUPPORTS. PROVIDE RISER CLAMPS AT EACH FLOOR LEVEL OF RISER RACEWAYS RESTING ON SLAB. SPACING OF SUPPORTS SHALL BE A MINIMUM OF 10 FT ON CENTER FOR METALLIC RACEWAY AND AS REQUIRED FOR NONMETALLIC RACEWAY. SPACING SHALL BE 5 FT ON CENTER FOR WIREWAYS AND PER CODE AND AS NOTED FOR OTHERS. MOUNT SUPPORTS TO STRUCTURE MASONRY WITH TOGGLE BOLTS ON HOLLOW MASONRY, EXPANSION SHIELDS OR INSERTS IN CONCRETE AND BRICK, MACHINE SCREWS ON METAL, BEAM CLAMPS ON FRAMEWORK, WOOD SCREWS ON WOOD, AND PAN THROUGH STRAPS IN METAL DECK. NAILS, RAWL PLUGS OR WOOD PLUGS SHALL NOT BE PERMITTED. WHERE REQUIRED BY STRUCTURE, FURNISH THROUGH BOLTS AND FISHPLATES.

EXPOSED RACEWAYS SHALL BE RUN PARALLEL WITH OR AT RIGHT ANGLES TO WALLS AND BUILDING STRUCTURE. PROVIDE CLEARANCE FROM WATER, STEAM OR OTHER PIPING (MINIMUM 3 IN. SEPARATION FROM STEAM AND HOT WATER PIPES, EXCEPT 1 IN. FROM PIPE COVER AT CROSSINGS AND 18 IN. FOR PARALLEL RUNS). FOR SUSPENDED CEILING OUTLETS, RUN ABOVE CEILING AND CONNECT TO CEILING SUPPORT CHANNELS. IN MASONRY AND POURED CONCRETE, RUN VERTICALLY ONLY.

MAINTAIN GROUNDING CONTINUITY OF INTERRUPTED METALLIC RACEWAYS WITH GROUND CONDUCTOR, AND IN FLEXIBLE CONDUIT FOR FEEDERS AND MOTOR TERMINAL CONNECTIONS.

EMPTY RACEWAYS OVER 10 FT LONG: PROVIDE FISH OR PULL WIRE, GALVANIZED OR NYLON ROPE.

RIGID STEEL CONDUIT SHALL BE PERMITTED FOR FEEDERS AND BRANCH CIRCUITS AND SHALL BE UTLIZED WHERE RUN IN MECHANCIAL ROOMS, OUTDOORS, EXPOSED CEILINGS, OR IN CONCRETE SLABS. PAINT MALE THREADS OF FIELD-THREADED CONDUIT WITH GRAPHITE-BASE PIPE COMPOUND AND BUTT CONDUIT ENDS. TOUCH UP MARRED SURFACES AND FIELD-CUT THREADS, CRC-COLD GALVANIZED.

EMT SHALL BE PERMITTED FOR INTERIOR FEEDERS AND BRANCH CIRCUITS, IN DRY LOCATIONS, DRY WALLS, EXPOSED CEILINGS (WHERE NOT SUBJECT TO PHYSICAL DAMAGE), SUSPENDED CEILINGS, HOLLOW BLOCK WALLS, FURRED SPACES AND WHERE NOT SUBJECT TO PHYSICAL DAMAGE.

FLEXIBLE STEEL CONDUIT SHALL BE UTILIZED FOR SHORT CONNECTIONS WHERE RIGID CONDUIT IS IMPRACTICAL. FROM OUTLET BOX TO RECESSED LIGHTING FIXTURE: PROVIDE MINIMUM 4 FT AND MAXIMUM 6 FT LENGTHS. FOR FINAL CONNECTION TO MOTOR TERMINAL BOX, TRANSFORMER AND OTHER VIBRATING EQUIPMENT: PROVIDE WITH POLYVINYL SHEATHING AND GROUND CONDUCTOR. MINIMUM LENGTH: 18 IN. WITH SLACK. CONNECT GROUND CONDUCTOR TO ENCLOSURE OR RACEWAY AT EACH END.

CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREADS OF FIELD THREADED RACEWAYS WITH GRAPHITE BASE PIPE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.

EXPANSION FITTINGS SHALL BE INSTALLED AT RIGHT ANGLES WITH CLIP JOINT CENTERED IN EXPANSION JOINT. PROVIDE A LENGTH OF RUN IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION. FOR EXPANSION JOINT CROSSINGS, CROSS AT RIGHT ANGLES AND ANCHOR ENDS. FOR RACEWAY NOT IN SLAB, PROVIDE FLEXIBLE CONDUIT WITH EXTERNAL BONDING JUMPER STRIP. IN SLAB, PROVIDE O-Z/GEDNEY TYPE "AX" OR APPLETON TYPE "XJ" OR "XJF" WITH GROUND CONTINUITY.

C. FOR THROUGH-THE-FLOOR SYSTEMS (FIRE RATED POKE-THRU), UTILIZE AN ASSEMBLY SIMILAR TO WIREMOLD EVOLUTION SERIES AV6 FIRE RATED POKE-THROUGH-FLOOR BOX SYSTEM. FOR CONFERENCE ROOMS UTILIZE AN ASSEMBLY SIMILAR TO WIREMOLD EVOLUTION SERIES AV8. FOR ABOVE FLOOR FITTINGS POWER SHALL BE DUPLEX RECEPTACLE OR OTHER AS NOTED. PROVIDE SEPARATION BARRIER BETWEEN POWER AND TEL/DATA COMPARTMENTS. PROVIDE JUNCTION BOX ON UNDERSIDE OF FLOOR. PACK FITTING TO RESTORE FIRE RATING OF FLOOR. FLOOR BOXES FOR FURNITURE SYSTEMS SHALL UTILIZE SEPARATE FIRE RATED POKE-THRU?S FOR POWER AND TEL/DATA. WIREMOLD TYPE RC-9 MAY BE UTILIZED FOR EACH POWER AND TEL/DATA IN-FEED LOCATION WITH 2 INCH CONDUIT CONNECTION FOR EACH IN-FEED CONNECTION.

D. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.

E. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS AS REQUIRED FOR ACCESSIBILITY. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE FLOOR-TO-CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT CONDUIT AND WIRING; ADD BOX VOLUME WHERE REQUIRED.

F. FIRE SEALANTS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE PARTITIONS.

G. PERFORM CONTINUITY TESTS OF RESISTANCE OF FEEDER CONDUITS FROM SERVICE TO POINT OF FINAL DISTRIBUTION USING 1 CONDUCTOR RETURN. MAXIMUM RESISTANCE SHALL BE 25 OHMS. ANY FEEDERS FOUND TO EXCEED THIS TOLERANCE SHALL BE REPLACED AT CONTRACTOR?S EXPENSE.

13. WIRE AND CABLE:

A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG AND/OR KCMIL EXCEPT AS NOTED.

B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 75FT UP TO 100 FT CIRCUIT LENGTH, PROVIDE NO. 10 MINIMUM. AT 277 VOLTS AND OVER 150FT UP TO 250 FT CIRCUIT LENGTH, PROVIDE NO. 10 MINIMUM.

C. CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT CIRCUIT LENGTH, PROVIDE NO. 12 MINIMUM.

D. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZING AS REQUIRED TO MAINTAIN CODE MAXIMUM VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.

E. INSULATION SHALL BE RUBBER AND THERMOPLASTIC, 90 DEG C MEETING ASTM AND ICEA STANDARDS. TYPE THHN/THWN SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. SFF-2 SHALL BE USED FOR BRANCH CIRCUITS LOCATED IN WIRING CHANNELS OF CONTINUOUS ROW FLUORESCENT FIXTURES AND IN AMBIENT TEMPERATURES OVER 90 DEG. C. UNDERGROUND SERVICE ENTRANCE CABLING SHALL BE USE. PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW) IN EXTERIOR LOCATIONS INCLUDING UNDERGROUND NON-SERVICE CABLES.

F. METAL-CLAD CABLE (TYPE MC) WITH GROUND WIRES MAY BE UTILIZED WHEN PERMITTED BY BUILDING RULES AND REGULATIONS FOR BRANCH CIRCUITS IN DRY HOLLOW LOCATIONS, HUNG CEILINGS, AND BLOCK WALLS. TYPE MC CABLE MAY NOT BE INSTALLED IN EXPOSED CEILINGS WITHOUT WRITTEN APPROVAL BY ARCHITECT AND ENGINEER. WHEN USED IN LIEU OF WIRING IN CONDUIT, STATE IN PROPOSAL THAT PRICE IS BASED UPON THE USE OF MC CABLE. MC CABLE SHALL INCLUDE COPPER CONDUCTORS AND STEEL OR LIGHTWEIGHT STEEL JACKET. TYPE MC CABLE UTILIZED IN HEALTH CARE FACILITIES AND AREAS AS DEFINED BY THE NATIONAL ELECTRICAL CODE ARTICLE 517 SHALL BE EQUIVALENT TO AFC CABLE SYSTEMS HCF-90 AND UTILIZED FOR NORMAL CIRCUITS ONLY. BX CABLE (TYPE AC) SHALL NOT BE UTILIZED. ALL BRANCH CIRCUIT HOMERUNS AND WIRING WITHIN ELECTRICAL CLOSETS SHALL BE RUN IN CONDUIT.

G. COLOR CODING SHALL BE AS FOLLOWS:

1) 120/208 VOLT SYSTEM:
BLACK FOR A PHASE
RED FOR B PHASE
BLUE FOR C PHASE

2) 277/480 VOLT SYSTEM:
BROWN FOR A PHASE
ORANGE FOR B PHASE
YELLOW FOR C PHASE

3) NEUTRAL WIRE SHALL UTILIZE WHITE OUTER COVERING THROUGHOUT. EQUIPMENT GROUND WIRE SHALL UTILIZE GREEN OUTER COVERING THROUGHOUT.

WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION TO OVERLAP CONDUCTORS WITH 6 IN. OF COLOR TAPING IN ACCESSIBLE LOCATIONS.

H. PROVIDE FLAMEPROOF LINEN OR FIBER TAGS IN ACCESSIBLE LOCATIONS. FOR FEEDERS INDICATE FEEDER NUMBER, SIZE, PHASE AND POINTS OF ORIGIN AND TERMINATIONS. FOR CONTROL AND ALARM WIRING, INDICATE TYPE (CONTROL OR ALARM), SIZE OF WIRE, AND POINTS OF ORIGIN AND TERMINATIONS. SIMILAR TO STRANCO PRODUCTS, INC.

I. TERMINATIONS, SPLICES AND TAPS UNDER 600 VOLTS: COPPER CONDUCTORS NO. 10 AND SMALLER SHALL UTILIZE COMPRESSION-TYPE OF TWIST-ON SPRING-LOADED CONNECTORS AND CLEAR NYLON-INSULATED COVERING. COPPER CONDUCTORS NO. 8 AND LARGER SHALL UTILIZE MECHANICAL BOLTED PRESSURE OR HYDRAULIC COMPRESSION TYPE USING MANUFACTURER'S RECOMMENDED TOOLING. CABLE LUGS AND CONNECTORS SHALL UTILIZE COMPRESSION TYPE OF SAME METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS: USE ANTI-SEIZE COMPOUND.

J. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. IF MORE THAN THREE CIRCUITS, DERATE WIRE CURRENT CARRYING CAPACITY AND MAINTAIN CODE REQUIREMENTS FOR CONDUIT FILL. NEUTRAL CONDUCTOR SHALL BE COUNTED AS A CURRENT CARRYING CONDUCTOR. SUBMIT TO ENGINEER FOR REVIEW PRIOR TO INSTALLATION. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEG F. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF NORMAL AND EMERGENCY SYSTEMS, 120/208 AND 277/480 VOLT SYSTEMS. THERMOPLASTIC WIRES SHALL NOT BE INSTALLED IN COMPUTER AREA RAISED FLOORS.

K. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.

L. PERFORM CONTINUITY AND INSULATION TESTS. MEGGER TEST 100 PERCENT OF FEEDERS, 10 PERCENT OF BRANCH CIRCUITS AND MOTOR BRANCH CIRCUITS OVER 25 HP. PERFORM TESTS PRIOR TO CONNECTING EQUIPMENT AND IN PRESENCE OF AUTHORIZED REPRESENTATIVES. SUBMIT WRITTEN REPORT OF RESULTS. CORRECT OR REPLACE CABLE TESTING BELOW MANUFACTURER'S STANDARDS.

14. GROUNDING

A. A SEPARATE EQUIPMENT GROUNDING CONDUCTOR COMMONLY DESCRIBED AS A ?GREEN WIRE? SHALL BE PROVIDED FOR ALL BRANCH CIRCUITS PROTECTED BY OVERCURRENT DEVICES. A ?GREEN WIRE? GROUND SHALL ALSO BE PROVIDED FOR FLEXIBLE CONDUIT AND MOTOR CIRCUITS. METALLIC RACEWAY CONTINUITY SHALL BE MAINTAINED WITH A BARE NO. 6 WIRE. WHERE ISOLATED GROUNDING BRANCH CIRCUITS ARE USED, PROVIDE A SEPARATE AND DISTINCTLY MARKED GREEN GROUND WIRE. EACH GROUNDING CONDUCTOR SHALL SERVE A MAXIMUM OF THREE CIRCUITS/POLES.

B. SERVICE AND EQUIPMENT:

1) FOR SEPARATELY DERIVED SERVICES AND ALL SERVICE SWITCHES, GROUND THE NEUTRAL CONDUCTOR THROUGH DISCONNECTING LINK AND GROUND TERMINAL TO WATER SERVICE GROUND CLAMP, BUILDING STEEL AND DRIVEN GROUND RODS.

2) GROUND THE CENTER TAP OF Y-CONNECTED TRANSFORMERS THROUGH SECONDARY NEUTRAL AND GROUND BUS TO WATER SERVICE GROUND CLAMP. CONNECTIONS TO BUILDING STEEL WILL BE CONSIDERED ONLY WHERE PERMITTED BY CODE AND BY APPROVAL.

3) GROUND CLAMPS SHALL BE BRONZE, SOLDERLESS TYPE WITH BRONZE SCREWS, SUITABLE FOR RECEIVING NOTED CONDUCTORS. MOUNT GROUND CLAMP ON WATER SERVICE AT STREET SIDE OF MAIN SERVICE VALVE. PROVIDE JUMPER TO BY-PASS WATER METER.

C. RUN INSULATED GROUND CONDUCTORS IN RIGID METALLIC CONDUIT WITH CONDUCTOR CONNECTED TO CONDUIT, THROUGH GROUND FITTING AT EACH END.

D. GROUND NONCURRENT CARRYING METAL PARTS OF DISTRIBUTION PANELS, SWITCHBOARDS, TRANSFORMER ENCLOSURES, RACEWAYS, BUSWAY ENCLOSURES, CONTROLLER ENCLOSURES, MOTOR FRAMES AND OTHER ELECTRICAL EQUIPMENT.

E. ALL COMPONENTS FOR GROUNDING SYSTEMS SHALL BE UL 467 LISTED.

F. MISCELLANEOUS:

1. GROUND THE FOLLOWING:

a. TEL/DATA/AUDIO-VISUAL SYSTEMS

b. FIRE ALARM SYSTEM.

c. EMERGENCY DISTRIBUTION SYSTEM.

d. COMPUTER EQUIPMENT/ENCLOSURES

e. RAISED FLOORS.

f. LINE AND LOAD SIDE OF A VFD.

15. POWER WIRING

A. PROVIDE ALL POWER WIRING IN CONDUIT TO ALL MOTORS AND EQUIPMENT FURNISHED UNDER ALL CONTRACTS ON THE PROJECT. INCLUDE EXTENSIONS FROM CONTROLLERS TO MOTORS AND MOTOR CONNECTIONS. MOUNT AND WIRE ALL CONTACTORS AND POWER DEVICES FURNISHED UNDER ALL CONTRACTS.

B. PROVIDE ONE (1) DEDICATED 120V 20A CIRCUIT FOR EACH HVAC CONTROL PANEL. COORDINATE QUANTITY AND LOCATION WITH HVAC/BMS CONTRACTOR.

16. CONTROL WIRING

A. PROVIDE ALL CONTROL WIRING IN CONDUIT FOR MOTORS AND EQUIPMENT FURNISHED UNDER ALL CONTRACTS AND AS SPECIFICALLY SHOWN ON THE DRAWINGS AND SPECIFICATIONS. INCLUDE MOUNTING AND WIRING OF ALL CONTROL DEVICES FURNISHED WITH EQUIPMENT.

17. WIRING DEVICES:

A. PROVIDE COMPLETE MATERIAL AND ACCESSORIES AS NOTED BY LEVITON, HUBBELL, OR EQUAL. ALL DEVICE TYPES, FINISH AND COLOR ARE SUBJECT TO APPROVAL BY ARCHITECT.

B. LOCAL WALL SWITCHES SHALL BE SPECIFICATION GRADE, TOGGLE, QUIET TYPE, RATED 20 AMP, 120/277 VOLT, AC. ALL SWITCHES SHALL BE GANGED WITH MULTI DEVICE PLATES, IN AREAS WHERE DIMMERS ARE SPECIFIED WITH WALL SWITCHES; ALL SWITCHES SHALL MATCH DIMMER SERIES AND SHALL BE GANGED TOGETHER. WHERE TABS FROM DIMMERS ARE REMOVED, FOLLOW MANUFACTURERS DE-RATING AND UP-SIZE DIMMER AS APPROPRIATE.

SIMILAR TO:

1) IN FINISHED AREAS ARCHITECTURAL TYPE ROCKER SWITCH: LEVITON DECORA PLUS #5621-2 (SINGLE POLE), 5622-2 (DOUBLE POLE), 5623-2 (THREE WAY), 5624-2 (FOUR WAY).

2) ALL OTHER AREAS HEAVY-DUTY INDUSTRIAL TYPE TOGGLE SWITCH: LEVITON 1221-2 (SINGLE POLE), 1222-2 (DOUBLE POLE). 1223-2 (3 WAY), 1224-2 (4 WAY).

3) LOCKING TYPE: LEVITON 1221-21 (SINGLE POLE), 1222-21 (DOUBLE POLE), 1223-2L (THREE WAY), 1224-2L (FOUR WAY).

4) ILLUMINATED SWITCHES FOR FINISHED AREAS: LEVITON DECORA PLUS #5631-2 (SINGLE POLE, 120V).

5) ILLUMINATED SWITCHES FOR UNFINISHED AREAS: TOGGLE TYPE; LEVITON #1221-LH.

6) COMBINATION DUPLEX AND USB CHARGER: LEVITON #T5832W

7) PILOT LIGHT SWITCHES IN FINISHED AREAS: LEVITON DECORA PLUS #5628-2 (SINGLE POLE).

8) PILOT LIGHT SWITCHES IN UNFINISHED AREAS: LEVITON DECORA PLUS # 1221-PLC (SINGLE POLE).

C. INSERTION RECEPTACLES SHALL BE COMMERCIAL SPECIFICATION GRADE HEAVY DUTY DUPLEX CONVENIENCE 125 VOLT, 2 POLE, 3 WIRE, 20 AMP WITH U GROUND SLOT GROUNDED, EXCEPT AS NOTED. DEVICE SHALL BE SIMILAR TO HUBBELL #HBL5362 OR EQUAL BY LEVITON, ARROW HART OR PASS & SEYMOUR LEGRAND OR GE. FACE COLOR SHALL BE SELECTED BY OWNER OR ARCHITECT. DEVICES USED ON EMERGENCY BRANCH CIRCUITS SHALL BE RED FACE ONLY. INSERTION RECEPTACLES SHALL MEET LATEST NEMA STANDARDS, PUBLICATION WD-6, FEDERAL SPECIFICATION W-C-596 AND BE UL LISTED TO UL498.

SIMILAR TO:

1) IN FINISHED AREAS ARCHITECTURAL TYPE DECORATOR SERIES FOR ALL TYPES NOTED BELOW. FOR DUPLEX RECEPTACLES COMMERCIAL SPECIFICATION GRADE: LEVITON DECORA PLUS #16351-W (SINGLE POLE), 16352-W (DOUBLE POLE).

2) IN AREAS DEFINED BY NEC 406.12: LEVITON, SMOOTH FACE ILLUMINATED DUPLEX RECEPTACLE #M8300-ILW (TAMPER RESISTANT MT830-ILW) OR DECORA PLUS LINE M1636-ILW (TAMPER RESISTANT MT163-ILW)

a) ISOLATED GROUND: LEVITON, SMOOTH FACE ILLUMINATED RECEPTACLE #M8300-IGW (TAMPER RESISTANT MT830-IGW) OR DECORA PLUS MD830-IGW (TAMPER RESISTANT MDT83-IGW).

b) OTHER AREAS: EXTRA HEAVY-DUTY HOSPITAL GRADE SMOOTH FACE, LEVITON #M8300-W (TAMPER RESISTANT M8300-SGW) OR DECORA PLUS #M1636-HGW (TAMPER RESISTANT #MT163-HGW)

3) COMBINATION DUPLEX RECEPTACLE AND USB CHARGER: LEVITON T5832 20A, 120V DUPLEX RECEPTACLE WITH DUAL 3.6A, 5.0VDC TYPE A USB CHARGERS

4) ALL OTHER AREAS: EXTRA HEAVY DUTY SPECIFICATION GRADE: LEVITON #M5362-W OR DECORA PLUS M1636-W.

a) ISOLATED GROUND: LEVITON #M5362-IGW OR DECORA PLUS #M1636-IGW.

5) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE WITH SELF-PROTECTION AND LED INDICATOR LIGHT. SIMILAR TO HUBBELL #GF5362 OR EQUAL BY LEVITON, ARROW HART OR PASS & SEYMOUR LEGRAND.

a) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES IN DAMP LOCATIONS SHALL BE WEATHER RESISTANT

b) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES IN WET LOCATIONS SHALL BE WEATHER RESISTANT WITH METALLIC WHILE-IN-USE COVER.

6) SURGE PROTECTION RECEPTACLES: SHALL BE BACK AND SIDE WIRED WITH A MAXIMUM SINGLE PULSE RATING OF 24KA, L-N. LEVITON #5380 (20 AMP).

a) ISOLATED GROUND: LEVITON 5380-IG (20 AMP).

D. MOMENTARY CONTACT SWITCHES. FOR REMOTE CONTROL SWITCHES, SIMILAR TO LEVITON #1257.

E. PILOT LIGHTS: NEON LAMP, SIMILAR TO HUBBELL NO. T1375, WITH 125-VOLT LAMP.

F. DEVICE PLATES: COORDINATE WITH ARCHITECT FOR FINAL TYPE, COLOR, MATERIAL AND FINISH. FOR RECEPTACLES WITH OTHER THAN 120 VOLT, INSCRIBED VOLTAGE AVAILABLE.

1) BRUSHED 302 STAINLESS STEEL WITH ENGRAVED CIRCUIT

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Revisions

01/11/2019	ISSUED FOR 80% REVIEW
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Project

TOWN OF STRATFORD
2725 Main Street
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Mechanical Upgrades:

Eli Whitney School
1130 Huntington Rd.
Stratford, CT

Drawing Title

ELECTRICAL SPECIFCATIONS

Issued: 03/05/2019
Scale: NTS
Job No.: 183171-000
Drawing No.: E-401

IDENTIFICATION PLATE WHEN USED TOGETHER WITH EMERGENCY BRANCH CIRCUIT DEVICE.

2) IF PERMITTED BY ARCHITECT AND BUILDING STANDARD, REINFORCED THERMOPLASTIC BY SAME MANUFACTURER OF DEVICES.

G. COLORS: AS SPECIFIED AND COORDINATED WITH ARCHITECT.

H. MOUNTING ORIENTATION OF RECEPTACLES (HORIZONTAL OR VERTICAL): COORDINATE WITH ARCHITECT.

18. EMPTY CONDUIT SYSTEMS:

A. PROVIDE COMPLETE SYSTEM OF EMPTY CONDUIT, FITTINGS, PULL BOXES, OUTLETS, SLEEVES AND FISH/PULLING WIRES.

B. EQUIPMENT AND INSTALLATION SHALL CONFORM TO REQUIREMENTS OF THE TELECOMMUNICATION SYSTEMS CONTRACT DRAWINGS AND EIA/TIA REQUIREMENTS.

1) OUTLETS SHALL BE:

a) WALL: 4 IN. SQUARE WITH REDUCER RING. COVER PLATE PROVIDED INTEGRAL WITH OUTLET DEVICE. BLANK OFF WHERE NO DEVICE IS INSTALLED.

b) FLOOR: IN-FLOOR CAST IRON WITH LOW-TENSION FITTING OR AS SPECIFIED FOR POKE THRU FLOOR ASSEMBLIES.

2) CONDUIT FROM OUTLETS SHALL BE 1 IN. MINIMUM WHERE SIZE IS NOT SHOWN ON DRAWINGS. FURNISH EMPTY CONDUIT FROM OUTLETS TO NEAREST ACCESSIBLE HUNG CEILING OR AS NOTED. TERMINATE OPEN END WITH INSULATED BUSHING.

C. PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG AND AT ALL DROPS TO OUTLETS.

D. PROVIDE RISER PULL BOXES AT A MINIMUM OF 50 FEET INTERVALS. FOR 2-INCH CONDUITS AND SMALLER, PROVIDE PULL BOX FOR EVERY 100 FEET FOR STRAIGHT RUNS. PROVIDE PULL BOX FOR EVERY 180 DEGREES OF BENDS. BENDING RADIUS SHALL NOT BE LESS THAN 10 TIMES INTERNAL CONDUIT DIAMETER.

E. BOND ALL RACEWAYS SYSTEMS TO PROVIDE A COMMON GROUND PATH

F. DEVICES, CONNECTORS AND WIRING COMPLETE WILL BE PROVIDED UNDER OTHER WORK SCOPES.

G. FURNITURE SYSTEM CONNECTIONS FOR TEL/DATA SHALL BE A MINIMUM SIZE OF 22 UNLESS OTHERWISE NOTED ON DRAWINGS. FLOOR BOXES FOR TEL/DATA FURNITURE SYSTEM IN-FEEDS SHALL BE SEPARATE FROM POWER IN FEEDS.

19. FIRE ALARM SYSTEM

A. REFER TO FIRE ALARM DRAWINGS. SYSTEM WIRING, DEVICES, ETC., SHALL BE IN ACCORDANCE WITH APPLICABLE CODE REQUIREMENTS, BUILDING STANDARDS AND SYSTEM MANUFACTURER. STROBE POWER SUPPLIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED. SYSTEM RE-PROGRAMMING TO ACCOMMODATE DEMOLITION AND NEW DEVICES SHALL BE INCLUDED. ALL LABOR AND MATERIALS FOR SYSTEM PRE-TEST AND TEST WITH BUILDING VENDOR AND FIRE DEPARTMENT SHALL BE INCLUDED.

20. ELECTRICAL TESTING (CONTRACTOR TO FOLLOW APPLICABLE NETA STANDARDS).

A. PROVIDE ALL NECESSARY METERS, INSTRUMENTS, TEMPORARY WIRING AND LABOR TO TEST AND ADJUST ALL EQUIPMENT AND WIRING INSTALLED AND/OR CONNECTED UNDER THIS CONTRACT, INCLUDING ELECTRICAL EQUIPMENT FURNISHED BY OTHERS, TO DETERMINE PROPER POLARITY, PHASING, FREEDOM FROM GROUND FAULTS AND SHORTS AND PROPER OPERATION OF EQUIPMENT. ALL MEASURING INSTRUMENTS MUST BE PROPERLY CALIBRATED.

B. WHENEVER THE AUTHORITIES HAVING JURISDICTION REQUIRE THAT ANY WORK BE TESTED OR APPROVED, CONTRACTOR SHALL PROVIDE PROPER FACILITIES FOR ACCESS FOR INSPECTION.

C. CHECK ALL LIGHTING FIXTURES AND RECEPTACLES FOR PROPER OPERATION.

21. FIRE STOPPING

A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION SPECIFICATION SECTIONS, APPLY TO WORK OF THIS SECTION.

B. PROVIDE ALL REQUIRED FIRE-STOPPING. WORK INCLUDES FIRE STOPPING PENETRATIONS OF FIRE-RESISTANCE RATED FLOORS, WALLS AND PARTITIONS IN NEW CONSTRUCTION, AS WELL AS PRE-EXISTING PENETRATIONS IN RENOVATION AREAS OF EXISTING CONSTRUCTION.

C. PRODUCT DATA: SUBMIT MANUFACTURER'S PRODUCT DATA FOR EACH FIRE-STOPPING PRODUCT REQUIRED, INCLUDING INSTRUCTIONS FOR SUBSTRATE PREPARATION AND FIRE-STOPPING INSTALLATION.

D. FIRE RESISTANT JOINT SEALERS: PROVIDE MANUFACTURER'S STANDARD FIRE-STOPPING SEALANT WITH ACCESSORY MATERIALS, HAVING FIRE RESISTANCE RATINGS INDICATED AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES PER ASTM E814 BY UNDERWRITERS LABORATORY, INC. OR OTHER TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

E. MATERIALS – PROVIDE THE FOLLOWING:

1) ONE-PART FIRE-STOPPING SEALANT: ONE PART LATEX BASED INTUMESCENT SEALANT FORMULATED FOR USE IN A THROUGH-PENETRATION FIRE-STOP SYSTEM FOR SEALING OPENINGS AROUND CABLES, CONDUIT, PIPES AND SIMILAR PENETRATIONS THROUGH WALLS AND FLOORS. ACCEPTABLE PRODUCTS/MANUFACTURERS INCLUDE THE FOLLOWING:

a) SPECIFIED TECHNOLOGIES INC. SPEC SEAL LC150

b) HILTI FS-ONE MAX

22. DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS

A. SUBMIT WRITTEN CERTIFICATION THAT ELECTRICAL SYSTEMS ARE COMPLETE AND OPERATIONAL. SUBMIT CERTIFICATION WITH CONTRACTOR'S REQUEST FOR FINAL REVIEW.

1) AT THE TIME OF FINAL REVIEW OF ELECTRICAL WORK, DEMONSTRATE THE OPERATION OF ELECTRICAL SYSTEMS. FURNISH LABOR, APPARATUS AND EQUIPMENT FOR SYSTEMS' DEMONSTRATION. THE VARIOUS TEST SHALL BE WITNESSED AND APPROVED BY THE OWNER AND/OR THE OWNERS REPRESENTATIVE.

B. THE CONTRACTOR SHALL FURNISH ALL TEST EQUIPMENT, MATERIALS, LABOR, AND TEMPORARY POWER HOOK-UPS TO PERFORM START-UP AND ALL TESTS AS REQUIRED. ALL TEST PROCEDURES SHALL CONFORM TO THIS SPECIFICATION AND APPLICABLE STANDARDS INCLUDING BUT NOT LIMITED TO; ANSI, IEEE, NEMA, OSHA AND NETA.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTS AND TEST RECORD. TESTING SHALL BE PERFORMED BY AND UNDER THE IMMEDIATE SUPERVISION OF THE CONTRACTOR. TEST RECORDS SHALL BE KEPT FOR EACH PIECE OF EQUIPMENT. COPIES SHALL BE FURNISHED TO THE ENGINEER FOR REVIEW AND/OR APPROVAL.

D. A VISUAL INSPECTION OF ALL ELECTRICAL EQUIPMENT, TO CHECK FOR THE FOREIGN MATERIAL, TIGHTNESS OF WIRING AND CONNECTION, PROPER GROUNDING, MATCHING NAMEPLATE CHARTS WITH SPECIFICATION, ETC., SHALL BE MADE PRIOR TO ACTUAL TESTING.

E. A COMPLETE OPERATIONAL TEST SHALL BE MADE ON THE REVISED LIFE SAFETY FIRE ALARM SYSTEM. THE CONTRACTOR SHALL CONSULT WITH THE EQUIPMENT VENDORS AND THEN SUBMIT FOR APPROVAL A STEP-BY-STEP PROCEDURE DESCRIBING THE METHOD OF MAKING THE TESTS, THE EQUIPMENT TO BE UTILIZED AND THE FEATURE TO BE CHECKED BY THE TEST. ALL INTERLOCKS AND PROTECTIVE FEATURES SHALL BE CHECKED OUT.

23. SPECIAL TESTING SERVICES

A. IN THE INSTANCE OF COMPLEX OR SPECIALIZED ELECTRICAL SYSTEMS SUCH AS EMERGENCY/STAND-BY POWER SYSTEMS, DIMMING/LIGHTING CONTROL SYSTEMS, FIRE ALARM SYSTEM OR SIMILAR, THE INSTALLATION, FINAL CONNECTIONS AND TESTING OF SUCH SYSTEMS SHALL BE MADE UNDER THE DIRECT SUPERVISION OF FACTORY AUTHORIZED FIELD TECHNICIAN/ENGINEER WHO SHALL BE IN THE EMPLOY OF THE RESPECTIVE EQUIPMENT MANUFACTURER.

B. ANY AND ALL EXPENSES INCURRED BY THESE EQUIPMENT MANUFACTURERS' REPRESENTATIVES RELATED TO THIS PROJECT, SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL INSTALLER/CONTRACTOR.

24. DESIGN MODIFICATIONS

A. THE DRAWINGS SHOW ELECTRICAL SYSTEMS THAT SUPPLY, CONTROL, AND/OR MONITOR SYSTEMS SPECIFIED ELSEWHERE. THE ELECTRICAL SYSTEM SHOWN HAS BEEN BASED ON SPECIFIC MANUFACTURER'S DATA OR INFORMATION CONVEYED TO THE ELECTRICAL DESIGNER. WHERE ANY AGREEMENT OR CHANGE IS MADE TO SUPPLY EQUIPMENT OF LARGER CAPACITY OR DIFFERENT ELECTRICAL CHARACTERISTICS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE ELECTRICAL DESIGN MODIFICATIONS TO AFFECT SUCH CHANGES WITHIN THE INTENT OF THESE SPECIFICATIONS AND TO INFORM THE ENGINEER, IN WRITING, OF SUCH CHANGE. FOR EXAMPLE, IF HVAC COMPRESSORS AND/OR MOTORS ARE ALLOWED TO BE CHANGED TO 230 VOLTS RATHER THAN THE ORIGINALLY SPECIFIED 208 VOLTS, BOOSTING OR BUCKING TRANSFORMERS SHALL BE SUPPLIED, INSTALLED, AND WIRED TO ACCOMMODATE

Revisions

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Stratford, CT

Drawing Title

ELECTRICAL SPECIFCATIONS

Issued 03/05/2019	**Drawing No.** E-402
Scale NTS	
Job No. 183171-000	

1

DRAWING NOTES:

1. COORDINATE WORK WITH NEW ROOF INSTALLATION.

KEY NOTES:

(1) PROVIDE REPLACEMENT IN KIND. REFER TO SCHEDULE ON M-300. RECONNECT TO EXISTING DUCTWORK, PIPING, AND ACCESSORIES.

(2) ADD-ALTERNATE #1:

PROVIDE REPLACEMENT IN KIND. REFER TO SCHEDULE ON M-300. RECONNECT TO EXISTING DUCTWORK, PIPING, AND ACCESSORIES.

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03/14/2019	1 ADDENDUM #1

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MECHANICAL ROOF PLAN - DUCTWORK

Issued: 03/05/2019	Drawing No.: M-202
Scale: 3/32"=1'-0"	
Job No.: 183171-000	

SPLIT AIR COOLED CONDITIONING UNIT SCHEDULE

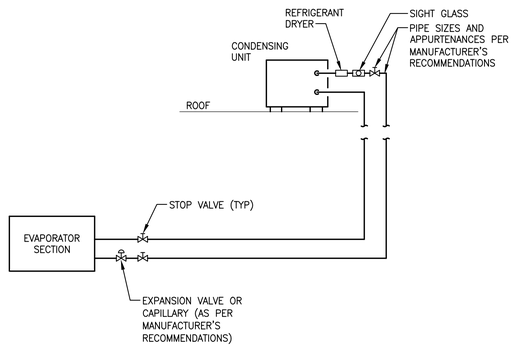
AIR HANDLING UNIT No.	LOCATION	SERVICE	TOTAL COOLING (MBH)	SENSIBLE COOLING (MBH)	EVAPORATOR COIL CONDITIONS			SUPPLY FAN			ELECTRICAL DATA			AHU MCA	AHU OPER. WEIGHT (LBS)	UNIT DIMENSIONS			MANUF. MODEL #	CONDENSING UNIT No.	CONDENSING UNIT								COND. WEIGHT (LBS)	UNIT DIMENSIONS			MANUF. MODEL #	REMARKS
					CFM	ENT. AIR DB/WB (°F)	LVG. AIR DB/WB (°F)	EXT. SP (IN. W.G.)	MOTOR W	RPM	VOLTS	PHASE	HZ			LENGTH (FT–IN)	WIDTH (FT–IN)	HEIGHT (FT–IN)			COMPRESSOR			EXT. SP (IN. W.G.)	ELECTRICAL DATA			COMPRESSOR MCA / MOCP					
																				QUANTITY	TYPE	LRA/RLA (EA.)		VOLTS	PHASE	HZ						
FCU–1	ATTIC	LOUNGE	40.5	31.6	1377	74	55	0.8	350	–	208	1	60	3.4	102	55–1/8	24–13/16	9–5/8	DAIKIN FBQ42PVJU	ACCU–1	1	–	–	–	208	1	60	27 / 30	283	35–7/16	13–9/16	52–15/16	DAIKIN RZR42PVJU8	SEE NOTES

NOTES:
1. PROVIDE MERV 7 FILTER.
2. PROVIDE STAINLESS STEEL DRAIN PAN.
3. REFRIGERANT PIPING SHALL BE SIZED BASED ON MANUFACTURERS RECOMMENDATIONS.
4. PROVIDE DISCONNECT SWITCH BY ELECTRICAL CONTRACTOR.
5. BUILT–IN CONDENSATE PUMP.

ROOFTOP UNIT SCHEDULE

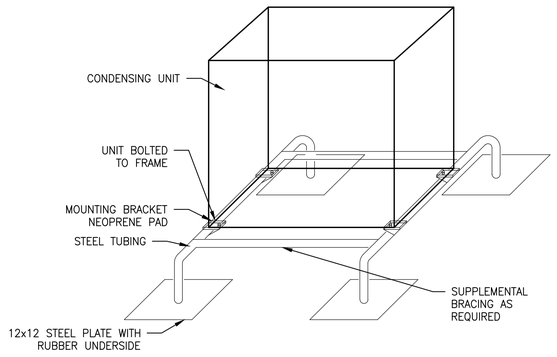
UNIT No.	LOCATION	SUPPLY FAN DATA						RETUR/ SPILL FAN DATA						HEATING DATA										UNIT ELECTRICAL DATA					UNIT DIMENSIONS					
														HOT WATER COIL DATA																				
		CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	WHEEL DIAMETER	CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	DRIVE TYPE	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	No. OF COILS	P.D. (FT)	TOTAL MBH	EAT (°F)	LAT (°F)	FPI	No. OF ROWS	FACE VELOCITY (FPM)	MAXIMUM AIR P.D. (IN W.G.)	VOLTS	PHASE	HZ	MCA	MCROPD	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	OPERATING WT. (LBS)	MANUF. MODEL #	REMARKS
HV–1	ROOF	7100	2	1186	6.75	7.5	15"	7200	0.75	871	4.16	5	BELT	180	140.5	13.1	1	2.6	258.5	46	79.3	10	1	592	0.22	208	3	60	43.6	60	180	68	52	3038	DAIKIN RDS708B	SEE NOTES
HV–2	ROOF	6125	2	1121	5.1	7.5	15"	7200	0.75	871	4.16	5	BELT	180	140.8	11.3	1	1.9	221	46	79	9	1	510	0.16	208	3	60	43.6	60	180	68	52	3036	DAIKIN RDS708B	ADD– ALTERNATE #1, SEE NOTES

NOTES:
1. PROVIDE MERV 8 FILTER FOR UNIT OUTSIDE AIR INTAKE.
2. PROVIDE VARIABLE FREQUENCY DRIVES.
3. PROVIDE DISCONNECT SWITCH BY ELECTRICAL CONTRACTOR.
4. PROVIDE WITH BURGLAR BARS AND LIGHTS.
5. MANUFACTURER PROVIDED ROOF CURB.

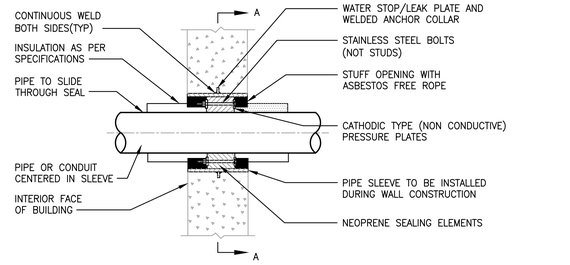


NOTES:
1. CONTRACTOR SHALL SIZE PIPING AS PER MANUFACTURER'S RECOMMENDATIONS FOR ACTUAL INSTALLED LENGTH AND ELEVATION DIFFERENCE BETWEEN CONDENSER AND EVAPORATOR. PROVIDE EXTRA OIL AS REQUIRED.

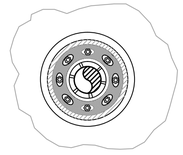
TYPICAL REFRIGERANT PIPING DETAIL



ROOF MOUNTED CONDENSING UNIT

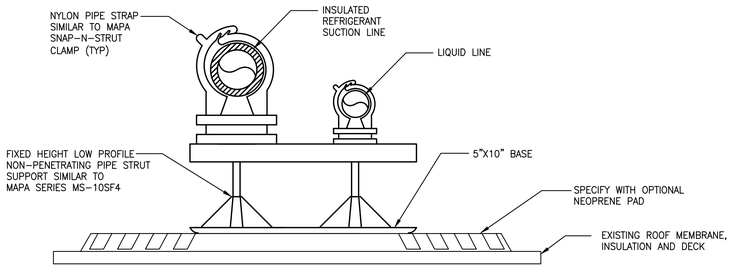


NOTES:
1. WHEN SEALING FLOOR PENETRATIONS, EXTEND SLEEVE 3" ABOVE FINISHED FLOOR.
2. WHEN CORE DRILL IS USED THE PIPE SLEEVE AND WATER STOP/LEAK PLATE ARE NOT REQUIRED.



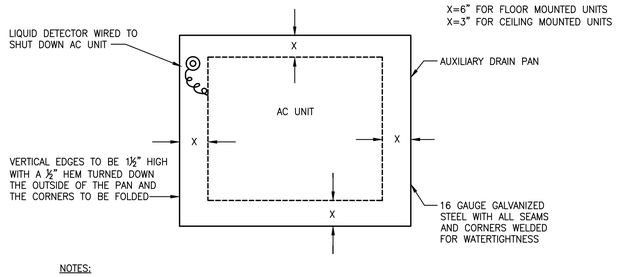
SECTION A–A

EXTERIOR WALL PIPE PENETRATION SEAL ASSEMBLY



NOTE:
1. USE FOR REFRIGERANT PIPING 3" OR SMALLER MAXIMUM SPACING 8'
2. REFRIGERANT PIPE SUPPORTS MUST COMPLY WITH MSS SP–58–2002

REFRIGERANT ROOFTOP PIPING SUPPORT



NOTES:
1. FOR CEILING INSTALLATIONS, SUPPORT AC UNIT AND DRAIN PAN INDEPENDENTLY FROM STRUCTURE OVERHEAD.
2. PITCH DRAIN PAN TO LIQUID DETECTOR. PROVIDE ¾" PLUGGED DRAIN AT LOW POINT.
3. PROVIDE AUXILIARY CONTACT ON LIQUID DETECTOR FOR INTERFACE WITH THE BUILDING MANAGEMENT SYSTEM WHEN SPECIFIED.
4. EXTEND PAN FOR CONTROL VALVE ASSEMBLY AND CONDENSATE PUMP.

AUXILIARY DRAIN PAN FOR AC UNITS

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MECHANICAL SCHEDULES AND DETAILS

Issued	Drawing No.
03/05/2019	M-300
Scale: NTS	
Job No.: 183171–000	

BID #2019-16
HVAC UPGRADES
ELI WHITNEY ELEMENTARY SCHOOL

TOWN OF STRATFORD
PURCHASING DEPARTMENT
2725 MAIN STREET
STRATFORD, CT 06615

Date Submitted _____, 2019.

SEALED submissions are subject to the standard instructions set forth on the attached sheets.
Any modifications must be specifically accepted by the Town of Stratford.

Bidder:

_____
Doing Business As (Trade Name)

_____
Address

Released: Monday, 5th March, 2019

_____
Town / State / Zip

Phillip Ryan, Purchasing Agent

_____
Title (Mr /Ms)

_____
Signature

_____
Telephone

_____
E-mail

Sealed bids will be received by the Purchasing Department at the office of the Purchasing Agent, 2725 Main Street, Room 202, Stratford, Connecticut 06615, up to:

1:30pm, Monday, 25th March, 2019

NOTE:

1. Bidders are to complete all requested data in the upper right corner of this page and must return this page with their bid proposal.
2. No bid shall be accepted from, or contracts awarded to, any person/company who is in arrears to the Town of Stratford upon debt, or contract or who has been within the prior five (5) years, a defaulter as surety or otherwise upon obligations to the Town of Stratford.
3. Submissions are to be submitted in a sealed envelope and clearly marked **"BID #2019-16"** on the outside of the envelope, including all outer packaging, such as, DHL, FedEx, UPS, etc.

PROJECT TEAM

Architect / Project Manager:

SNYDER ARCHITECTS, LLC
Architecture . Planning . Construction Management
Trumbull, CT 203-243-3346
info@snyderarchitects.com

Mechanical, Electrical, Plumbing Engineer:

AKF Group
MEP Engineering
New Haven, CT 203-323-4333
akfct@akfgroup.com

Eli Whitney Elementary School

HVAC Upgrades

3/5/2019

Table of Contents

INVITATION TO BID

The Town of Stratford (Town) and on behalf of its Board of Education (BOE) is seeking competitive bids from qualified contractors to perform **HVAC Upgrades at Eli Whitney Elementary School, 1130 Huntington Avenue, Stratford.**

PRE-BID MEETING

A site meeting will commence at **Eli Whitney Elementary School, 1130 Huntington Avenue, Stratford, CT** at **4:00pm** on **Wednesday, March 13, 2019** for prospective bidders to scope the conditions.

- While the meeting is non-mandatory, prospective bidders are strongly encouraged to attend and will be required to sign-in at commencement of the meeting. The sign-in sheet will be posted on the Purchasing Department website as below. Copies will not be made available at the meeting, nor will they be faxed out.
- All requests for information will be answered in writing as specified below under RFI / Addenda.

REQUESTS FOR INFORMATION (RFI) / ADDENDA

Direct requests in writing to: Town of Stratford, Purchasing Department
Attention: Phillip Ryan, Purchasing Agent
2725 Main Street, Stratford, CT 06615
E-mail: PRyan@townofstratford.com

NOTE: Written requests for information will not be accepted after **12:00PM** on **Wednesday, March 20, 2019.**

Response will be in the form of an addendum that will be posted periodically but no later than **Thursday, March 21, 2019** at the close of business to the Purchasing Department website: www.townofstratford.com/purchase

It is the responsibility of each bidder to retrieve addenda from the website. Any contact about this bid between a Bidder and any other Town official and/or department manager and/or Town of Stratford employee, other than as set forth above, may be grounds for disqualification of that Bidder. No questions or clarifications shall be answered by phone, in person or in any other manner than specified above. Addenda will not be mailed, e-mailed or faxed out.

CHECKLIST

The following must be submitted with proposal:

- ☐ Cover page, completed and signed.
- ☐ Bid Form
  - Addenda acknowledged on Bid Form, or submitted if requested.
- ☐ Bid Bond or Equal Approved Security.
- ☐ Insurance Procedure
- ☐ Non-Collusion Affidavit
- ☐ AIA Document A305 – Contractor's Qualification Statement
- ☐ List of 5 (minimum) equivalent projects completed within the last 3-years. Include project and reference contact information for each.
- ☐ List of all subcontractors identifying each trade, hourly rates, location, and Tax ID number.
- ☐ Identify any exceptions that may apply. These must be itemized and attached to the proposal form.

The Bidder hereby certifies that any and all defects, errors, inconsistencies or omissions of which he/she is aware, either directly or by notification from any material supplier found in the Contract Documents are listed herewith in this Bid Form.

Name _____ Title _____ Signature _____ Date_____

COMPLETED PROJECTS / REFERENCES:
Contractor required to have completed a minimum of 5 equivalent projects completed within the last 3-years. Provide project information and contact information below or attached Projects Sheet.

PROJECT #1:

Project		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

PROJECT #2:

Project		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

PROJECT #3:

Project		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

PROJECT #4:

Project		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

PROJECT #5:

Project		Contract Price	Completion Date
Owner / Architect	**Contact Person**	**Phone**	**E-mail**

Description of the Work

This page must be fully completed and submitted with your proposal, including accurate contact names and contact details. Prospective bidders may opt to submit own formatted reference sheets with complete project details and contact information.

SUBCONTRACTORS
Provide subcontractor details if any are to be employed as part of this contract, including labor rates:

SUBCONTRACTOR #1:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

SUBCONTRACTOR #2:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

SUBCONTRACTOR #3:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

SUBCONTRACTOR #4:

Name of Company _____ Fed ID # _____

Contact Person _____ Title _____

Company Address _____ Phone _____

Trade _____ E-mail _____

Rates: Supervisor $_____/hr Foreman $_____ /hr Journeyman $_____ /hr Apprentice $_____ /hr

NOTE: All sub-contractors are subject to approval by the Town of Stratford and are required to provide Fed ID #.

PURCHASING DEPARTMENT
TOWN OF STRATFORD
INSTRUCTIONS FOR BIDDERS
TERMS AND CONDITIONS OF BID

BID PROPOSALS

Bid proposals are to be submitted in a sealed envelope and clearly marked on the outside **"BID #2019-16"** including all outer packaging such as DHL, FedEx, UPS, etc. All prices and notations must be printed in ink or typewritten. No erasures are permitted. Bid proposals are to be in the office of the Purchasing Department, Town Hall, 2725 Main Street, Room 202, Stratford, Connecticut, prior to date and time specified, at which time they will be publicly opened.

RIGHT TO ACCEPT / REJECT

AFTER REVIEW OF ALL FACTORS, TERMS AND CONDITIONS, INCLUDING PRICE, THE TOWN OF STRATFORD RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS, OR ANY PART THEREOF, OR WAIVE DEFECTS IN SAME, OR ACCEPT ANY PROPOSAL DEEMED TO BE IN THE BEST INTEREST OF THE TOWN OF STRATFORD.

POWER OF REJECTION

The Mayor shall have the power to reject all bids and to advertise again.

QUESTIONS

Questions concerning conditions, bidding guidelines and specifications should only be directed in writing to:

Mr. Phillip Ryan, Purchasing Agent: PRyan@townofstratford.com

Inquiries must reference date of bid opening, requisition or contract number, and must be received no later than as indicated in the bid documents prior to date of bid opening. Failure to comply with these conditions will result in the bidder waiving the right to dispute the bid specifications and conditions.

PRICES

Prices quoted must be firm, for acceptance by the Town of Stratford, for a period of ninety (90) days. Prices shall include all applicable duties. Bidders shall be required to deliver awarded items at prices quoted in their original bid.

F.O.B. DESTINATION

Prices quoted shall be net, delivered to destination. Bids quoting other than F.O.B. Destination may be rejected.

BID BOND

The BID BOND furnished, as bid security, must be duly executed by the bidder as principal. It must be in the amount equal to five percent (5%) of the total estimated bid, as guarantee that, in case the contract is awarded to the bidder, the bidder will, within ten days thereafter, execute such contract and furnish a Performance Bond and Payment Bond.

Small businesses may elect to obtain an irrevocable letter of credit or cashier's check in lieu of the Bid Bond. Such surety must also be in an amount equal to at least five percent (5%) of the total estimated bid.

All bid bonds shall be written by a surety company or companies licensed in the State of Connecticut, and shall have at least an A-VII policy holders rating, as reported by A.M. Best Rating Services, or otherwise deemed acceptable by the Town. The Town always reserves the right to reject surety companies, if an approved surety bond cannot be provided, the bidder shall be deemed non-responsive.

A complete list of certified surety companies can be accessed on the U.S. Government Department of Treasury website: https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm

NOTE: Failure to provide a Bid Bond or equivalent security is not cause for a waiver defect. Any bid not accompanied by such security will be excluded from consideration.

PERFORMANCE AND LABOR AND MATERIAL BOND

The successful bidder, within seven (7) business days after notification of award, will be required to furnish Performance and Labor and Material Bond provided by a company authorized to issue such bonds in the State of Connecticut, or Certified Check or properly executed Irrevocable Letter of Credit equal to a hundred per cent (100%) of the award.

In the event that the Contractor where required to provide evidence of insurance and a performance bond does not do so before beginning work, the Town of Stratford reserves the right to withhold payment from such supplier until the evidence of insurance and performance bond has been received by the Town.

All payment and performance bonds shall be written by a surety company or companies licensed to issue bonds in the State of Connecticut, and shall have at least an A-VIII policy holders rating, as reported by A.M. Best Rating Services, or otherwise deemed acceptable by the Town. The Town always reserves the right to reject surety companies, if approved surety bonds cannot be provided the contract shall be terminated.

A complete list of certified surety companies can be accessed on the U.S. Government Department of Treasury website: https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm

BOND REQUIREMENT – NON-RESIDENT CONTRACTORS

1. Non-resident contractors are required to deposit with the Department of Revenue Services a sum equivalent to 5% of the total contract value, as assurance that personal property taxes and/or any other State taxes assessed and due the State during the contract will be paid.
2. If this surety is not deposited with the State, the Town is required to deduct and submit to the State 5% of the total contract value.

PERMITS

The contractor shall be responsible for securing all necessary permits, state and local, and as required by the Town of Stratford.

PAYMENT PROCEDURES

No voucher, claim or charge against the Town shall be paid without the approval of the Director of Finance for correctness and legality.

PAYMENT PERIOD

The Town of Stratford shall put forth its best effort to make payment within thirty days (30) after delivery of the item acceptance of the work, or receipt of a properly completed invoice, whichever is later. Payment period shall be net thirty days (30) unless otherwise specified. For projects that do not require a performance or bid bond, The Town of Stratford reserves the right to retain five percent (5%) of total bid amount, which is payable ninety (90) days after final payment or acceptance of the work.

THE CONTRACTOR

The Contractor for the work described shall be thoroughly familiar with the requirements of all specifications, and the actual physical conditions of various job sites. The submission of a proposal shall be construed as evidence that the Contractor has examined the actual job conditions, requirements, and specifications. Any claim for labor, equipment, or materials required, or difficulties encountered which could have been foreseen had such an examination been carefully made will not be recognized.

ASSIGNMENT OF CONTRACT

No contract may be assigned or transferred without the consent of the Town of Stratford.

AWARD OF BIDS

Contracts and purchases will be made or entered into with the lowest responsible bidder meeting specifications, except as otherwise specified in the invitation. If more than one item is specified in the invitation, the Town of Stratford reserves the right to determine the low bidder on an individual basis or on the basis of all items included in the Invitation for Bids, unless otherwise expressed by the Town.

BIDDING FOR PUBLIC WORK OR IMPROVEMENT

Any public work or improvement costing more than seven thousand five hundred ($7,500.00) dollars shall be executed by contract except where specified work or improvement is authorized by the council based on detailed estimates submitted by the department authorized to execute such work or improvement.

All contracts for more than seven thousand five hundred ($7,500.00) dollars, shall be awarded to the lowest responsible bidder, after public advertisement and competition, as may be prescribed by ordinance.

The Mayor shall establish reasonable regulations for prefiling sub bids on construction contracts where it is anticipated that the contracting party shall subcontract all or a portion of the work to be done.

Any public work or improvement costing more than $7,500 shall be executed by contract except where specified work or improvement is authorized by the Council based on detailed estimates submitted by the Department authorized to execute such work or improvement. All contracts under this section shall be awarded by the Town Council to the lowest responsible bidder, after public advertisement as specified above.

NONUSE OF WASTES

A. All bids and contracts related to the retention of services to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford shall include a provision stating that no materials containing natural gas or oil waste shall be utilized in providing such a service.

B. All bids and contracts related to the purchase or acquisition of materials to be used to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford shall include a provision stating that no materials containing natural gas or oil waste shall be provided to the Town of Stratford.

C. The following statement, which shall be a sworn statement under penalty of perjury, shall be included in all bids related to the purchase or acquisition of materials to be used to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford and all bids related to the retention of services to construct or maintain any publicly owned and/or maintained road or real property within the Town of Stratford:

   "We ____ hereby submit a bid for materials, equipment and/or labor for the Town of Stratford. The bid is for bid documents titled ____. We hereby certify under penalty of perjury that no natural gas waste or oil waste will be used by the undersigned bidder or any contractor, subcontractor, agent or vendor agent in connection with the bid; nor will the undersigned bidder or any subcontractor, agent or vendor agent thereof apply any natural gas waste or oil waste to any road or real property within the Town of Stratford as a result of the submittal of this bid if selected."

CHANGE ORDERS

Approval Required: Except as specified herein, when any public work or improvement has been executed by contract, no changes in the terms, conditions or scope of said contract nor deviations from the specifications made a part of that contract which would result in any way in an increase in the cost of that contract to the Town shall be allowed except by the approval of the Council.

Review: Any request for change orders shall first be considered by an appropriate committee appointed and then referred to the Council for appropriate action.

Mayor's Approval: Notwithstanding any provision to the contrary herein, the Mayor, acting upon the advice of the Town Engineer, shall have the authority to approve any such changes or deviations without the approval of the Council, provided that the cost of any such changes or deviations does not exceed the sum of $5,000, and further provided that, in the opinion of the Mayor, due to extraordinary conditions, unforeseen contingencies, market conditions or the nature of the requested change, it would not be feasible or in the best interest of the Town to delay approval of the requested change.

GUARANTEE

Equipment, materials and/or work executed shall be guaranteed for a minimum period of one (2) years against defective material and workmanship. The cost of all labor, materials, shipping charges and other expenses in conjunction with the replacement of defective equipment, and/or unsatisfactory work, shall be borne by the Contractor.

CATALOGUE REFERENCE

Unless expressly stated otherwise, any and all reference to commercial types, sales, trade names and catalogues are intended to be descriptive only and not restrictive; the intent is to indicate the kind and quality of the articles that will be acceptable. Bids on other equivalent makes, or with reference to other catalogue items will be considered. The bidder is to clearly state exactly what will be furnished. Where possible and feasible, submit an illustration, descriptive material, and/or product sample.

OSHA

The bidder will certify all equipment complies with all regulations and conditions stipulated under the Williams-Steiger Occupational Safety and Health Act of 1971, as amended. The successful bidder will further certify that all items furnished under this project will conform and comply with Federal and State of Connecticut OSHA standards. The successful bidder will agree to indemnify and hold harmless the Town of Stratford for any and all damages that may be assessed against the Town.

LIFE CYCLE COSTING

Where applicable, Life Cycle Costing will be used as a criterion for awarding bids. This is a method of calculating total cost of ownership of an item over the life of the product, which may include operation and maintenance expenses, transportation, salvage value, and/or disposal costs.

INSURANCE

The Contractor shall not commence any work under the Contract until all insurance required by this section has been obtained and Certificates of Insurance and any other evidence of required coverage requested by the Town, including a copy of the policy itself, have been received and approved by the Town.

Such policies shall stipulate that no coverage can be changed or canceled, including for non-payment of premium, unless the Town has had thirty (30) days prior notice in writing. Certificates of renewals or changes in policies shall be delivered to the Owner at least thirty (30) days prior to the expiration of the policy.

All insurance issuers chosen by the Contractor must be licensed to do business in the State of Connecticut and rated A- or better by A.M. Best Rating Services.

The Town always reserves the right to reject insurance companies, if approved insurance policies cannot be provided the contract shall be terminated.

The insurance requirements set forth below are minimum limits of coverage only and in no way limit the Contractor's liability.

The following insurance is required to be maintained in full force until all work required by the contract has been fully completed, except that Products/Completed Operations coverage shall be maintained for five (5) years.

Worker's Compensation Insurance: The Contractor shall carry Worker's Compensation and Employer's Liability Insurance in the form and in such amounts as may be currently required to comply with the Labor Laws of the State of Connecticut.

Automobile Insurance: The Contractor shall carry and maintain during the life of the Contract a policy with a combined single limit of $2,000,000 and rider CA9948 or equivalent.

This policy shall include all liability of the Contractor arising from the operation of all self-owned motor vehicles used in the performance of the Contract; and shall also include a "non-Ownership" provision covering the operation of motor vehicles not owned by the Contractor, but used in the performance of the work.

INSURANCE (continued)
Commercial General Liability:

- Bodily Injury and Property Damage $2,000,000
- Products/Completed Operations $2,000,000

This policy shall include Subcontractor's Liability coverage, protecting the Contractor and the Town against liability arising out of the activities of Subcontractors engaged by him in the performance of the work.

Umbrella Policy: An umbrella policy in the amount of $5,000,000, covering general liability, auto liability, and employer liability is required.

Pollution Liability Insurance: Where applicable, a policy in the amount of $5,000,000 including coverage for transport and other offsite risks. Such policy must be given to the Town for review and determination of acceptability before an award will be made.

Waiver of Subrogation: Waiver of subrogation is required on all policies.

Additional Insureds: The Town of Stratford, Stratford Board of Education, its officers, officials, employees, agents, Boards, and Commissions shall be named as Additional Insureds. The coverage shall be primary and non-contributory and contain no special limitations on the scope of protection afforded to the Town of Stratford. A waiver of subrogation applies under general liability, auto liability and workers compensation.

The coverage shall be primary and non-contributory and contain no special limitations on the scope of protection afforded to the Town of Stratford. A waiver of subrogation applies under general liability, auto liability and workers compensation.

Subcontractor's Insurance: Each Subcontractor engaged by the Contractor to perform any work under the Contract shall obtain all insurance required of the Contractor in the same amounts and subject to the same provisions specified above for the Contractor, including the Additional Insured requirement. Certificates of Insurance shall be submitted to the Contractor and the Town and approved by the Town, before commencing any work.

HOLD HARMLESS
Contractor shall defend, indemnify, and hold harmless the Town of Stratford, its officers, employees, agents or volunteers, from and against any and all claims and demands of any nature for any loss, damage or injury which any person may suffer by reason of, or in any way arising out of, this Agreement, unless caused by the sole negligence of the Town.

FEDERAL, STATE, AND LOCAL LAWS
All applicable Federal, State and local laws, rules and regulations of all authorities having jurisdiction over the locality of the project shall apply to the contract and are deemed to be included herein**.** If the total amount of the project, including any current or future change orders, exceeds $100,000.00 all work is to be done in accordance with Connecticut Department of Labor (CT-DOL) rules and regulations. More information may be obtained from: www.ctdol.state.ct.us

The Davis-Bacon and Related Acts, shall apply to contractors and subcontractors performing on federally funded or assisted contracts in excess of $2,000 for the construction, alteration, or repair (including painting and decorating) of public buildings or public works. More information may be obtained from: https://www.dol.gov/whd/govcontracts/dbra.htm

NOTE: The Town shall apply the most current wage decision applicable at the time of contract award.

CONFLICT OF INTEREST
No officer or employee or member of any elective or appointive board, commission, committee or council of the Town, whether temporary or permanent, shall have or acquire any financial interest gained from a successful bid, direct or indirect, in any project, matter, contract or business within his/her jurisdiction or the jurisdiction of the board, commission, committee or council of which he/she is a member. Nor shall the officer / employee / member have any financial interest, direct or indirect, in any contract or proposed contract for materials or services to be furnished or used in connection with any project, matter or thing which comes under his/her jurisdiction or the jurisdiction of the board, commission, committee or council of which he/she is a member.

SCOPE OF WORK / SITE INSPECTIONS

The bidder declares that the scope of the work has been thoroughly reviewed and any questions resolved (see above for name and number of individual to contact for questions). If applicable, the bidder further declares that the site has been inspected as called for in the specifications (q.v.).

EXCEPTION TO SPECIFICATIONS

No protest regarding the validity or appropriateness of the specifications or of the Invitation for Bids will be considered, unless the protest is filed in writing with the Purchasing Agent prior to the closing date for the bids. All bid proposals rendered shall be considered meeting the attached specifications unless exceptions are noted on a separate page dated and signed by the bidder.

UNLESS OTHERWISE NOTED

It will be assumed that all terms and conditions and specifications will be complied with and will be considered as part of the Bid Proposal.

TAX EXEMPT

Federal Tax Exemption 06-6002103.
Exempt from State Sales Tax under State General Statues Chapter 219-Section 12-412 Subsection A.

BID FORM

Bids must be submitted to the Town of Stratford Purchasing Office, attention Phillip Ryan, Purchasing Agent, on the following form signed by an authorized company officer. Bids will be opened on **Monday, March 25, 2019, 1:30pm.**

Phillip Ryan, Purchasing Agent
Town of Stratford
2725 Main Street
Stratford, CT 06615

HVAC Upgrades:
Eli Whitney Elementary School
1130 Huntington Road
Stratford, CT 06614

To Whom It May Concern:

(I, We) _____ the undersigned having visited the project site at **Eli Whitney Elementary School** and having familiarized ourselves with the local conditions affecting the cost of the work and with Contract Documents and all addenda thereto, hereby propose to furnish all labor, materials, tools, equipment, insurance to pay all applicable taxes, and to do and perform all things as provided in the drawings and specifications for the following sum(s):

BASE BID:

Refer to enclosed drawings and specifications.

Contractor shall include all monies and fees to complete documented HVAC upgrades as indicated in bid documents. Contractor shall include a $5,000 allowance in base bid number for unforeseen conditions and changes to be used at Architect and Owners discretion. Any unused portion of allowance shall be credited back to owner.

*Written Form: _____

*Dollars: ($_____)

***PLEASE NOTE THAT STATE OF CONNECTICUT PREVAILING WAGES MUST BE USED IF TOTAL BID EXCEEDS $100,000.**

ADD ALTERNATE #1: HV-2 REPLACEMENT:

All work and materials necessary to remove and replace existing HV-2 unit as documented in construction documents.

*Written Form: _____

*Dollars: ($_____)

***Please note the ADDITIONAL COST ONLY**, not the basebid plus additional costs in Alternate bid numbers.

ADDENDA

In submitting this proposal, I have received and included in this Proposal, the following Addenda:

Addendum No.	Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Signed: _____ _____

Signature Corporate Seal

Company Name : _____

Address : _____

City, St, Zip Code : _____

Phone : (__ __ __) - __ __ __ - __ __ __ __

Fax : (__ __ __) - __ __ __ - __ __ __ __

AIA® Document A305™ – 1986

Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO: Town of Stratford

ADDRESS: 2725 Main St., Stratford, CT 06615

SUBMITTED BY:

NAME:

ADDRESS:

PRINCIPAL OFFICE:

[ ] Corporation
[ ] Partnership
[ ] Individual
[ ] Joint Venture
[ ] Other

NAME OF PROJECT *(if applicable)*:

TYPE OF WORK (file separate form for each Classification of Work):

[X] General Construction
[ ] HVAC
[ ] Electrical
[ ] Plumbing
[ ] Other (please specify)

§ 1. ORGANIZATION

§ 1.1 How many years has your organization been in business as a Contractor?

§ 1.2 How many years has your organization been in business under its present business name?

§ 1.2.1 Under what other or former names has your organization operated?

§ 1.3 If your organization is a corporation, answer the following:

§ 1.3.1 Date of incorporation:
§ 1.3.2 State of incorporation:
§ 1.3.3 President's name:

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.

§ 1.3.4 Vice-president's name(s)

§ 1.3.5 Secretary's name:
§ 1.3.6 Treasurer's name:

§ 1.4 If your organization is a partnership, answer the following:
§ 1.4.1 Date of organization:
§ 1.4.2 Type of partnership (if applicable):
§ 1.4.3 Name(s) of general partner(s)

§ 1.5 If your organization is individually owned, answer the following:
§ 1.5.1 Date of organization:
§ 1.5.2 Name of owner:

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

§ 2. LICENSING

§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

§ 3. EXPERIENCE

§ 3.1 List the categories of work that your organization normally performs with its own forces.

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)
§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

§ 4. REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

§ 4.3.2 Name and address of agent:

§ 5. FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ **5.1.2** Name and address of firm preparing attached financial statement, and date thereof:

§ **5.1.3** Is the attached financial statement for the identical organization named on page one?

§ **5.1.4** If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

§ **5.2** Will the organization whose financial statement is attached act as guarantor of the contract for construction?

§ **6. SIGNATURE**

§ **6.1** Dated at this day of

Name of Organization:

By:

Title:

§ **6.2**

M being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this day of

Notary Public:

My Commission Expires:

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Town of Stratford
2725 Main Street
Stratford, CT 06615
BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
Flooring Replacement:
Franklin Elementary School
Stratford, CT

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**	**OWNER'S REPRESENTATIVE:** *(Architect, Engineer or other party:)*

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

.1 the name of the Claimant;
.2 the name of the person for whom the labor was done, or materials or equipment furnished;
.3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
.4 a brief description of the labor, materials or equipment furnished;
.5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
.6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
.7 the total amount of previous payments received by the Claimant; and
.8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

Minimum Rates and Classifications for Building Construction

ID# : B 25659

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:
State#:

Project Town: Stratford
FAP#:

Project: Air Conditioning And HVAC Updates At Eli Whitney Elementary School

CLASSIFICATION	Hourly Rate	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings	38.25	27.96
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	40.21	29.30

As of: **Friday, February 08, 2019**

2) Boilermaker	38.34	26.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	33.48	32.06 + a
3b) Tile Setter	34.90	25.87
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.70	21.75
3e) Plasterer	33.48	32.06

As of: **Friday, February 08, 2019**

Project: Air Conditioning And HVAC Updates At Eli Whitney Elementary School

------LABORERS------

4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	30.05	20.10
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	30.30	20.10
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	30.55	20.10
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is $26.80.	30.55	20.10
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	30.55	20.10

4e) Group 6: Blasters, nuclear and toxic waste removal.	31.80	20.10
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	31.05	20.10
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	28.38	20.10
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	27.86	20.10
4i) Group 10: Traffic Control Signalman	16.00	20.10
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	32.60	25.34

As of: **Friday, February 08, 2019**

5a) Millwrights	33.14	25.74
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	38.82	26.25+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	51.71	32.645+a+b
-----LINE CONSTRUCTION----		
Groundman	26.50	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00

As of: **Friday, February 08, 2019**

8) Glazier (Trade License required: FG-1,2)	37.18	21.05 + a
9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	35.47	35.14 + a
----OPERATORS----		
Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required)	39.55	24.30 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	39.23	24.30 + a
Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	38.49	24.30 + a

Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	38.10	24.30 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	37.51	24.30 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	37.51	24.30 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	37.20	24.30 + a
Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrell).	36.86	24.30 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	36.46	24.30 + a

As of: **Friday, February 08, 2019**

Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	36.03	24.30 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	33.99	24.30 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	33.99	24.30 + a
Group 12: Wellpoint operator.	33.93	24.30 + a
Group 13: Compressor battery operator.	33.35	24.30 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	32.21	24.30 + a

As of: **Friday, February 08, 2019**

Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	31.80	24.30 + a
Group 16: Maintenance Engineer/Oiler.	31.15	24.30 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	35.46	24.30 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	33.04	24.30 + a
------PAINTERS (Including Drywall Finishing)------		
10a) Brush and Roller	33.62	21.05

10b) Taping Only/Drywall Finishing	34.37	21.05
10c) Paperhanger and Red Label	34.12	21.05
10e) Blast and Spray	36.62	21.05
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	42.62	31.21
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
Roofer: Cole Tar Pitch	41.50	17.00 + a

As of: **Friday, February 08, 2019**

Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	40.00	17.00 + a
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	43.70	42.40
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	42.62	31.21
------TRUCK DRIVERS------		
17a) 2 Axle	29.13	23.33 + a
17b) 3 Axle, 2 Axle Ready Mix	29.23	23.33 + a

As of: **Friday, February 08, 2019**

17c) 3 Axle Ready Mix	29.28	23.33 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.33	23.33 + a
17e) 4 Axle Ready Mix	29.38	23.33 + a
17f) Heavy Duty Trailer (40 Tons and Over)	29.58	23.33 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.38	23.33 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	43.92	15.84 + a

19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

***Note: Hazardous waste premium $3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $4.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

As of: **Friday, February 08, 2019**

Project: Air Conditioning And HVAC Updates At Eli Whitney Elementary School

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: **Friday, February 08, 2019**

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine
Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007,* where the total cost of all work to be performed is at least $100,000)

(1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);

(2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;

(3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least $100,000;

(4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;

(5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;

(6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;

(7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;

(8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;

(9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

(10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;

(11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;

(12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;

(13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;

(14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and

(15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.

(16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTMATELY ARISE CONCERNIG THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

Statute 31-55a

- Special Notice -

To All State and Political Subdivisions,Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the ***contractor's*** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

Workplace Laws

Published by the Connecticut Department of Labor, Project Management Office
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CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

I,_____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

Subscribed and sworn to before me this _____ day of _____,_____.

_____
Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

In accordance with Connecticut General Statutes, 31-53
Certified Payrolls with a statement of compliance
shall be submitted monthly to the contracting agency.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Connecticut Department of Labor
Wage and Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

CONTRACTOR NAME AND ADDRESS:

SUBCONTRACTOR NAME & ADDRESS

WORKER'S COMPENSATION INSURANCE CARRIER

POLICY #

EFFECTIVE DATE:

EXPIRATION DATE:

PAYROLL NUMBER

Week-Ending Date

PROJECT NAME & ADDRESS

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE							Total ST Hours Total O/T Hours	BASE HOURLY RATE TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				S	M	T	W	TH	F	S					FICA	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER		
				HOURS WORKED EACH DAY																
											S-TIME		1. $							
												$	2. $							
												Base Rate	3. $							
											O-TIME		4. $							
												$	5. $							
												Cash Fringe	6. $							
											S-TIME		1. $							
												$	2. $							
												Base Rate	3. $							
											O-TIME		4. $							
												$	5. $							
												Cash Fringe	6. $							
											S-TIME		1. $							
												$	2. $							
												Base Rate	3. $							
											O-TIME		4. $							
												$	5. $							
												Cash Fringe	6. $							
											S-TIME		1. $							
												$	2. $							
												Base Rate	3. $							
											O-TIME		4. $							
												$	5. $							
												Cash Fringe	6. $							

7/13/2009
WWS-CP1

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER ______OF

OSHA 10 ~ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

1) Medical or hospital care _____ 4) Disability_____

2) Pension or retirement _____ 5) Vacation, holiday_____

3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____of _____, (hereafter known as

Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

a) The records submitted are true and accurate;

b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;

c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);

d) Each such employee of the Employer is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;

e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and

f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such employee's name first appears.

_____ _____ _____

(Signature) (Title) Submitted on (Date)

Section B: Applies to CONNDOT Projects ONLY

That pursuant to CONNDOT contract requirements for reporting purposes only, all employees listed under Section B who performed work on this project are not covered under the prevailing wage requirements defined in Connecticut General Statutes Section 31-53.

_____ _____ _____

(Signature) (Title) Submitted on (Date)

Note: CTDOL will assume all hours worked were performed under Section A unless clearly delineated as Section B WWS-CP1 as such. Should an employee perform work under both Section A and Section B, the hours worked and wages paid must be segregated for reporting purposes.

*****THIS IS A PUBLIC DOCUMENT*****

*****DO NOT INCLUDE SOCIAL SECURITY NUMBERS*****

Weekly Payroll Certification For
Public Works Projects (Continued)

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Week-Ending Date:
Contractor or Subcontractor Business Name:

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION	DAY AND DATE							Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
			Trade License Type & Number - OSHA 10 Certification Number	S	M	T	W	TH	F	S	Total O/T Hours	TOTAL FRINGE BENEFIT PLAN CASH			FICA	FEDERAL WITH- HOLDING	STATE WITH- HOLDING	LIST OTHER		
				HOURS WORKED EACH DAY																
											S-TIME	$ Base Rate	1. $ 2. $ 3. $							
											O-TIME	$ Cash Fringe	4. $ 5. $ 6. $							
											S-TIME	$ Base Rate	1. $ 2. $ 3. $							
											O-TIME	$ Cash Fringe	4. $ 5. $ 6. $							
											S-TIME	$ Base Rate	1. $ 2. $ 3. $							
											O-TIME	$ Cash Fringe	4. $ 5. $ 6. $							
											S-TIME	$ Base Rate	1. $ 2. $ 3. $							
											S-TIME	$ Cash Fringe	4. $ 5. $ 6. $							
											S-TIME	$ Base Rate	1. $ 2. $ 3. $							
											S-TIME	$ Cash Fringe	4. $ 5. $ 6. $							

*IF REQUIRED

7/13/2009
WWS-CP2

NOTICE: THIS PAGE MUST BE ACCOMPANIED BY A COVER PAGE (FORM # WWS-CP1)

PAGE NUMBER ______OF

Information Bulletin
Occupational Classifications

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53.

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

  Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

  Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

  Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

  Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

  Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **CLEANING LABORER**

  The clean up of any construction debris and the general cleaning, including sweeping, wash down, mopping, wiping of the construction facility, washing, polishing, dusting, etc., prior to the issuance of a certificate of occupancy falls under the *Labor classification.*

- **DELIVERY PERSONNEL**

  If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

  An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer/tradesman and not a delivery personnel.

- **ELECTRICIANS**

  Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**

- **ELEVATOR CONSTRUCTORS**

  Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ***License required by Connecticut General Statutes: R-1,2,5,6.**

- **FORK LIFT OPERATOR**

  Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

  Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- **GLAZIERS**

  Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce.

- **IRONWORKERS**

  Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce. Insulated metal and insulated composite panels are still installed by the Ironworker.

- **INSULATOR**

  Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings. Past practice using the applicable licensed trades, Plumber, Sheet Metal, Sprinkler Fitter, and Electrician, is not inconsistent with the Insulator classification and would be permitted.

- **LABORERS**

  Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

  Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

  Painter's Rate
  1. Removal of lead paint from bridges.
  2. Removal of lead paint as preparation of any surface to be repainted.
  3. Where removal is on a Demolition project prior to reconstruction.

  Laborer's Rate
  1. Removal of lead paint from any surface NOT to be repainted.
  2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

  Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

  Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ***License required, crane operators only, per Connecticut General Statutes.**

- **ROOFERS**

  Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (tear-off and/or removal of any type of roofing and/or clean-up of any and all areas where a roof is to be relaid)

- **SHEETMETAL WORKERS**

  Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, facia, louvers, partitions, wall panel siding, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Insulated metal and insulated composite panels are still installed by the Iron Worker. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers.

- **SPRINKLER FITTERS**

  Installation, alteration, maintenance and repair of fire protection sprinkler systems. ***License required per Connecticut General Statutes: F-1,2,3,4.**

- **TILE MARBLE AND TERRAZZO FINISHERS**

  Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

Definitions:

1) "Site of the work" (29 Code of Federal Regulations (CFR) 5.2(l)(b) is the physical place or places where the building or work called for in the contract will remain and any other site where a significant portion of the building or work is constructed, provided that such site is established specifically for the performance of the contact or project;

(a) Except as provided in paragraph (l) (3) of this section, job headquarters, tool yards, batch plants, borrow pits, etc. are part of the "site of the work"; provided they are dedicated exclusively, or nearly so, to the performance of the contract or project, and provided they are adjacent to "the site of work" as defined in paragraph (e)(1) of this section;

(b) Not included in the "site of the work" are permanent home offices, branch plant establishments, fabrication plants, tool yards etc, of a contractor or subcontractor whose location and continuance in operation are determined wholly without regard to a particular State or political subdivision contract or uncertain and indefinite periods of time involved of a few seconds or minutes duration and where the failure to count such time is due to consideration justified by industrial realities (29 CFR 785.47)

2) "Engaged to wait" is waiting time that belongs to and is controlled by the employer which is an integral part of the job and is therefore compensable as hours worked. (29 CFR 785.15)

3) "Waiting to be engaged" is waiting time that an employee can use effectively for their own purpose and is not compensable as hours worked. (29 CFR 785.16)

4) "De Minimus" is a rule that recognizes that unsubstantial or insignificant periods of time which cannot as a practical administrative matter be precisely recorded for payroll purposes, may be disregarded. This rule applies only where there are uncertain and indefinite periods of time involved of a short duration and where the failure to count such time is due to consideration justified by worksite realities. For example, with respect to truck drivers on prevailing wage sites, this is typically less than 15 minutes at a time.

Coverage of Truck Drivers on State or Political subdivision Prevailing Wage Projects

Truck drivers <u>are covered</u> for payroll purposes under the following conditions:

- Truck Drivers for time spent working on the site of the work.
- Truck Drivers for time spent loading and/or unloading materials and supplies on the site of the work, if such time is not de minimus

- Truck drivers transporting materials or supplies between a facility that is deemed part of the site of the work and the actual construction site.

- Truck drivers transporting portions of the building or work between a site established specifically for the performance of the contract or project where a significant portion of such building or work is constructed and the physical places where the building or work outlined in the contract will remain.

For example: Truck drivers delivering asphalt are covered under prevailing wage while" engaged to wait" on the site and when directly involved in the paving operation, provided the total time is not "de minimus"

Truck Drivers <u>are not</u> covered in the following instances:

- Material delivery truck drivers while off "the site of the work"

- Truck Drivers traveling between a prevailing wage job and a commercial supply facility while they are off the "site of the work"

- Truck drivers whose time spent on the "site of the work" is de minimus, such as under 15 minutes at a time, merely to drop off materials or supplies, including asphalt.

These guidelines are similar to U.S. Labor Department policies. The application of these guidelines may be subject to review based on factual considerations on a case by case basis.

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

Any questions regarding the proper classification should be directed to:
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

NON-COLLUSION AFFIDAVIT

State of _____:

County of _____:s.s.

I state that I am the_____ of _____
(TITLE) (NAME OF MY FIRM)
and that I am authorized to make this affidavit on behalf of my firm, and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

(1) The price(s) and amount of this bid have been arrived at independently and without consultation communication or agreement with any other contractor, bidder/proposer or potential bidder/proposer.

(2) Neither the price(s) nor the amount of this bid/rfp, and neither the approximate price(s) nor approximate amount of this bid/rfp, have been disclosed to any other firm or person who is a bidder/proposer or potential bidder/proposer, and they will not be disclosed before bid/rfp opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding/proposing on this contract, or to submit a bid/proposal higher than this bid/rfp, or to submit any intentionally high or noncompetitive bid/rfp or other form of complementary bid/rfp.

(4) I fully understand that more than one offer from an individual, firm partnership; corporation or association under the same or different name will be rejected. Reasonable grounds for believing that a bidder/proposer is interested in more than one bid/rfp for the work contemplated may cause rejection of all bids/rfps in which the bidder/proposer is interested. Any or all bidders/proposers will be rejected if there is any reason for believing that collusion exists among the bidders/proposers. Participants in such collusion may not be considered in the future offers for the same work. Each bidder/proposer by submitting a bid/proposal certifies that it is not a part to any collusive action.

(5) The bid/rfp of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid/proposal.

(6) _____its affiliates, subsidiaries, officers,
(NAME OF MY FIRM)
directors and employees are not currently under investigation by any governmental agency and have not in the last four years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding/proposing on any public contract, except as follows:
I state that _____ understands and acknowledges that
(NAME OF MY FIRM)

the above representations are material and important, and will be relied on by the Town of Stratford in awarding the bid/proposal for which this is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the Town of Stratford of the true facts relating to the submission of bids/proposals for this contract.

(7) I agree to furnish and deliver all services on the date and time agreed on by _____ and the Town of Stratford once the
(NAME OF MY FIRM)
Contract is signed. Furthermore, there will not be any cancellations to the Town of Stratford. If a bidder/proposer submits a bid/proposal on any services he/she will be responsible for delivering that service at the bid/proposal cost, in accordance with the attached above specifications, which were submitted with this bid/proposal and upon which the bid/proposal was made.

(8) In submitting this bid/proposal, the undersigned declares that this is made without any connection with any persons making another bid/proposal on the same contract; that the bid/proposal is in all respects fair and without collusion, fraud or mental reservation; and that no official of the Town, or any person in the employ of the Town, is directly or indirectly interested in said bid/proposal or in the supplies or work to which it relates, or in any portion of the profits thereof.

(9) The undersigned further understands that the above declarations are material representations to the Town of Stratford made as a condition to the acceptance of the bid/proposal. If found to be false, the Town of Stratford retains the right to reject said bid/proposal and rescind any resultant contract and/or purchase order and notify the undersigned accordingly, thereby declaring as void said bid/proposal and contract or purchase order.

CONTINUTED >>>

VENDOR INFORMATION. (Please print the following)

VENDOR NAME

ADDRESS

TELEPHONE FAX #

E-MAIL WEB SITE

AUTHORIZED SIGNATURE TITLE

(12) By signing this bid/proposal the bidder/proposer understands and agrees to the attached terms, conditions, and specifications, including Collusion among Bidders/Proposers Employment Discrimination by the Contractor Prohibited.

SIGNATURE

SWORN AND SUBSCRIBED TO BEFORE ME, A NOTARY PUBLIC, IN AND FOR THE COUNTY OF _____ AND THE STATE OF

_____ THIS _____

DAY OF _____, 2014

_____ MY COMMISSION EXPIRES_____

NOTARY PUBLIC

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit ($ 0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ( ). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ( );

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

§ 8.3 The Owner's representative:
(Name, address and other information)

§ 8.4 The Contractor's representative:
(Name, address and other information)

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents

unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($ 0.00)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name, legal status and address)
Town of Stratford
2725 Main Street, Stratford, CT 06615

THE ARCHITECT:
(Name, legal status and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

INDEX
(Numbers and Topics in Bold are Section Headings)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

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 one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the

portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and

completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the

Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount

for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or

encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work to comply with the requirements of the Contract Documents; or

.3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment

property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by

such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS

The following supplements modify, change, delete from or add to the General Conditions of the Contract for Construction, A.I.A. Document A201, 2007 (thereafter referred to as "The General Conditions). Where any Article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these supplements, the unaltered provisions of that article, paragraph, subparagraph or clause shall remain in effect.

Numerical designations herein have the same, or are a sequential developmental of the same designations as the General Conditions.

ARTICLE 1 – GENERAL PROVISIONS

Add the following Subparagraph 1.1.1.1:

1. Where discrepancies or conflicts occur:

(a) Addenda shall take precedence over Drawings or Specifications.
(b) Specifications shall take precedence over Drawings.
(c) Stated dimensions shall take precedence over dimensions obtained by scaling.
(d) Large-scale detail drawings shall take precedence over small-scale drawings.

ARTICLE 3 - CONTRACTOR

Add the following Subparagraphs to 3.3:

3.3.4 The Contractor shall verify all measurements at the Project and shall be responsible for their accuracy. No increase in the Contract Sum will be allowed for additional work required due to differences between field dimensions and Drawing Documents or stated approximate quantities.

3.3.5 The Contractor shall consult with representatives of all Subcontractors to avoid interference. The Contractor shall rearrange any work which may cause interference with work of other trade, without increase in contract Sum.

Add the following Subparagraphs to 3.9:

3.9.2 Once assigned, the Project Superintendent may not be changed without the approval of the Owner and Architect.

3.9.3 Project Superintendent must attend all Project meetings.

Add the following Subparagraph to 3.18:

3.18.3 Unless otherwise stated in the Agreement, each respective Contractor shall, before commencing work, secure and pay for such insurance as may be required to comply with the indemnification and hold harmless provisions outlined under Articles 3.18.1 and 3.18.2.

Such insurance shall be with such companies as may be satisfactory to the Owner. Insurance shall be so written as to prevent cancellation without at least thirty (30) days written notice to the Owner, Architect and Contractor.

ARTICLE 7 – CHANGES IN THE WORK

Add the following Subparagraph to 7.3.6:

7.3.6.1 The allowance for the overhead and profit combined, included in the total cost to the Owner shall be based on the following:

1. For the Contractor, for any work performed by the Contractor's own forces 15 percent of this total direct cost.
2. For work performed by a Subcontractor, 5 percent (5%) of the amount of the Subcontractor's total direct costs (not including Subcontractor's overhead and profit).

ARTICLE 9 – PAYMENTS AND COMPLETION Add

the following sentence to 9.3.1:

The form of application for payment shall be AIA Document G702, "Application and Certification for Payment," supported by AIA Document G703, "Continuation Sheet." Two (2) copies of the Application for Payment shall be submitted and sworn before a Notary Public.

Add the following clause to 9.3.1:

Payments to the Contractor shall include five percent (5%) retainage and shall be as follows:

1. Monthly progress payments bringing total payments to ninety-five percent (95%) of the contract amount upon final acceptance by the Owner and Architect.

2. Payment of five percent (5%) retainage no later than forty five (45) days after final payment and upon receipt of warranties, operational and maintenance manual and record drawings.

Add the following to Subparagraph to 9.3.3:

The Contractor further agrees that the submission of any Application for Payment shall, upon receipt of such payment and to the fullest extent permitted by law, be conclusively deemed to waive all liens with respect to said work, materials and labor to which the Contractor then may be entitled; provided, however, that in no event shall such waiver of lien rights waive right to payment for said work, materials and labor.

ARTICLE 11 – INSURANCE AND BONDS

Add the following clause to 11.1:

11.1.1.9 Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:

1.
2. Premises Operation (including X, C and U coverage as applicable).
3. Independent Contractor's Protective.
4. Products and Completed Operations.
5. Personal Injury Liability with Employment Exclusion deleted.
6. Contractual, including specified provision for Contractors.
7. Owned, Non-owned and Hired Motor Vehicles.
8. Broad Form Property Damage including Completed Operations.

11.1.2.1 If the General Liability coverage is provided by a Commercial General Liability Policy on a "claims-made" basis, the policy date shall predate the Contract termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverage required to be maintained after final payment certified in accordance with Subparagraph 9.10.2.

11.1.2.1 Refer to Town of Stratford – Insurance Requirements document contained in Project Manual for coverage requirements.

~~1. Workers' Compensation~~

~~(a) State: Statutory~~
~~(b) Applicable Federal: Statutory~~
~~(c) Each accident by bodily injury; $100,000~~
~~(d) Each accident by disease; $100,000~~
~~(e) Employer's Liability: $500,000.00~~

~~2. Refer to Town of Stratford – Insurance Requirements document contained in Project Manual for coverage requirements.~~

~~(a) Bodily Injury:~~

~~$1,000,000.00 Each Occurrence~~
~~$2,000,000.00 Annual Aggregate~~

~~(b) Property Damage:~~

~~$1,000,000.00 Each Occurrence~~
~~$2,000,000.00 Annual Aggregate~~

~~(c) Other Insurance: Owned, Non-owned and Hired Motor Vehicles:~~

~~$1,000,000.00 Single Limit~~

(d) Additionally named insured:

Town of Stratford
2725 Main Street
Stratford, CT 06615

Snyder Architects, LLC
Trumbull, CT 06611

Including employees, consultants and agents of the above parties.

~~3. Contractual Liability~~

~~(a) Bodily Injury:~~

~~$1,000,000.00 Each Occurrence~~
~~$2,000,000.00 Annual Aggregate~~

~~(b) Property Damage:~~
~~$1,000,000.00 Each Occurrence~~
~~$2,000,000.00 Annual Aggregate~~

~~4. Personal Injury, with Employment Exclusion deleted:~~

~~$1,000,000.00 Each Person~~
~~$2,000,000.00 Annual Aggregate~~

~~5. Comprehensive Automobile Liability:~~

~~(a) Bodily Injury:~~

~~$1,000,000.00 Each Person~~
~~$2,000,000.00 Annual Aggregate~~

~~(b) Property Damage:~~

~~$1,000,000.00 Each Occurrence~~

~~6. Excess Umbrella Liability:~~

~~$2,000,000.00 Annual Aggregate~~

7. The Contractor shall provide adequate Fire and Extended Coverage insurance to cover equipment, tools, etc., owned or rented by him, his Subcontractors, the capital value of which is not included in the work, and those materials stored on the site for which payment by the Owner has not been approved. Such coverage shall include an endorsement to the effect that the Underwriter waives their rights of subrogation against the Owner.

8. The Contractor agrees to secure and protect himself, and shall secure and indemnify the Owner and his representatives or employees from any claim of liability, expense, cause of action, loss or damage whatsoever for any injury,

including death, to any person or property in the performance of this Contract; it being the intent of this Agreement to protect and indemnify the Owner from any and all loss arising out of or in connection with, the work performed under this Contract.

11.1.4 Contractor's liability insurance must be maintained until final Certificate of Payment is issued pursuant to paragraph 9.10.2 and completed Operators Insurance is in effect

11.1.5 Certificates of Insurance must be submitted on AIA Document G715 Certificate of Insurance or such other form as acceptable to the owner and Architect.

ARTICLE 13 – MISCELLANEOUS PROVISIONS

Add the following to Paragraph 13.1.1:

13.1.1.2 The Contractor and his Subcontractors shall abide by Sections 46a-51, 46a, 60,61 and 62 of the Connecticut General Statutes "Discriminatory Practices."

13.1.1.3 The Contractor and all Subcontractors shall comply with all applicable requirements of paragraph 814c "Human Rights and Opportunities" of the Connecticut General Statutes.

ADD THE FOLLOWING ARTICLE 15.

ARTICLE 15 – CERTIFIED GUARANTEE AND WARRANTY TO OWNER

15.1 The Contractor shall provide a project Guarantee/Warranty on his letterhead in the general format shown on the following page.

(CONTRACTOR'S LETTERHEAD)

NAME AND ADDRESS OF OWNER

Date: _____

Re: _____
(Name of Project)

Gentlemen:

The undersigned guarantees the Owner that he will be responsible for faulty materials, equipment and workmanship and that he will remedy all defects due thereto and pay for all damages to other work resulting therefrom which shall appear within a period of two (2) years from the date at which Substantial Completion of the work is certified by the Architect.

During this period, upon written notice, the undersigned will proceed with due diligence at the undersigned's expense to replace properly all defective materials and equipment and perform all labor necessary to correct all defects in the work.

In case the undersigned fails upon reasonable notice to remedy such defects, the owner may, in addition to and without limitation of any other rights or remedies the Owner may have, furnish such materials or labor as are necessary to do so, and the undersigned agrees to reimburse the Owner fully and promptly upon demand.

Guarantees from Contractor shall be supported by individual guarantees from each trade or subcontractor and manufacturer or supplier covering work performed and material and equipment.

All materials, fixtures, appliances, equipment and other items requiring excessive servicing during the guarantee period, in the opinion of the Architect, will be considered defective, and shall be made good, replaced and/or corrected, to the satisfaction of the Architect and Owner, under the terms of this paragraph.

The furnishing of the above guarantee, and all other special guarantees required by the Contract Documents, shall be a condition precedent to payment of retainage.

_____
(Signature of Contractor)

(Notarized) _____

END OF SUPPLEMENTARY CONDITIONS

INSURANCE PROCEDURE

PLEASE NOTE:

THIS PAGE MUST BE RETURNED WITH YOUR BID/PROPOSAL. FAILURE TO DO SO MAY RESULT IN YOUR BID/PROPOSAL BEING REJECTED.

Please take the insurance requirements of the Contract to your agent/broker immediately upon receipt of the bid documents to determine your existing coverage and any costs for new or additional coverage required for the work noted in this Request for Bid/Proposal. Any bids/proposals with deficient insurance requirements will be rejected.

STATEMENT OF VENDOR:

I have read the insurance requirements for this work and have taken the documentation to my insurance agent/broker. The bid/proposal cost reflects any additional costs relating to insurance requirements for this work.

_____ _____

Signature Date

_____

Contractor

(SAMPLE ENDORSEMENT LETTER)

AGENT/BROKER
(LETTERHEAD)

(Date)

Mr. Phillip Ryan
Purchasing Agent
Purchasing Department
Town of Stratford
2725 Main Street
Stratford, CT 06615

Re:

Town of Stratford Contract #_____
(Name of Contract)

Dear Mr. Ryan:

The undersigned hereby certifies as follows:

(1) I am a duly licensed insurance agent under the laws of the State of [insert State] and an authorized representative of all companies affording coverage under the Acord form submitted herewith;

(2) The Town of Stratford has been endorsed as an additional insured under the general liability policy no. [insert policy number], issued by [insert company affording coverage] to [name of insured];

(3) The general liability policy referenced in paragraph (2) above meets or exceeds the coverage in Commercial General Liability ISO form CG 00 01 10 01, including contractual liability;

(4) The policies listed in the Acord form submitted to the Town of Stratford in connection with the above-referenced contract have been issued to the insured in the amounts stated and for the periods indicated in the Acord form; and

(5) The Town of Stratford shall be given thirty (30) days prior written notice of cancellation, lapse or restrictive amendment (except ten days notice of nonpayment) of the policies listed in the Acord form.

Sincerely,

Authorized Representative for all companies listed in the Acord form

ACORD **CERTIFICATE OF LIABILITY INSURANCE**

PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER, THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.
	INSUREERS AFFORDING COVERAGE
INSURED CONTRACT	INSURER A:
	INSURER B:
	INSURER C:
	INSURER D:
	INSURER E:

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OF CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSRLT	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE(MM/DD/YY)	POLICY EXPIRATION DATE(MM/DD/YY)	LIMITS
	GENERAL LIABILITY COMMERCIAL GENERAL ☐ CLAIMS MADE ☒ OCCUR ☐_____ ☐_____ GENERAL AGGREGATE LIMIT ☐ POLICY ☐PROJECT ☐ LOC				EACH OCCURENCE FIRE DAMAGE (Any one fire) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGRREGATE PRODUCTS-COMP/OP AGG
	AUTOMOBILE LIABILITY ☐ ANY AUTO ALL OWNED AUTOS ☐ SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS ☐_____ ☐				COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)
	GARAGE LIABILITY ☐ ANY AUTO ☐				AUTO ONLY-EA ACCIDENT OTHER THAN EA ACC AUTO ONLY: AGG
	EXCESS LIABILITY ☐ OCCUR ☐ CLAIMS MADE ☐ DEDUCTIBLE ☐ RETENTION $				EACH OCCURRENCE AGGREGATE
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				WC STATUORY LIMITS ☐ OTHER E.L. EACH ACCIDENT E.L. DISEASE-EA EMPLOYEE E.L. DISEASE – POLICY LIMIT
	Professional Liability				

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS
Contract #_____

CERTIFICATE HOLDER	X	ADDITIONAL INSURED; INSURER LETTER: __	CANCELLATION

Certificate Holder:
Town of Stratford
2725 Main Street
Stratford, CT 06615
&
The State of Connecticut

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OF REPRESENTATIONS

AUTHORIZED REPRESETNATIVE

A. M. BEST KEY RATING GUIDE FORM

The _____ is licensed in

The State of Connecticut as per listing in the 2008 edition of the

A.M. Best Key Rating Guide for Property and Casualty, page

Number _____.

Their rating is _____.

SECTION 01009

MILESTONE SCHEDULE

PART 1 – GENERAL

1.01 MASTER SCHEDULE

The following milestone schedule serves as a basis for bidding. A Master Schedule shall be developed at a general meeting of the successful bidder within fourteen (14) days of Letter of Intent to Award the Contracts. This Master Schedule will incorporate the milestones listed below.

1.02 Milestone Dates:

A.	Issue for Bid:	**March 5, 2019**
B.	Bid Opening:	**March 25, 2019**
C.	Award Project – on or about:	**April 12, 2019**
D.	Submittals & Shop Drawings:	**April 26, 2019**
E.	Start Construction:	**June 13, 2019**
F.	Substantial Completion:	**August 9, 2019**
G.	Final Close-out of Contract:	**September 30, 2019**

- Final Milestone Schedule to be coordinated and approved by the Town of Stratford and Stratford Public Schools
- Final close out of all contracts shall be by or prior to the date established above. All work including, but not limited to punch lists, project closeout, testing, balancing, owners operation, warranties, etc. shall be complete.

END OF MILESTONE SCHEDULE

SECTION 011000

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Agreement and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Use of premises.
4. Owner's occupancy requirements.
5. Work restrictions.
6. Specification formats and conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

Project Identification:

HVAC Upgrades
Eli Whitney Elementary School
1130 Huntington Road
Stratford, CT 06614

A. Owner: The Town of Stratford

1. Owner's Representative: Maurice McCarthy, Director of Public Works, (203) 385-4083

B. Architect: Brian Snyder, Snyder Architects – (203) 203-243-3346

C. The Work consists of the following:

1. The Work includes but not limited to:
   a. Replacement of existing air conditioning system in Teachers' Lounge.
   b. Replacement of rooftop HVAC unit HV-1.
   c. Replacement of rooftop HVAC unit HV-2 (Add Alternate #1).

d.

1.4 TYPE OF CONTRACT

A. Project will be constructed under a single prime contract. Contractor to be referred to as “General Work Contractor” or “GC” or “Contractor”.

1.5 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as required to perform work per Contract Documents. Contractor will coordinate access to project site with owner representative.

1.6 WORK RESTRICTIONS

A. On-Site Work Hours shall be coordinated with the Town of Stratford Department of Public Works and Stratford Public Schools.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS

- **<u>Contractor agrees to order long lead materials, submit submittals and shop drawings within 5 days of being awarded contract.</u> "Or-equal" long lead materials will be considered during the bidding period (use attached substitution form).**

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01250

REGULATORY REQUIREMENTS

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Contract Provisions and the General Requirements of Division 1 apply to the work of this Section.

1.02 LAWS, CODES, ORDINANCES, PERMITS, FEES, ETC.

A. All necessary permits from the municipal or other public authorities shall be secured by the Contractor who shall give all notices required by Law, Municipal Ordinances, or the Rules and Regulations of the various Municipal Bureaus or Departments, and also as a part of the Contract, shall comply with all Federal and State laws and all Municipal Ordinances or Regulations that may be applicable to this work which shall be issued (in compliance with Ordinances or Regulations existing at the time of Notice to Proceed) by any or all of said Departments as applying to the work of the Contract.

B. Wherever in these Specifications the name of an Official, Bureau or Department is mentioned, it is intended to mean that Official, Bureau, or Department having jurisdiction.

C. The Contractor shall deliver to the Owner all permits or certificates of approval and inspections issued by all Agencies having jurisdiction in connection with this work, before the certificate for final payment is issued.

D. Laws, Codes, Provisions - Comply with:

1. Connecticut Building Code

2. NFPA 101

3. OSHA

4. See other codes and ordinances referenced therein.

5. In case of conflicting requirements between the various codes, the Contract Documents or any other Local and State Codes or Ordinances having jurisdiction, the most stringent shall govern.

E. It is the intention of these Contract documents that the contractor's work be fully in compliance with all applicable codes and ordinances and that the cost of such compliance is included in the Contract Price. If there are errors or omissions in the contract documents which would result in work that was not in compliance with all the applicable codes and ordinances then the contractor shall not proceed but shall notify the architect in writing. The Contractor shall have included in the contract price the cost of all such work even in the case of errors or omissions to the contract documents if such errors and omissions could have been readily ascertainable through the exercise of reasonable diligence by the contractors.

END OF SECTION 01250

SECTION 01310

PROJECT MANAGEMENT AND COORDINATION

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 WORK INCLUDED

A. To enable orderly review of progress during construction and to provide for systematic discussions of problems, the Architect will conduct project meetings throughout the construction period.

B. In general, project meetings will be held bi-weekly at the job site in accordance with a mutually acceptable schedule.

C. The purpose of the project meetings is analysis of problems that might arise between the Owner and the Contractor relative to execution of the work.

1.03 RELATED WORK

A. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility as described in the General Conditions and are not part of project meetings content.

1.04 QUALITY ASSURANCE

A. Persons designated by the Contractor to attend and participate in project meetings shall have all required authority to commit the Contractor to solutions as agreed upon in the project meetings.

1.05 SUBMITTALS

A. Agenda Items: To the maximum extent possible, advise the Architect at least 24 hours in advance of the project meeting regarding all items to be added to the agenda.

B. Minimum Agenda:
   1. Review work progress since last meeting.
   2. Note field observations, problems and decisions.
   3. Identify problems which impede planned progress.
   4. Review off-site fabrication problems.
   5. Develop corrective measures and procedures to regain schedule.
   6. Coordinate projected progress with other prime contractors.
   7. Review submittal schedules, expedite as required to maintain schedule.

C. Minutes:
   The Contractor will compile minutes of each project meeting and will distribute copies to the Owner and the Architect. The Contractor shall make and distribute such other copies as he wishes.

PART 2.00 - PRODUCTS

(Not Used)

PART 3.00 - EXECUTION

3.01 MEETING SCHEDULE

A. There will be a Pre-construction meeting shortly after award of contract to review schedule, use of site, and team coordination issues.
B. Coordinate with the Architect as required to establish a mutually acceptable schedule for project meetings.

3.02 MEETING LOCATION

A. To the maximum extent practicable, project meetings shall be held at the job site. Provide adequate space and facility including table, chairs, and lighting for proper conduct of meetings.

3.03 ATTENDANCE

A. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout the construction period. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the work are involved.

END OF SECTION 01202

SECTION 01330

SUBMITTALS

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 WORK INCLUDED

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete submittal requirements as specified herein, including, but not limited to, the following:

1. Construction schedules.

2. Survey data.

3. Shop drawings and samples.

4. Manuals.

5. Integrated drawings.

1.03 RELATED WORK

A. Substitution requirements - Section 01600.

B. General submittal requirements - General Conditions.

PART 2.00 - PRODUCTS

2.01 CONSTRUCTION SCHEDULES

A. Refer to the *Agreement* for submission of a progress schedule.

B. Contractor shall submit a Schedule of Submittals within thirty (14) days of award of contract.

2.02 SHOP DRAWINGS AND SAMPLES

A. General:

1. Samples, shop drawings, manufacturer's literature, and other required information shall be submitted in sufficient time to permit proper consideration and action on same before any materials and items are delivered on the work. All samples of materials requiring laboratory tests shall be submitted to the laboratory for testing in sufficient time to obtain test results before such materials are required to be used in the work.

2. Shop drawings for each Section of the work shall be numbered consecutively, and the numbering system shall be retained throughout all revisions. Each drawing shall have a clear space for the stamps of the Contractor, Architect, and one of the Architect's consultants.

3. No work shall be fabricated, manufactured, or installed from shop drawings stamped "Revise and Resubmit" or "Rejected", and such shop drawings shall be corrected and resubmitted by the Contractor until accepted by the Architect. At least one complete set of "No Exceptions Taken" or "Exceptions Taken As Noted" shop drawings shall be kept at the site in the Contractor's field office for reference at all times. "Revise and Resubmit" or "Rejected" shop drawings shall not be permitted at the site.

4. Submittals marked "No Exceptions Taken":

   a. Submittals which require no corrections by the Architect will be marked "No Exceptions Taken".

5. Submittals marked "Exception Taken as Noted":

   a. Submittals which require only a minor amount of correcting shall be marked "Exceptions Taken as Noted". This mark shall mean that checking is complete and all corrections are obvious without ambiguity. Fabrication will be allowed on work "Exceptions Taken as Noted", provided such action will expedite construction and noted corrections are adhered to. If fabrication is not made strictly in accordance with corrections noted, the item shall be rejected in the field, and the Contractor will be required to replace such work in accordance with corrected submittals.

6. Submittals marked "Revise and Resubmit" or "Rejected":

    a. When submittals are contrary to contract requirements or too many corrections are required, they shall be marked "Revise and Resubmit" or "Rejected". No work shall be fabricated under this mark. The Architect shall list his reasons for rejection on the submittals or in the transmittal letter accompanying their return. The submittals must be corrected and resubmitted for approval.

7. All shop drawings and samples shall be identified as follows:

    a. Date of submittal.

    b. Title of project.

    c. Name of Contractor and date of his approval.

    d. Name of subcontractor or supplier and date of submittal to Contractor.

    e. Number of submission.

    f. Any qualification, departure, or deviation from the requirements of the Contract.

    g. Federal Specification or ASTM number where required.

    h. Such additional information as may be required by the Specifications for the particular material being furnished.

8. The Architect will review and approve shop drawings and samples for approval with reasonable promptness, but only for conformance with the design concept of the work and with information contained in the Contract Documents.

9. The Contractor shall submit appropriate transmittal forms with every submittal of shop drawings, manufacturer's literature, and samples. All sepia reproducibles shall be rolled on cardboard tubes for resubmittal. The Contractor shall submit all required shop drawings, manufacturer's literature and samples in accordance with the following procedures noted herein.

10. Unless otherwise specifically directed by the Architect, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.

11. The Contractor shall submit one copy of each standard referred to in the Specifications (ASTM, Fed. Spec., etc.) with the submission of each respective shop drawing, sample, or literature.

B. Submission of Shop Drawings:

1. Architectural Work: Submit one (1) sepia reproducible and two (2) black line prints of each shop drawing to the Architect for approval. If approved, the Architect will return one (1) sepia stamped "No Exceptions Taken" or "Exceptions Taken as Noted", and the Contractor shall print the required number of copies. In the event the Architect returns one (1) sepia stamped "Revise and Resubmit" or "Rejected", the Contractor shall make indicated changes and resubmit one (1) sepia reproducible and two (2) black line prints to the Architect.

2. Structural Work and Mechanical Work: Submit one (1) sepia reproducible and two (2) black line prints of each shop drawing to the Engineer, with one (1) black line print and copy of the transmittal form to the Architect. If accepted, the Architect shall return one (1) sepia stamped "No Exceptions Taken" or "Exceptions Taken as Noted", and the Contractor shall print the required number of copies. In the event the Architect returns one (1) sepia stamped "Revise and Resubmit" or "Rejected", the Contractor shall make indicated changes and resubmit one (1) sepia reproducible and two (2) black line prints to the Engineer, with a copy of the transmittal form and one (1) black line print to the Architect.

3. Prints: The Contractor shall provide all prints of shop drawings as reasonably required by subcontractors, material suppliers, superintendents, inspectors, and others as required for the work, or as directed by the Architect. The Contractor shall pay all costs in connection with printing and distribution of shop drawings.

C. Submission of Manufacturer's Literature, Including Catalog, Catalog Cuts, Brochures, Charts, Test Data, and Similar Information:

1. Manufacturers literature will receive consideration only when accompanied by the transmittal form properly filled out, as the Specification Section and paragraph numbers describing such materials. Any deviations from contract requirements shall be stated

on the above form or attached to it.

2. Architectural Work: Submit six (6) copies of manufacturer's literature to the Architect for acceptance. If accepted, the Architect will return four (4) copies stamped "No Exceptions Taken" or "Exceptions Taken as Noted". In the event the Architect returns the literature stamped "Revise and Resubmit" or "Rejected", he will return two (2) copies only. The Contractor shall resubmit six (6) copies of correct or corrected literature of all submissions stamped "Revise and Resubmit" or "Rejected", with one (1) copy of correct or corrected literature with copy of the transmittal form to the Architect.

~~3. Structural Work and Mechanical Work: Submit six (6) copies of manufacturer's literature to the Engineer, with one (1) copy of the literature and copy of the transmittal form to the Architect. If accepted, the Architect will return four (4) copies stamped "No Exceptions Taken" or "Exceptions Taken as Noted". In the event the Architect stamps the literature "Revise and Resubmit" or "Rejected", he will return two (2) copies only. The Contractor shall resubmit six (6) copies of correct or corrected literature to the Engineer for all submissions stamped "Revised and Resubmit" or "Rejected", with one (1) copy of correct or corrected literature with copy of the transmittal form to the Architect.~~

4. All copies of manufacturer's literature required to be resubmitted hereunder shall be original printed material. Reproductions of printed material will not receive consideration.

D. Submissions of Samples:

1. All samples shall be submitted in triplicate unless otherwise indicated in the Specifications.

2. Samples will receive consideration only when accompanied by the transmittal form properly filled out, as indicated, and listing each sample, as well as the he listing of any ASTM, Federal or other standard references specified or applicable and such additional information as may be required by the Specifications for the materials being submitted. Any deviation from the contract requirements shall be so stated on the above form or attached to it.

3. The Architect shall have the right to require submission of samples of any materials, whether or not specifically indicated in the various

Sections of the Specifications.

4. Unless otherwise specified, samples of sufficient size to indicate general visual effect shall be submitted. Where samples must show a range of color, texture, finish, graining, or other similar property, the Contractor shall submit sets or pairs illustrating the full scope of the range.
5. One (1) sample of each submission will be returned to the Contractor. Samples stamped "Revise and Resubmit" or "Rejected" by the Architect shall be resubmitted in triplicate by the Contractor.

6. All samples stamped "No Exceptions Taken" or "Exceptions Taken as Noted" shall be kept at the site in the Contractor's field office facilities for reference at all times. "Revise and Resubmit" or "Rejected" samples shall not be kept at the site.

2.03 MANUALS

A. Where manuals are required to be submitted covering included in this work, prepare all such manuals in durable plastic binders approximately 8-1/2 x 11" in size and with at least the following:

1. Identification on, or readable through, the front cover stating general nature of the manual.

2. Neatly typewritten index near the front of the manual furnishing immediate information as to location in the manual of all emergency data regarding the installation.

3. Complete instructions regarding operation and maintenance of all equipment involved.

4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.

5. Copy of all guarantees and warranties issued.

6. Copy of the approved shop drawings with all data concerning changes made during construction.

B. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete or otherwise clearly indicate all manufacturer's data with which this installation is not concerned.

C. Number of Copies Required: Refer to Section 01770 - Contract Closeout.

2.04 INTEGRATED DRAWINGS

~~A. The HVAC subcontractor shall prepare a Drawing or Drawings showing duct work, heating and sprinkler piping. This Drawing shall include location of grilles, registers, etc., and access doors in hung ceilings. Locations shall be fixed by elevations and dimensions from column center lines and/or walls.~~

~~B. The HVAC subcontractor shall prepare and distribute to the Plumbing and Electrical subcontractors, the General Contractor, the Construction Manager, and to the Architect a sepia of the above.~~

~~C. The HVAC subcontractor shall lay out on his sepia the reflected ceiling plan, beam soffit elevations, ceiling heights, roof openings, etc.~~

~~D. The Plumbing subcontractor shall lay out on his sepia the piping, valves, cleanouts, etc., indicating locations and elevations and shall indicate the necessary access doors.~~

~~E. The Electrical subcontractor shall indicate on his sepia the fixtures, large conduit runs, clearances, pull boxes, junction boxes, sound system speakers, etc.~~

~~F. The General Contractor shall indicate on his sepia any structural framing, ceiling hangers, etc.~~

G. The General Contractor shall call as many meetings with the subcontractors as are necessary to resolve any conflicts that become apparent. He will call on the services of the ~~Consultant Engineer or~~ Architect where necessary. Any conflicts which result in a relocation of a finished surface are to be brought to the attention of the Architect prior to installation.

~~H. On resolution of the conflicts, each subcontractor shall enter his own work on the HVAC subcontractor's sepia, which shall become the master or integrated Drawing. The master sepia shall be signed by each contributing subcontractor to indicate his acceptance of the arrangement of the work.~~

~~I. A reproducible copy of the master integrated Drawing will be prepared by the HVAC subcontractor. The Construction Manager will make distribution to the contractors and the Architect.~~

J. Each subcontractor shall prepare his shop Drawings in accordance with the integrated Drawings. No work will be permitted without approved shop

Drawings. It is therefore essential that this procedure be instituted as quickly as possible.

2.05 SURVEY DATA

A. Be responsible for properly laying out the work and for the lines and measurements for the work executed under the Contract Documents. Verify the figures shown on the Drawings before laying out the work.

B. Be responsible for the proper location and level of the work and for maintenance of the reference lines and bench marks. Establish bench marks and axis lines at each floor showing partition layout lines and dimensional reference points as required for the information and guidance of all trades.

C. The mechanical and electrical trades shall be responsible for the layout of the duct work, piping, and conduit based on the reference lines and bench marks established.

PART 3.00 - EXECUTION

3.01 COORDINATION OF SUBMITTALS

A. Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including the following procedures:

1. Determine and verify all field dimensions and conditions, materials, catalog numbers and similar data.

2. Coordinate as required with all trades and with public agencies involved.

3. Secure all necessary approvals from public agencies and others and signify by stamp, or other means, that they have been secured.

4. Clearly indicate all deviations from the Contract Documents.

B. Unless otherwise specifically permitted by the Architect, make all submittals in groups containing all associated items; the Architect may reject partial submittals as not complying with the provisions of the Contract Documents.

END OF SECTION 01300

SECTION 01400

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality-control services.

B. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

E. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies requirements for development of a schedule of required tests and inspections.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.
2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.

B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.
2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
4. Provide facilities for storage and curing of test samples.
5. Deliver samples to testing laboratories.
6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Provide security and protection of samples and test equipment at the Project Site.

D. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in

individual Sections shall cooperate with the Architect and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.4 SUBMITTALS

A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:

    a. Date of issue.
    b. Project title and number.
    c. Name, address, and telephone number of testing agency.
    d. Dates and locations of samples and tests or inspections.
    e. Names of individuals making the inspection or test.
    f. Designation of the Work and test method.
    g. Identification of product and Specification Section.
    h. Complete inspection or test data.
    i. Test results and an interpretation of test results.
    j. Ambient conditions at the time of sample taking and testing.
    k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
    l. Name and signature of laboratory inspector.

m. Recommendations on retesting.

1.5 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are pre-qualified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 01400

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:

1. Division 1 Section "Allowances" for products selected under an allowance.
2. Division 1 Section "Alternates" for products selected under an alternate.
3. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
4. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility**,** except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service

performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:

    a. Specification Section number and title.
    b. Generic name used in the Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.
    g. Projected delivery date or time span of delivery period.
    h. Identification of items that require early submittal approval for scheduled delivery date.

3. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

4. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. Substitution Requests: Submit three copies of each request for consideration no later than 5 business days prior to bid opening. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided at end of Section.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    j. Cost information, including a proposal of change, if any, in the Contract Sum.
    k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system,

complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.

    a. Substitutions may be considered**,** unless otherwise indicated.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

    a. Substitutions may be considered, unless otherwise indicated.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

    a. Substitutions may be considered, unless otherwise indicated.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a

product by one of the manufacturers listed that complies with requirements.

a. Substitutions may be considered, unless otherwise indicated.

5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product[**s**]" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

   a. Substitutions may be considered, unless otherwise indicated.

9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.

   a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

11. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received no later than 5 business days prior to bid opening. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is

uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

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Advancement of Construction Technology

SUBSTITUTION REQUEST

(After the Bidding Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

September 1996
CSI Form 13.1A

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

_____

_____

_____

_____

_____

_____

SECTION 01770

CONTRACT CLOSEOUT

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 WORK INCLUDED

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the contract closeout, including, but not limited to, the following:

1. Punch list.
2. Final cleaning.
3. Warranties.
4. Operating and maintenance data.
5. Project record documents.
6. Waiver of Release of Liens from All Suppliers and Sub-Contractors
7. Certificate of Occupancy.

1.03 RELATED WORK

A. Submittals - Section 01330.

B. *Agreement*.

1.04 PUNCH LIST

A. Contractor:

1. Submit written declaration to Architect that project is substantially complete.

2. Submit list of items to be completed or corrected.

B. Owner, Construction Manager and Architect will make preliminary inspection after receipt to Contractor's declaration.

C. Should Owner, Architect, and/or Construction manager consider that work is substantially complete:

1. Architect will prepare a punch list of items to be completed or corrected, as determined by the inspection.

2. Architect will prepare and issue a Certificate of Substantial Completion, containing:

a. Date of substantial completion.

b. Punch list of items to be completed or corrected.

c. The time within which Contractor shall complete or correct work of listed items.

d. Date or time Owner will assume possession of work or designated portion thereof.

D. Contractor: Complete work listed for completion or correction, within designated time.

1.05 FINAL INSPECTION

A. Contractor shall submit written declaration to Owner, Architect and Construction Manager that:

1. All aspects of Contract Documents have been complied with.

2. All items on substantial completion punch list have been completed.

3. All tools, construction equipment, and surplus materials have been removed from site.

B. Contractor with Owner, Architect, and Construction Manager will make final inspection to ensure completion of all contract requirements.

C. When Owner, Architect and Construction Manager consider that work is finally complete in accordance with Contract Document requirements, the Architect will prepare and process closeout documents.

1.06 FINAL CLEANING

A. The Contractor shall be responsible for final cleaning. The building shall be prepared for occupancy by a thorough cleaning throughout, including washing (or cleaning by other approved methods) of surfaces on which dirt or dust has collected, and by washing glass on both sides. Wash exterior glass using a window cleaning contractor specializing in such work. Provide and maintain adequate runner strips of non-staining reinforced Kraft building paper on finished floors as required for protection. Leave equipment in an undamaged, bright, clean, and polished condition. Re-cleaning will not be required after the work has been inspected and accepted unless later operations of the Contractor make re-cleaning of certain portions necessary.

B. Employ experienced workmen or professional cleaners for final cleaning.

C. In preparation for Substantial Completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces.

D. Remove grease, dirt, dust, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.

E. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.

F. Broom clean paved surfaces; rake clean "landscaped" grounds.

G. Clean ducts, blowers and coils.

1.07 DOCUMENTS REQUIRED PRIOR TO FINAL PAYMENT

A. Prior to final payment, and before the issuance of a final certificate of payment, the Contractor shall file the following papers with the Architect:

1. Warranties: The warranty required by the *Agreement* and any other extended warranties stated in the technical Sections of the Specifications.

2. Release of liens from contractor and all entitles of contractor.

3. Consent of Surety to Final Payment.

4. Contractor's Affidavit of Release of Liens (AlA G706A).

5. Contractors Affidavit of Payment of Debts and Claims (AIA G706)

6. Certification of Payment of Prevailing Wage Rates (If applicable).

7. Contractor's certified statement that no asbestos containing material was incorporated into the project.

8. Operation and Maintenance Manuals:

    a. Furnish complete set of manuals in PDF format containing the manufacturer's instructions for maintenance and operation of each item of equipment and apparatus furnished under the contract and any additional data specifically required under the various Sections of the Specifications. Refer to Section 01330 - Submittals, for further requirements.

9. Project Record Documents:

    a. As the work progresses, keep a complete and accurate record of changes or deviations from the Contract Documents and the shop drawings, indicating the work as actually installed. Changes shall be neatly and correctly shown on the respective portion of the affected document, using blackline prints of the drawings affected, or the specifications, with appropriate supplementary notes. This record set of drawings, shop drawings, and specifications shall be kept at the job site for inspection by the Architect and Owner.

    b. The records above shall be arranged in order, in accordance with the various sections of the Specifications, and properly indexed. At the completion of the work, certify by endorsement thereof that each of the revised prints of the drawings and Specifications is complete and accurate. Prior to application for final payment, and as a condition to its approval by the Architect and Owner, deliver the record drawings and specifications, arranged in proper order, indexed, and endorsed as hereinbefore specified. Provide suitable transfer cases and deliver the records therein, indexed and marked for each division of the work.

    c. No review or receipt of such records by the Architect or Owner shall be a waiver of any deviation from the Contract Documents or the shop drawings or in any way relieve the Contractor from his responsibility to perform the work in accordance with the Contract Documents and the shop drawings to the extent they are in accordance with the Contract

Documents.

10. Certificate of Occupancy: The Contractor shall obtain a Certificate of Occupancy and pay for these certificates and deliver them to the Architect.

1.08 EQUIPMENT SYSTEMS DEMONSTRATION

A. Upon completion of the work and tests, instruct the Owner's Representative in the operation, adjustment and maintenance of systems and equipment furnished.

B. The Owner will determine date of starting the instruction. The respective Subcontractor shall provide instructions for each system installed.

PART 2.00 - PRODUCTS

(Not Used)

PART 3.00 - EXECUTION

(Not Used)

END OF SECTION 01770

MECHANICAL SYMBOL LIST

DUCTWORK

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

- SINGLE LINE DUCTWORK OR EQUIPMENT – NEW
- SINGLE LINE DUCTWORK OR EQUIPMENT – EXISTING
- DUCTWORK TO BE REMOVED
- DUCTWORK WITH ACOUSTIC LINING
- DUCT UNDER POSITIVE PRESSURE (SUPPLY AIR OR FAN DISCHARGE)
- DUCT UNDER NEGATIVE PRESSURE (RETURN OR OUTSIDE AIR)
- DUCT UNDER NEGATIVE PRESSURE (EXHAUST)
- VD — VOLUME DAMPER
- FD — FIRE DAMPER AND ACCESS DOOR
- BDD — BACK DRAFT DAMPER
- M — AUTOMATIC DAMPER (ELECTRIC)
- P — AUTOMATIC DAMPER (PNEUMATIC)
- M FSD — COMBINATION SMOKE AND FIRE DAMPER (ELECTRIC) AND ACCESS DOOR
- P FSD — COMBINATION SMOKE AND FIRE DAMPER (PNEUMATIC) AND ACCESS DOOR
- $\mathcal{E}$ OR CFM — CUBIC FEET PER MINUTE
- Ø — DIAMETER
- CD–A 400$ — TYPE A CEILING DIFFUSER 400 CFM SUPPLY AIR
- CR–A 400$ CE–A 400$ — TYPE A CEILING RETURN GRILLE/CEILING EXHAUST GRILLE, 400 CFM RETURN/EXHAUST AIR
- 10x6 150$ — 10" BY 6" REGISTER, 150 CFM SUPPLY AIR TRS – TOP SUPPLY REGISTER BRS – BOTTOM SUPPLY REGISTER
- 10x6 150$ — 10" BY 6" REGISTER, 150 CFM RETURN AIR TGR – TOP RETURN GRILLE BGR – BOTTOM RETURN GRILLE
- 10x6 150$ — 10" BY 6" REGISTER, 150 CFM EXHAUST AIR TGE – TOP EXHAUST GRILLE BGE – BOTTOM EXHAUST GRILLE
- VANED ELBOW (SEE DETAIL) OR RADIUS ELBOW
- RADIUS ELBOW
- FLEXIBLE DUCT
- SEE DUCT DETAILS FOR TYPE OF BRANCH CONNECTION
- DUCT FLEXIBLE CONNECTION
- VERTICAL DUCT DROP (IN DIRECTION OF AIRFLOW)
- VERTICAL DUCT RISE (IN DIRECTION OF AIRFLOW)
- T — THERMOSTAT
- H — HUMIDISTAT
- SD — SMOKE DETECTOR

GENERAL

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

- POINT OF CONNECTION
- POINT OF DISCONNECTION
- DDCP — DIRECT DIGITAL CONTROL PANEL

PIPING

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

- NEW PIPE WITH DIRECTION OF FLOW
- EXISTING PIPING
- EXISTING PIPING TO BE REMOVED
- PIPE DROP
- PIPE RISE
- U D — PITCH UP/ DOWN IN DIRECTION OF FLOW
- UNION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER – FLAT BOTTOM
- ECCENTRIC REDUCER – FLAT TOP
- FLANGED CONNECTION
- DEAD END – SCREWED CAP
- DEAD END – WELDED CAP
- GATE VALVE
- GLOBE VALVE
- NEEDLE VALVE COCK
- DRAIN VALVE
- LOCK SHIELD VALVE
- CHECK VALVE, SWING OR LIFT
- S — SILENT CHECK (NON–SLAM) VALVE
- FLEXIBLE CONNECTOR
- BUTTERFLY VALVE
- BALL VALVE
- SQUARE HEAD COCK
- BALANCING VALVE
- PLUG VALVE (TYPE AS NOTED)
- AUTOMATIC CONTROL VALVE
- THREE–WAY AUTOMATIC CONTROL VALVE
- FLOW CONTROL VALVE
- S — SOLENOID VALVE
- M — ELECTRIC MOTORIZED VALVE OPERATOR
- "Y" TYPE STRAINER WITH BLOWOFF VALVE AND CAP
- SINGLE BASKET STRAINER
- AUTOMATIC AIR VENT
- MANUAL AIR VENT
- THERMOMETER WELL
- THERMOMETER AND WELL
- PUMP
- PSD — PUMP SUCTION DIFFUSER
- FM — FLOW METER
- A — AQUASTAT
- FS — FLOW SWITCH
- TS — TEMPERATURE SWITCH
- PS — PRESSURE SWITCH
- HWR — HOT WATER RETURN
- HWS — HOT WATER SUPPLY

ABBREVIATIONS

(NOT ALL ABBREV. ARE NECESSARILY USED ON THIS PROJECT)

A	AMPERES
AC	AIR CONDITIONING
ACCU	AIR COOLED CONDENSING UNIT
ACS	AUTOMATIC CONTROL SYSTEM
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
CC	COOLING COIL
CCW	COUNTER CLOCKWISE
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
COND	CONDENSATE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CW	CLOCKWISE
DB	DRY BULB
DX	DIRECT EXPANSION
DN	DOWN
(E)	EXISTING TO REMAIN
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB TEMPERATURE
EQ	EQUAL
(ER)	EXISTING TO BE REMOVED
(ERR)	EXISTING TO BE REMOVED & RELOCATED
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
°F	DEGREES FAHRENHEIT
FA	FREE AREA (SQ.FT.)
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FLA	FULL LOAD AMPERES
FPM	FEET PER MINUTE
FT	FEET
FV	FACE VELOCITY
GPM	GALLONS PER MINUTE
H	HUMIDIFIER
HC	HEATING COIL
HD	HEAD
HR	HOUR
HT	HEIGHT
HWP	HOT WATER PUMP
HV	HEATING AND VENTILATING
IN	INCH OR INCHES
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LDB	LEAVING DRY BULB TEMPERATURE
LF, LIN.FT.	LINEAR FEET
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MB	MIXING BOX
MBH	THOUSAND BTU PER HOUR
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MOT	MOTOR
MOV	MOTOR OPERATED VALVE
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO.	NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
P	PUMP
PD	PRESSURE DROP
PHC	PREHEAT COIL
PSI	POUNDS PER SQUARE INCH
PSIA	PSI ABSOLUTE
PSIG	PSI GAUGE
RA	RETURN AIR
(RE)	RELOCATED EXISTING
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SF	SUPPLY FAN
SP	STATIC PRESSURE
T	THROAT
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VOLTS
W	WIDTH
W/	WITH
W/O	WITHOUT
WB	WET BULB
WG	WATER GAUGE
WMS	WIRE MESH SCREEN

GENERAL NOTES

1. GENERAL NOTES, SYMBOL LIST AND DETAILS ARE APPLICABLE TO ALL HVAC/MECHANICAL DRAWINGS.
2. ALL WORK IS NEW UNLESS OTHERWISE NOTED.
3. DRAWINGS ARE DIAGRAMMATIC. DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD. RELOCATE EXISTING WORK THAT INTERFERES WITH WORK OF THIS CONTRACT.
4. COORDINATE THIS WORK WITH THAT OF OTHER TRADES.
5. DIMENSIONS SHOWN ON PLAN ARE HORIZONTAL. DIMENSIONS SHOWN IN ELEVATION ARE VERTICAL EXCEPT IN WAY OF STRUCTURAL STEEL, DIMENSIONS ARE MEASURED PERPENDICULAR TO FLANGE.
6. NEITHER ACCURACY NOR COMPLETION OF SERVICES AND UTILITY LOCATIONS SHOWN ON DRAWINGS IS GUARANTEED. DETERMINE EXACT LOCATIONS OF EXISTING SERVICES AND UTILITIES IN FIELD, WHETHER OR NOT SHOWN ON DRAWINGS. EXERCISE CAUTION AND IDENTIFY LOCATIONS OF UNMARKED UTILITY LINES AS NECESSARY TO PERFORM WORK OF THIS SECTION.
7. MANUFACTURERS MODEL NUMBERS ARE SPECIFIED SOLELY TO ESTABLISH STANDARDS OF QUALITY FOR PERFORMANCE AND MATERIALS.
8. PRODUCT INSTALLATION SHALL ADHERE TO MANUFACTURERS RECOMMENDATIONS.
9. PROVIDE ACCESS PANELS FOR EQUIPMENT THAT REQUIRES PERIODIC SERVICE.
10. PROVIDE HANGERS, INSERTS, ANCHORS, SUPPLEMENTAL STEEL & SUPPORTS AS REQUIRED TO SUPPORT DUCTWORK, PIPING AND EQUIPMENT FROM STRUCTURE.
11. SCHEDULE WORK OF THIS SECTION TO AVOID INTERFERING WITH EXISTING OPERATIONS IN THE FACILITY.
12. COORDINATE ROOF PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. MECHANICAL CONTRACTOR TO NOTIFY OWNER PRIOR TO STARTING WORK TO VERIFY COMPLIANCE WITH BOND AND WARRANTY OF EXISTING ROOF.
13. RUN DUCTS AND PIPING CONCEALED, UNLESS OTHERWISE SPECIFIED AND CLEAR OF CEILING INSERTS.
14. INSTALL THERMOSTATS 4'–6" ABOVE FINISHED FLOOR OR AS DIRECTED OTHERWISE BY ARCHITECT.
15. STRUCTURAL WELDING SHALL BE CONTINUOUS 1/4" FILLET UNLESS REQUIRED OTHERWISE.

AIR SYSTEMS

16. AIR SYSTEMS REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES.
17. INTERNAL AIRFLOW DIMENSIONS ARE SHOWN FOR DUCTS. INCREASE DUCT SIZE AS NECESSARY TO MAINTAIN FREE FLOW AREA INDICATED.
18. USE FLAT TRANSVERSE SEAM FOR DUCTWORK WHERE SPACE AVAILABLE DICTATES.
19. PROVIDE VOLUME DAMPERS OR OTHER APPROVED BALANCING DEVICES AT DUCT BRANCHES AND RUN OUTS, AND AT REGISTER GRILLE AND DIFFUSER NECKS IN SUPPLY, RETURN AND EXHAUST DUCTWORK WHETHER SHOWN OR NOT.
20. DUCTWORK DOWNSTREAM OF ALL FANS SHALL BE ACOUSTICALLY LINED WITH 1" ACOUSTICAL LINING FOR A MINIMUM OF 10 FEET.
21. PROVIDE 36" CLEARANCE IN FRONT OF ALL ELECTRIC CONTROL PANELS PER N.E.C. AND MFG. REQUIREMENTS.

DEMOLITION NOTES

1. GENERAL
   - A. THIS CONTRACTOR SHALL VISIT THE SITE AND ADJOINING AREAS AND EXAMINE THE EXISTING CONDITIONS TO BECOME FAMILIAR WITH THEM AND TO DETERMINE THE DIFFICULTIES WHICH WILL AFFECT THE EXECUTION OF THE WORK OF THIS CONTRACT. THIS CONTRACTOR SHALL PERFORM THIS PRIOR TO THE SUBMISSION OF HIS PROPOSAL. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
   - B. THE DEMOLITION WORK SHALL INCLUDE, PROVIDING ALL MATERIALS, ALL NECESSARY EXTENSIONS, CONNECTIONS, CUTTING, REPAIRING, ADAPTING AND OTHER MECHANICAL WORK REQUIRED, TOGETHER WITH ANY REQUIRED TEMPORARY CONNECTIONS TO MAINTAIN SERVICE PENDING THE COMPLETION OF THE PERMANENT WORK. NOTES AND GRAPHIC REPRESENTATION SHALL NOT LIMIT THE EXTENT OF DEMOLITION REQUIRED. EXTENT OF DEMOLITION WORK SHALL BE COORDINATED WITH THE ARCHITECT AND BUILDING MANAGEMENT.
   - C. REFER TO ARCHITECTS PLANS FOR AREA OF WORK.
2. SCOPE OF WORK
   - A. EXISTING WORK INTERFERING WITH NEW.
     1) ALL EXISTING WORK REQUIRED TO REMAIN BUT INTERFERING WITH PROPOSED NEW MECHANICAL (AS WELL AS ELECTRICAL AND GENERAL CONSTRUCTION WORK) SHALL BE RELOCATED AND RECONNECTED USING MATERIALS CONFORMING TO STANDARDS OF THIS CONTRACT.
   - B. REMOVAL OF MECHANICAL EQUIPMENT DUCTWORK AND PIPING.
     1) REMOVE ALL EXISTING AIR AND WATER COOLED, CEILING AND FLOOR MOUNTED AIR CONDITIONING UNITS AND OUTDOOR HEAT REJECTION DEVICES WITH ALL ASSOCIATED DUCTWORK, TERMINAL BOXES, DIFFUSERS, GRILLES, HANGERS AND ACCESSORIES.
     2) EXISTING STEEL DUNNAGE UNDER DRYCOOLERS TO REMAIN.
     3) REMOVE ALL EXHAUST, RETURN AND TRANSFER FANS AND ASSOCIATED DUCTWORK.
     4) REMOVE ALL PIPING, VALVING AND HANGERS ASSOCIATED WITH PIPING TO BE REMOVED BACK TO MAINS. IDENTIFY ALL PIPING BY SERVICE TYPE AND CAP AT MAINS.
     5) REMOVE ALL PUMPS, VALVES AND ASSOCIATED ACCESSORIES.
        a) REMOVE ALL STARTERS, DISCONNECT SWITCHES, MOTORS, CONTROL (BOTH TEMPERATURE AND SYSTEM CONTROL) BACK TO MAIN PANELS AND CAP AT PANEL. COORDINATE WITH ELECTRICAL CONTRACTOR BEFORE REMOVAL OF ANY ELECTRICAL POWERED EQUIPMENT. ELECTRICAL CONTRACTOR IS TO DISCONNECT ALL POWER TO SUCH EQUIPMENT.
   - C. REMOVAL OF DUCTWORK AND ACCESSORIES
     1) REMOVE ALL SUPPLY AIR, RETURN AIR AND EXHAUST AIR DUCTWORK WITH ALL ASSOCIATED DIFFUSERS, TERMINAL BOXES, CONTROLS, COLLARS, DAMPERS, RETURN/EXHAUST GRILLES AND CONTROLS BACK TO THE EXISTING SUPPLY AND RETURN AIR SHAFTS, OR AS NOTED ON DRAWINGS.
     2) CONTRACTOR TO CONTACT BUILDING MANAGEMENT AND TENANT REGARDING DUCTWORK REMOVAL SCOPE OF WORK TO ENSURE THAT OTHER TENANTS THAT ARE TO STAY OPERATIONAL ARE NOT AFFECTED BY REMOVALS OF THE BASE BUILDING DUCTWORK.
     3) ALL EXISTING BUILDING FIRE DAMPERS, FIRE/SMOKE DAMPERS, DUCT MOUNTED SMOKE DETECTORS AT SUPPLY AND RETURN AIR SHAFTS TO REMAIN.
   - D. PERIMETER SERVICES
     1) REMOVE PERIMETER AIR CONDITIONING UNITS AND/OR HEATING ELEMENTS, AS NOTED. REMOVE PIPING, FITTINGS, VALVES, DUCTS AND INSULATION FOR ALL EQUIPMENT TO BE REMOVED BACK TO MAIN AND CAP. PATCH AND CAP EXISTING AS REQUIRED FOR CONTINUED OPERATION.
     2) LEAVE ALL BUILDING FREEZE PROTECTION SPACE HEATING INTACT.
   - F. CONTRACTOR TO REPLACE/ PATCH WALLS AND FLOORS TO MATCH EXISTING.
   - G. PROVIDE ADDITIONAL SUPPORT FOR ALL EXISTING DUCTS AND PIPING TO REMAIN WHICH ARE AFFECTED BY DEMOLITION OF EXISTING CEILING AND PARTITIONS.
   - H. EQUIPMENT REQUIRED TO BE TURNED OVER TO THE OWNER SHALL BE PLACED IN A MUTUALLY ACCEPTABLE LOCATION. ALL MATERIALS AND EQUIPMENT REMOVED AS A RESULT OF DEMOLITION SHALL BE TAKEN FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND ENVIRONMENTAL REGULATIONS.
   - I. CONTRACTOR SHALL IDENTIFY ALL EXISTING WORK TO REMAIN BY ACCEPTABLE IDENTIFICATION MEANS TO CONFIRM PROPER SCOPE PRIOR TO COMMENCEMENT OF DEMOLITION.

HVAC EQUIPMENT DESIGNATIONS

XXX–XX–XX
- EQUIPMENT TAG NUMBER
- FLOOR DESIGNATION
- EQUIPMENT DESIGNATION (REFER TO SPECIFIC TRADE LIST)

ACU–2–3
- UNIT NUMBER 3
- SECOND FLOOR
- AIR CONDITION UNIT (REFER TO LIST)

DRAWING INDEX

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Mechanical Upgrades:

Eli Whitney School
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Stratford, CT

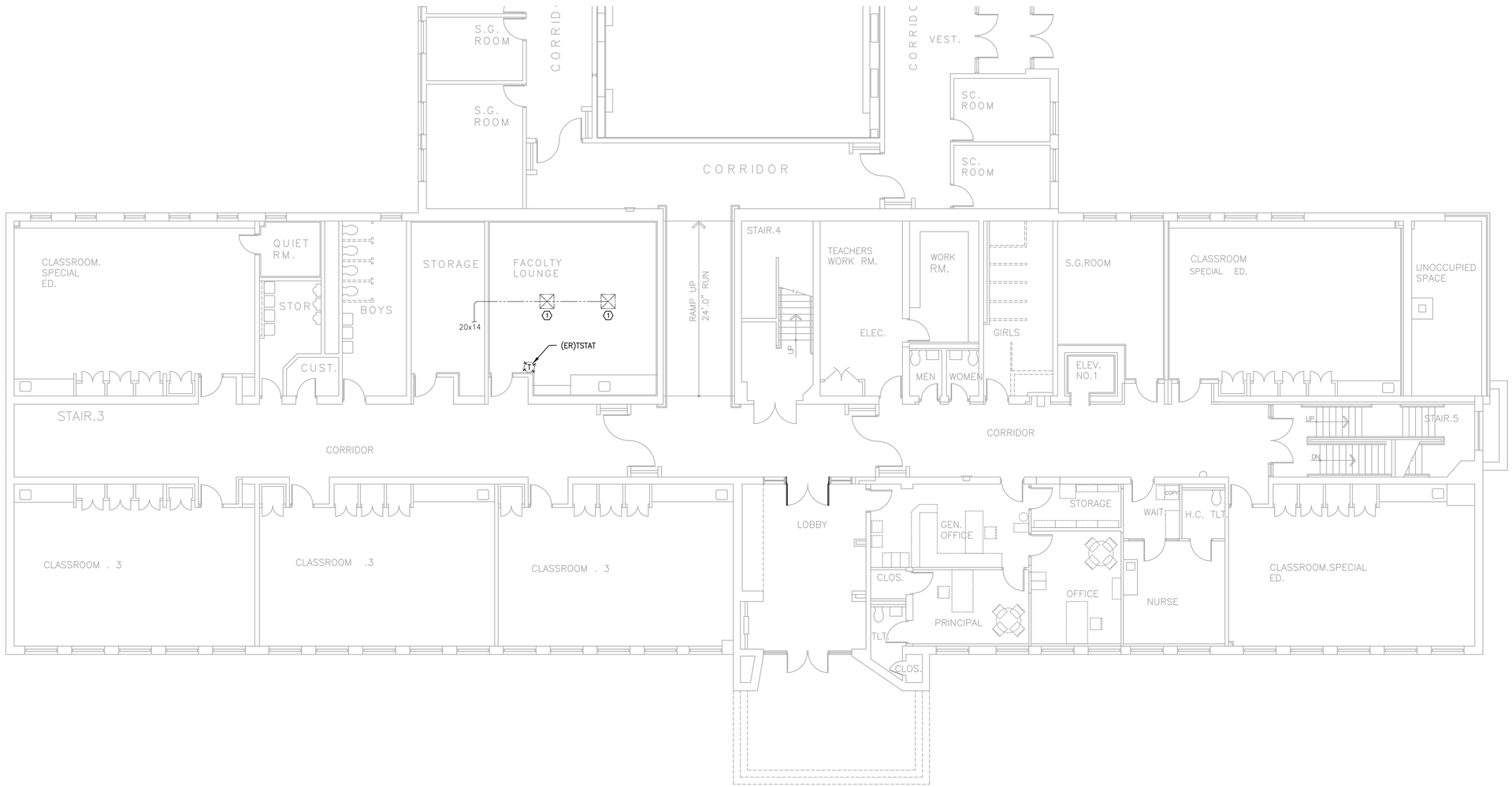
Drawing Title

MECHANICAL COVER SHEET

Issued	03/05/2019
Scale	NTS
Job No.	183171–000
Drawing No.	M-000

KEY NOTES:

(1) PRIOR TO ANY REMOVALS, CONTRACTOR TO TAKE PRE-CONSTRUCTION AIRFLOW READINGS AT THE CEILING DIFFUSER LOCATION(S) SHOWN ON PLAN AND FOR ALL EXISTING SUPPLY AIR DUCTWORK MAINS IN THE AREA OF WORK. READINGS SHALL INCLUDE CFM, STATIC PRESSURE & AIR TEMPERATURE. SUBMIT RESULTS TO ENGINEER FOR REVIEW.



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Drawing Title

MECHANICAL PARTIAL FIRST FLOOR PLAN - DEMOLITION

Issued 03/05/2019	Drawing No. M-100
Scale 1/8"=1'-0"	
Job No. 183171-000	

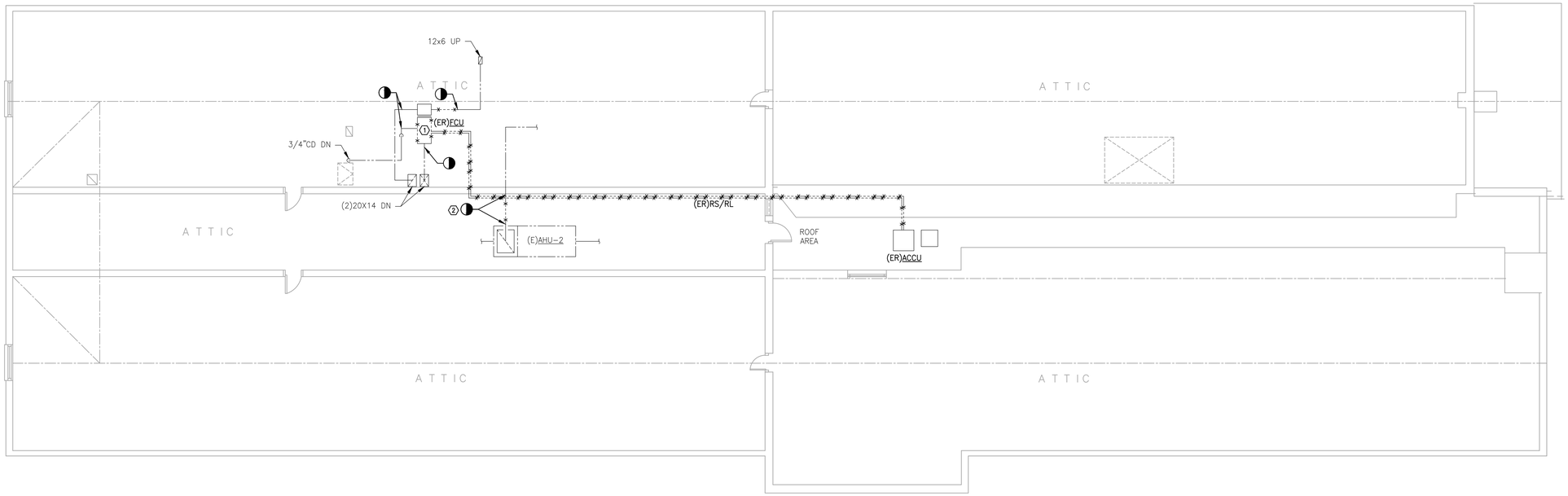
DRAWING NOTES:

1. REMOVE ALL ABANDONED WIRING AND PIPING ASSOCIATED WITH EQUIPMENT DEMOLITION.
2. PATCH ANY UNUSED PENETRATIONS.

KEY NOTES:

(1) REMOVE EXISTING FAN COIL UNIT AND DRAIN PAN. DISCONNECT ASSOCIATED SUPPLY, RETURN, AND OUTSIDE AIR DUCT AS SHOWN. DISCONNECT WIRING, REFRIGERANT LINES AND CONDENSATE PIPING. PROTECT DUCTWORK AND ACCESSORIES FOR RECONNECTION.

(2) TEMPORARILY DISCONNECT THE INDICATED 4' SECTION OF DUCT FROM PLENUM TO ALLOW THE REPLACEMENT FAN COIL UNIT (FCU-1) TO BE PASSED THROUGH.



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■ Drawing Title

MECHANICAL ATTIC FLOOR PLAN - DEMOLITION

Issued: 03/05/2019	Drawing No. M-101
Scale: 1/8"=1'-0"	
Job No.: 183171-000	

DRAWING NOTES:

1. PRIOR TO ANY REMOVALS, CONTRACTOR TO TAKE PRE-CONSTRUCTION AIRFLOW READINGS AT ALL EXISTING SUPPLY AIR DUCTWORK MAINS IN THE AREA OF WORK. READINGS SHALL INCLUDE CFM, STATIC PRESSURE & AIR TEMPERATURE. SUBMIT RESULTS TO ENGINEER FOR REVIEW.

KEY NOTES:

(1) REMOVE EXISTING HV-1 AND DISCONNECT ASSOCIATED SUPPLY RETURN AIR DUCTS. DISCONNECT WIRING AND HOT WATER PIPING. PROTECT PIPING, WIRING, DUCTWORK, AND ACCESSORIES FOR RECONNECTION.

(2) ADD-ALTERNATE #1:

REMOVE EXISTING HV-2 AND DISCONNECT ASSOCIATED SUPPLY RETURN AIR DUCTS. DISCONNECT WIRING AND HOT WATER PIPING. PROTECT PIPING, WIRING, DUCTWORK, AND ACCESSORIES FOR RECONNECTION.

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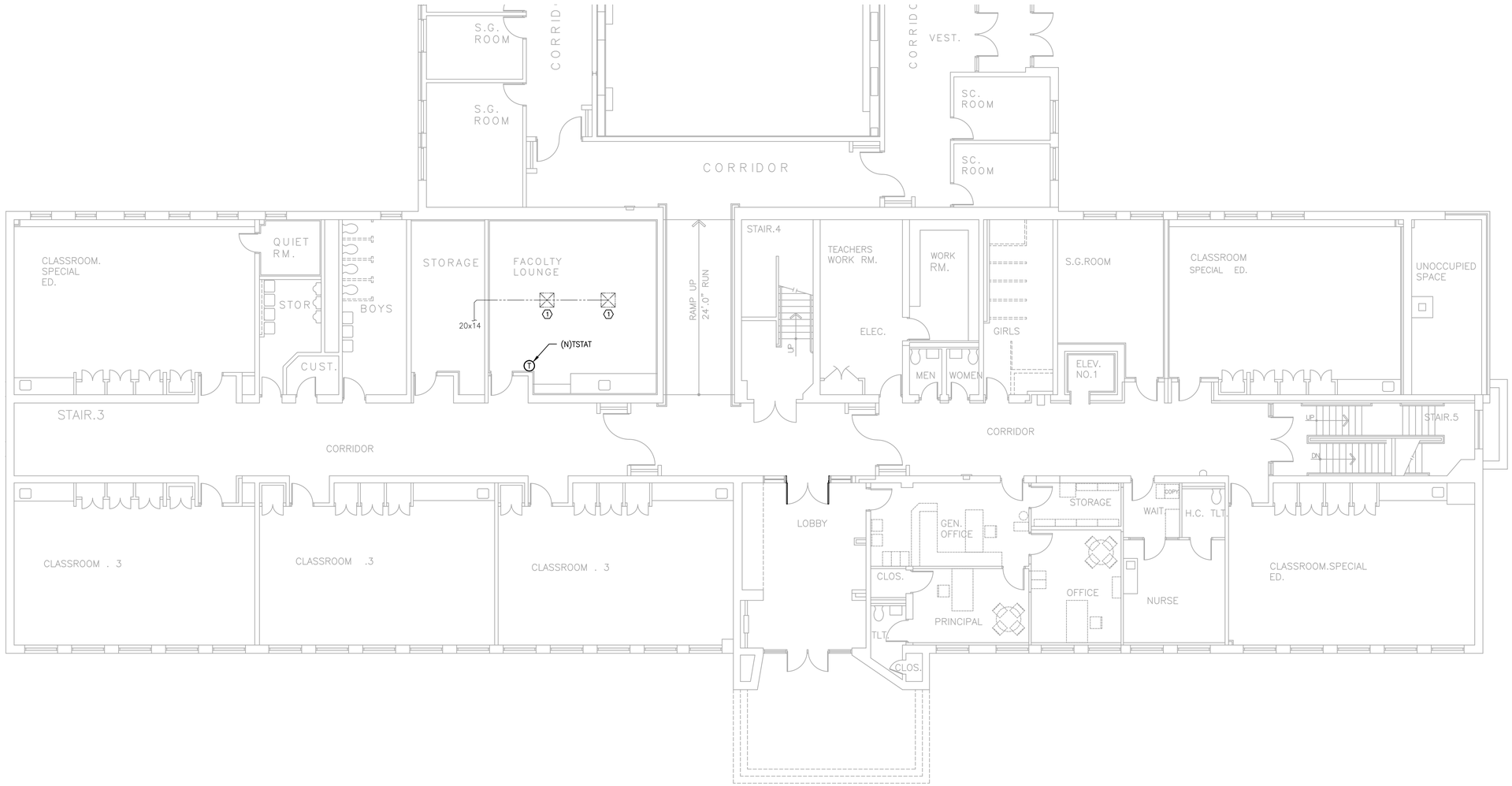
Drawing Title

MECHANICAL ROOF PLAN - DEMOLITION

Issued 03/05/2019	Drawing No. M-102
Scale 3/32"=1'-0"	
Job No. 183171-000	

KEY NOTES:

(1) RE-BALANCE ALL SUPPLY AIR DIFFUSERS TO PRE-BALANCE AIRFLOW READINGS UNLESS NOTED OTHERWISE.



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Drawing Title

MECHANICAL PARTIAL FIRST FLOOR PLAN - DUCTWORK

Issued 03/05/2019	Drawing No. M-200
Scale 1/8"=1'-0"	
Job No. 183171-000	

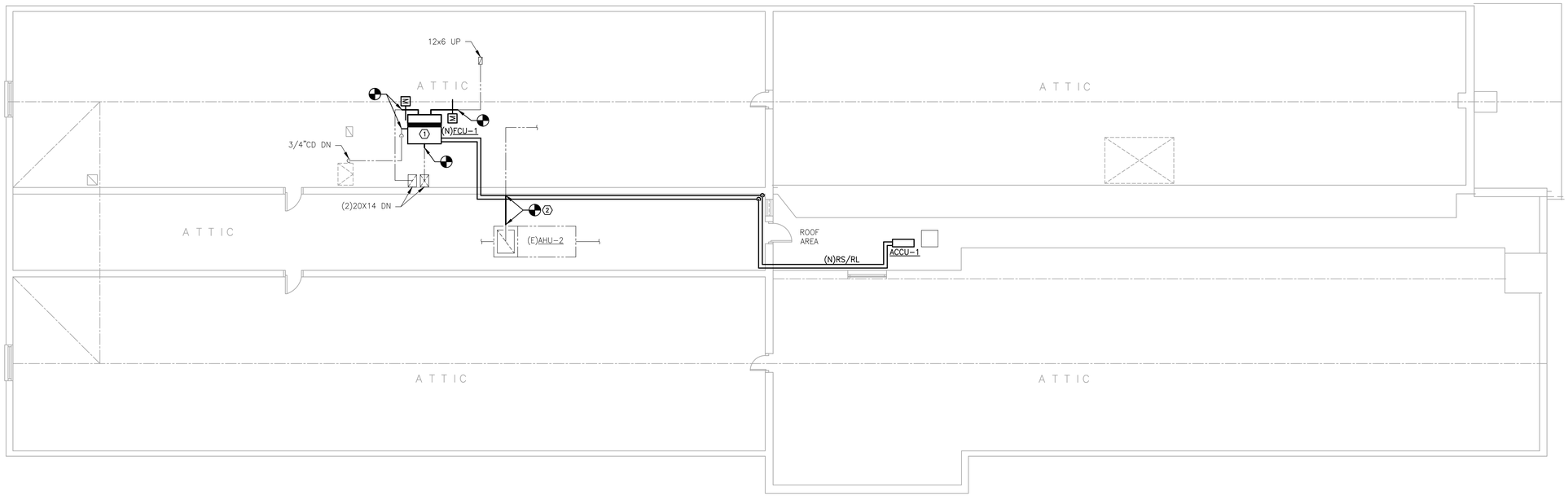
DRAWING NOTES:

1. AFTER COMPLETION OF NEW WORK, CONTRACTOR SHALL RE-BALANCE ALL SUPPLY AIR DIFFUSERS DOWNSTREAM/UPSTREAM OF THE POINT OF NEW CONNECTION TO PRE-BALANCE AIRFLOW READINGS UNLESS NOTED OTHERWISE.

KEY NOTES:

(1) REFER TO SCHEDULE ON M-300. RECONNECT TO EXISTING DUCTWORK, PIPING, AND ACCESSORIES.

(2) RECONNECT DUCT TO MATCH EXISTING CONDITION.



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Drawing Title

MECHANICAL ATTIC FLOOR PLAN - DUCTWORK

Issued 03/05/2019	Drawing No. M-201
Scale 1/8"=1'-0"	
Job No. 183171-000	

KEY NOTES:

1. PROVIDE REPLACEMENT IN KIND. REFER TO SCHEDULE ON M-300. RECONNECT TO EXISTING DUCTWORK, PIPING, AND ACCESSORIES. PROVIDE CURB ADAPTER AS REQUIRED.

2. ADD-ALTERNATE #1:

   PROVIDE REPLACEMENT IN KIND. REFER TO SCHEDULE ON M-300. RECONNECT TO EXISTING DUCTWORK, PIPING, AND ACCESSORIES. PROVIDE CURB ADAPTER AS REQUIRED.

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Drawing Title

MECHANICAL ROOF PLAN - DUCTWORK

Issued: 03/05/2019	Drawing No.: M-202
Scale: 3/32"=1'-0"	
Job No.: 183171-000	

SPLIT AIR COOLED CONDITIONING UNIT SCHEDULE

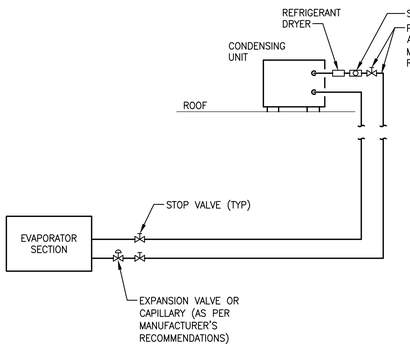
AIR HANDLING UNIT No.	LOCATION	SERVICE	TOTAL COOLING (MBH)	SENSIBLE COOLING (MBH)	EVAPORATOR COIL CONDITIONS			SUPPLY FAN			ELECTRICAL DATA			AHU MCA	AHU OPER. WEIGHT (LBS)	UNIT DIMENSIONS			MANUF. MODEL #	CONDENSING UNIT No.	CONDENSING UNIT								COND. WEIGHT (LBS)	UNIT DIMENSIONS			MANUF. MODEL #	REMARKS
					CFM	ENT. AIR DB/WB (°F)	LVG. AIR DB/WB (°F)	EXT. SP (IN. W.G.)	MOTOR W	RPM	VOLTS	PHASE	HZ			LENGTH (FT–IN)	WIDTH (FT–IN)	HEIGHT (FT–IN)			COMPRESSOR			EXT. SP (IN. W.G.)	ELECTRICAL DATA			COMPRESSOR MCA / MOCP					
																				QUANTITY	TYPE	LRA/RLA (EA.)		VOLTS	PHASE	HZ				LENGTH (FT–IN)	WIDTH (FT–IN)	HEIGHT (FT–IN)		
FCU–1	ATTIC	LOUNGE	40.5	31.6	1377	74	55	0.8	350	–	208	1	60	3.4	102	55–1/8	24–13/16	9–5/8	DAIKIN FBQ42PVJU	ACCU–1	1	–	–	–	208	1	60	27 / 30	283	35–7/16	13–9/16	52–15/16	DAIKIN RZR42PVJU8	SEE NOTES

NOTES:
1. PROVIDE MERV 7 FILTER.
2. PROVIDE STAINLESS STEEL DRAIN PAN.
3. REFRIGERANT PIPING SHALL BE SIZED BASED ON MANUFACTURERS RECOMMENDATIONS.
4. PROVIDE DISCONNECT SWITCH BY ELECTRICAL CONTRACTOR.
5. BUILT–IN CONDENSATE PUMP.

ROOFTOP UNIT SCHEDULE

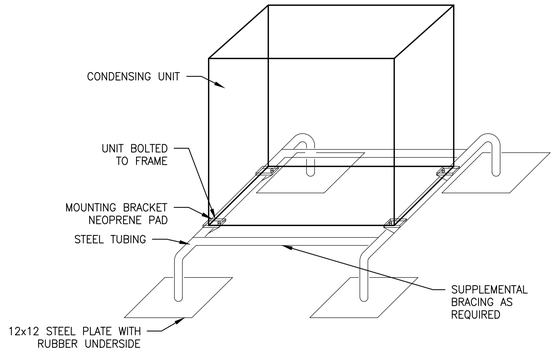
UNIT No.	LOCATION	SUPPLY FAN DATA						RETUR/ SPILL FAN DATA						HEATING DATA										UNIT ELECTRICAL DATA					UNIT DIMENSIONS					
														HOT WATER COIL DATA																				
		CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	WHEEL DIAMETER	CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	DRIVE TYPE	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	No. OF COILS	P.D. (FT)	TOTAL MBH	EAT (°F)	LAT (°F)	FPI	No. OF ROWS	FACE VELOCITY (FPM)	MAXIMUM AIR P.D. (IN W.G.)	VOLTS	PHASE	HZ	MCA	MROPD	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	OPERATING WT. (LBS)	MANUF. MODEL #	REMARKS
HV–1	ROOF	7100	2	1186	6.75	7.5	15"	7200	0.75	871	4.16	5	BELT	180	140.5	13.1	1	2.6	258.5	46	79.3	10	1	592	0.22	208	3	60	43.6	60	180	68	52	3038	DAIKIN RDS708B	SEE NOTES
HV–2	ROOF	6125	2	1121	5.1	7.5	15"	7200	0.75	871	4.16	5	BELT	180	140.8	11.3	1	1.9	221	46	79	9	1	510	0.16	208	3	60	43.6	60	180	68	52	3036	DAIKIN RDS708B	ADD– ALTERNATE #1, SEE NOTES

NOTES:
1. PROVIDE MERV 8 FILTER FOR UNIT OUTSIDE AIR INTAKE.
2. PROVIDE VARIABLE FREQUENCY DRIVES.
3. PROVIDE DISCONNECT SWITCH BY ELECTRICAL CONTRACTOR.
4. PROVIDE WITH BURGLAR BARS AND LIGHTS.

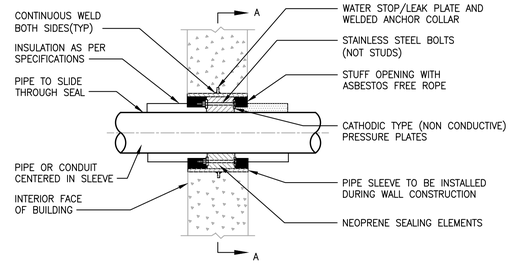


NOTES:
1. CONTRACTOR SHALL SIZE PIPING AS PER MANUFACTURER'S RECOMMENDATIONS FOR ACTUAL INSTALLED LENGTH AND ELEVATION DIFFERENCE BETWEEN CONDENSER AND EVAPORATOR. PROVIDE EXTRA OIL AS REQUIRED.

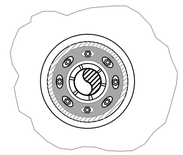
TYPICAL REFRIGERANT PIPING DETAIL



ROOF MOUNTED CONDENSING UNIT

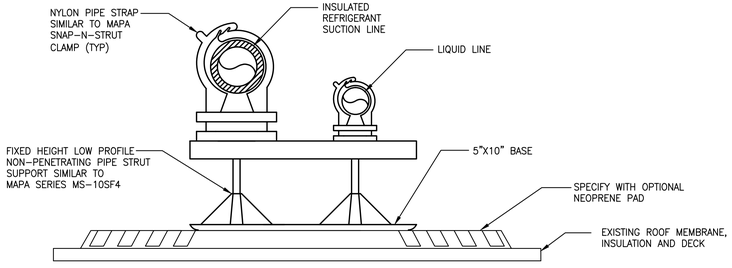


NOTES:
1. WHEN SEALING FLOOR PENETRATIONS, EXTEND SLEEVE 3" ABOVE FINISHED FLOOR.
2. WHEN CORE DRILL IS USED THE PIPE SLEEVE AND WATER STOP/LEAK PLATE ARE NOT REQUIRED.



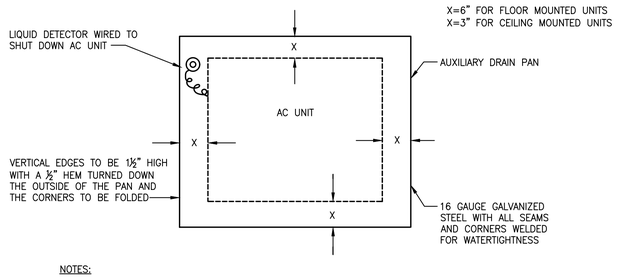
SECTION A–A

EXTERIOR WALL PIPE PENETRATION SEAL ASSEMBLY



NOTE:
1. USE FOR REFRIGERANT PIPING 3" OR SMALLER MAXIMUM SPACING 8'
2. REFRIGERANT PIPE SUPPORTS MUST COMPLY WITH MSS SP–58–2002

REFRIGERANT ROOFTOP PIPING SUPPORT



NOTES:
1. FOR CEILING INSTALLATIONS, SUPPORT AC UNIT AND DRAIN PAN INDEPENDENTLY FROM STRUCTURE OVERHEAD.
2. PITCH DRAIN PAN TO LIQUID DETECTOR. PROVIDE ¾" PLUGGED DRAIN AT LOW POINT.
3. PROVIDE AUXILIARY CONTACT ON LIQUID DETECTOR FOR INTERFACE WITH THE BUILDING MANAGEMENT SYSTEM WHEN SPECIFIED.
4. EXTEND PAN FOR CONTROL VALVE ASSEMBLY AND CONDENSATE PUMP.

AUXILIARY DRAIN PAN FOR AC UNITS

■ Revisions

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MECHANICAL SCHEDULE

Issued	Drawing No.
03/05/2019	M-300
Scale: NTS	
Job No.: 183171–000	

HVAC SPEC

1. GENERAL

A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.

B. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.

C. INVESTIGATE EACH SPACE THROUGH WITH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.

D. DUCTWORK AND PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ARCHITECT. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED.

E. SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL, SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LOADING INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75% OF RATED INSERT CAPABILITY. WHEN SUPPORTING FROM BUILDING USE BEAM CLAMPS IN APPROVED MANNER.

F. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.

G. THIS CONTRACTOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL A PLAN INDICATING THE SIZE (MINIMUM 18 INCH X 18 INCH) AND LOCATION OF ALL ACCESS DOORS REQUIRED FOR OPERATION AND MAINTENANCE OF ALL CONCEALED EQUIPMENT, DEVICES, VALVES, DAMPERS AND CONTROLS. CONTRACTOR SHALL ARRANGE FOR FURNISHING AND INSTALLATION OF ALL ACCESS DOORS IN FINISHED CONSTRUCTION AND INCLUDE COSTS IN THE BID.

H. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.

I. PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO ENSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING OWNER. INSTALL ISOLATION VALVES AT POINT OF CONNECTION TO THE EXISTING PIPING. PROVIDE TEMPORARY DUCT CAPS AND/OR CONNECTIONS TO MINIMIZE SHUTDOWN TIME.

J. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.

K. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.

L. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.

M. SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL.

N. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.

O. ALL PRESENT MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.

P. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

Q. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.

R. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

S. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.

T. REMOVABLE ACCESS TILE AND/OR ACCESS DOOR ARE REQUIRED IN HUNG CEILINGS, SHAFTS AND WALLS FOR ALL VOLUME AND FIRE DAMPERS, AUTOMATIC DAMPERS AND ALL OTHER MECHANICAL EQUIPMENT AND DEVICES. HVAC CONTRACTOR TO FURNISH ACCESS LOCATION REQUIREMENTS TO GENERAL CONTRACTOR. ACCESS TILE IDENTIFICATION: PROVIDE BUTTONS, TABS, AND MARKERS TO IDENTIFY LOCATION OF CONCEALED VALVES, DAMPERS AND EQUIPMENT.

U. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

V. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING DUCTWORK, PIPING (SIZES, CLEARANCES, ETC.) AND CONDITIONS.

W. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

X. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.

Y. GUARANTEE:

1) ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF THIS WORK. FINAL ACCEPTANCE SHALL BE DEFINED AS THE TIME AT WHICH THE MECHANICAL WORK IS TAKEN OVER AND ACCEPTED BY THE OWNER, AND IS UNDER CARE, CUSTODY, AND CONTROL OF THE OWNER. ENGAGE THE SERVICES OF VARIOUS MANUFACTURERS SUPPLYING THE EQUIPMENT FOR THE PROPER STARTUP AND OPERATION OF ALL SYSTEMS INSTALLED. INSTRUCT THE OWNERS PERSONNEL IN THE PROPER OPERATION AND SERVICING OF THE SYSTEM.

2) THE CONTRACTOR SHALL GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN THE GUARANTEE PERIOD. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL INCLUDE RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THIS CONTRACTOR.

3) THIS CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE AND OPERATION OF ALL SYSTEMS UNTIL THE FINAL ACCEPTANCE OF THE WORK.

4) ALL AIR CONDITIONING UNIT COMPRESSORS AND REFRIGERATION COMPONENTS SHALL HAVE A 5-YEAR WARRANTY.

Z. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

AA. DEFINITIONS:

1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

6) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

7) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

2. SCOPE OF WORK

A. THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS AND APPLIANCES NECESSARY FOR THE FURNISHING, INSTALLING AND TESTING, COMPLETE AND READY FOR SAFE OPERATION OF THE SYSTEMS. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.

B. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.

C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES, BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

D. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT PROVIDE COMPLETE SET OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, DUCTWORK, PIPING AND CONTROL SYSTEMS INDICATING CAPACITY DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

E. WITHIN 15 DAYS AFTER AWARD OF CONTRACT, SUBMIT FOR REVIEW, A LIST OF ALL MATERIAL AND EQUIPMENT MANUFACTURER'S PRODUCTS THAT ARE PROPOSED, AS WELL AS NAMES OF ALL SUBCONTRACTORS WHOM THIS TRADE PROPOSES TO UTRILIZE ON THIS PROJECT.

3. SHOP DRAWINGS

A. INDICATE ON EACH SUBMISSION: PROJECT NAME AND LOCATION, ARCHITECT AND ENGINEER, ITEM IDENTIFICATION AND APPROVAL STAMP OF PRIME CONTRACTOR, SUBCONTRACTOR NAMES AND PHONE NUMBERS, REFERENCE TO THE APPLICABLE DESIGN DRAWING OR SPECIFICATION ARTICLE, DATE AND SCALE.

B. THE WORK DESCRIBED IN ALL SHOP DRAWING SUBMISSION SHALL BE CAREFULLY CHECKED FOR ALL CLEARANCES (INCLUDING THOSE REQUIRED FOR MAINTENANCE AND SERVICING), FIELD CONDITIONS, MAINTENANCE OF ARCHITECTURAL CONDITIONS AND PROPER COORDINATION WITH ALL TRADES ON THE JOB.

C. EACH SUBMITTED SHOP DRAWING IS TO INCLUDE A CERTIFICATION THAT ALL RELATED JOB CONDITIONS HAVE BEEN CHECKED AND VERIFIED AND THAT THERE ARE NO CONFLICTS.

D. ALL SHOP DRAWINGS ARE TO BE SUBMITTED TO ALLOW AMPLE TIME FOR CHECKING IN ADVANCE OF FIELD REQUIREMENTS. ALL SUBMITTALS TO BE COMPLETE AND CONTAIN ALL REQUIRED AND DETAILED INFORMATION. SHOP DRAWINGS WITH MULTIPLE PARTS SHALL BE SUBMITTED AS A PACKAGE.

E. IF SUBMITTALS DIFFER FROM THE CONTRACT DOCUMENT REQUIREMENTS, MAKE SPECIFIC MENTION OF SUCH DIFFERENCES IN A LETTER OF TRANSMITTAL, WITH REQUEST FOR SUBSTITUTION, TOGETHER WITH REASONS FOR SAME.

F. ELECTRONIC COPIES OF AKF DRAWINGS:

1) UPON AWARD OF CONTRACT, CONTRACTOR SHALL SUBMIT LIST OF DRAWINGS THAT THEY WILL REQUIRE. AKF WILL PROVIDE DRAWINGS IN (.PDF) FORMAT ONLY.

2) IF THE CONTRACTOR REQUIRES (.DWG) FORMAT, THERE WILL BE A CHARGE OF $200 FOR EACH DRAWING SUPPLIED PLUS SHIPPING AND HANDLING FOR PREPARATION AND PROCESSING. AFTER PREPARATION THE DRAWINGS WILL BE FORWARDED ONLY UPON RECEIPT OF SIGNED ACCEPTANCE OF TERMS FORM. PERMISSION FROM THE ARCHITECT MUST FIRST BE OBTAINED FOR AKF TO INCLUDE THE ARCHITECTURAL BACKGROUND AS REFERENCE. THE CONTRACTOR IS TO OBTAIN THE ARCHITECT'S LATEST DRAWINGS DIRECTLY FROM THE ARCHITECT.

3) THESE FILES ARE BEING ISSUED FOR THE CONVENIENCE OF THE CONTRACTOR AND THE CONTRACTOR REMAINS RESPONSIBLE FOR ALL CONTRACT REQUIREMENTS RELATED TO THE NORMAL SHOP DRAWING PREPARATION PROCESS.

G. SUBMISSIONS:

1) PROVIDE ALL COORDINATION DRAWINGS, DUCTWORK AND PIPING SHOP DRAWINGS IN AUTOCAD FORMAT, VERSION COMPATIBLE WITH OWNER. ALL CATALOG CUTS AND SUBMITTALS TO BE PROVIDED IN ELECTRONIC ?PDF? FORMAT THE ARCHITECT WILL FORWARD ALL SUBMISSIONS TO THE ENGINEER.

2) IF PAPER SUBMISSIONS ARE TO BE PROVIDED THE FOLLOWING SHALL BE ADHERED TO.

A. SUBMISSIONS 11 INCH X 17 INCH OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND ONE COPY. OTHERWISE, THEY SHALL SUBMIT TWO COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.

B. SUBMISSIONS LARGER THAN 11 INCH X 17 INCH: SUBMIT TWO COPIES TO THE ARCHITECT. THE ARCHITECT WILL FORWARD TO THE ENGINEER.

H. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:

1) AIR AND WATER BALANCE REPORT.

2) HEATING AND VENTILATION UNITS.

3) SPLIT SYSTEM UNITS.

4) PIPING SHOP STANDARDS

5) VALVES

6) PIPING LAYOUT: DETAIL, AT 3/8 INCH SCALE PIPING LAYOUT WITH FITTINGS, VALVES AND EQUIPMENT, USE SINGLE LINE FOR PIPE SIZES 3 INCHES AND SMALLER, AND DOUBLE LINE FOR PIPE SIZES 4 INCHES AND GREATER. FABRICATION OF PIPE ANCHORS, HANGERS, SUPPORTS FOR MULTIPLE PIPES, ALIGNMENT GUIDES, EXPANSION JOINTS AND LOOPS, AND ATTACHMENTS OF THE SAME TO THE BUILDING STRUCTURE. DETAIL LOCATION OF ANCHORS, ALIGNMENT GUIDES, AND EXPANSION JOINTS AND LOOPS SUBMIT ALL WELDING CERTIFICATES.

7) OPERATING SEQUENCES.

8) AUTOMATIC CONTROL SYSTEMS AND DEVICES.

9) SEQUENCE OF OPERATIONS

4. AS-BUILTS AND EQUIPMENT OPERATION INSTRUCTIONS

A. PROVIDE ALL COORDINATION DRAWINGS, DUCTWORK AND PIPING SHOP DRAWINGS IN AUTOCAD FORMAT, VERSION COMPATIBLE WITH OWNER. ALL CATALOG CUTS AND SUBMITTALS TO BE PROVIDED IN ELECTRONIC "PDF" FORMAT THE ARCHITECT WILL FORWARD ALL SUBMISSIONS TO THE ENGINEER.

B. ON COMPLETION AND ACCEPTANCE OF WORK, THIS CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS, EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

C. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 INCH X 11 IN FORMAT. THE CONTRACTOR SHALL GIVE ONE COPY OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.

D. THE INSTRUCTIONS SHALL BE ORGANIZED IN SECTIONS, WITH ONE SECTION PER SYSTEM. THE COVER OF THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND PHONE NUMBER OF THE PROJECT, ARCHITECT, ENGINEER, MECHANICAL CONTRACTOR AND SUBCONTRACTORS.

E. FINAL "AS-BUILT" DRAWINGS INDICATING AS INSTALLED CONDITIONS SHALL BE PROVIDED TO THE ARCHITECT AND ENGINEER AFTER COMPLETION OF THE INSTALLATION.

5. SUBSTITUTIONS

A. NO SUBSTITUTE MATERIAL OR MANUFACTURER OF EQUIPMENT SHALL BE PERMITTED WITHOUT A FORMAL WRITTEN SUBMITTAL TO THE ENGINEER WHICH INCLUDES ALL DIMENSIONAL, PERFORMANCE AND MATERIAL SPECIFICATIONS. ANY CHANGES IN LAYOUT, ELECTRICAL CHARACTERISTICS, STRUCTURAL REQUIREMENTS OR DESIGN DUE TO THE USE OF A SUBSTITUTION SHALL BE SUBMITTED TO THE ENGINEER AS PART OF THIS PROPOSAL. THE CONTRACTOR TAKES FULL RESPONSIBILITY FOR THE SUBSTITUTION AND ALL CHANGES RESULTING FROM THE SUBSTITUTION. ALL ITEMS SHALL BE SUBMITTED FOR REVIEW IN CONJUNCTION WITH THE SUBMITTAL OF THE SUBSTITUTION. ANY SUBSTITUTION MUST BE SUBMITTED WITH AN EXPLANATION WHY A SUBSTITUTION IS BEING UTILIZED. IF THE SUBSTITUTED ITEM DEVIATES FROM THE SPECIFIED ITEM, THOSE DEVIATIONS ARE TO BE IDENTIFIED ON A LINE BY LINE BASIS. IF THE SUBSTITUTE IS BEING UTILIZED FOR FINANCIAL REASONS, THE ASSOCIATED CREDIT MUST BE SIMULTANEOUSLY SUBMITTED.

B. ALL SUBSTITUTED EQUIPMENT SHALL CONFORM TO SPACE REQUIREMENTS AND PERFORMANCE REQUIREMENTS SHOWN ON CONTRACT DOCUMENTS. CONTRACTOR SHALL REPLACE ANY EQUIPMENT THAT DOES NOT MEET THESE REQUIREMENTS AT HIS OWN EXPENSE. ANY MODIFICATIONS TO ASSOCIATED SYSTEMS OR ADDITIONAL COSTS ATTRIBUTED TO THIS SUBSTITUTION SHALL BE AT THIS CONTRACTOR?S EXPENSE.

C. CONTRACTOR SHALL SUBMIT BID BASED ON SPECIFIED ITEMS AND SHALL SUPPLY AS AN ALTERNATE PRICE ANY SUBSTITUTIONS.

6. SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

A. THIS CONTRACTOR SHALL PROVIDE AS AN ADD ALTERNATE PRICE, A FULL ONE YEAR SERVICE OF ALL MECHANICAL COMPONENTS AND SYSTEMS, WITH PRICES FOR YEARS 2, 3 AND 4 FOLLOWING THIS FIRST YEAR. AT THE TIME OF ACCEPTANCE OF PROJECT, THE TENANT OR OWNER?S REPRESENTATIVE WILL DECIDE TO ACCEPT WHICH ALTERNATE, IF ANY. THIS IS IN ADDITION TO THE WARRANTY BEING PROVIDED AS PART OF THE BASE CONTRACT.

7. ACCESS DOORS IN GENERAL CONSTRUCTION

A. THIS CONTRACTOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL A PLAN INDICATING THE SIZE (MINIMUM 18 INCH X 18 INCH) AND LOCATION OF ALL ACCESS DOORS REQUIRED FOR OPERATION AND MAINTENANCE OF ALL CONCEALED EQUIPMENT, DEVICES, VALVES, DAMPERS AND CONTROLS. CONTRACTOR SHALL ARRANGE FOR FURNISHING AND INSTALLATION OF ALL ACCESS DOORS IN FINISHED CONSTRUCTION AND INCLUDE COSTS IN THE BID.

8. NOISE CONTROL

A. ALL ROOM NC LEVELS SHALL BE 35 OR LESS.

B. ALL SOUNDLINING, ADHESIVES, FACES AND ACCESSORIES TO BE APPLIED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, EXCEPT AS OTHERWISE NOTED.

9. TESTING AND BALANCING

A. ALL AIR AND WATER BALANCING SHALL BE BY AN INDEPENDENT CONTRACTOR NOT AFFILIATED WITH THE MECHANICAL CONTRACTOR AND IN

Revisions

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Project

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Mechanical Upgrades:

Eli Whitney School
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Drawing Title

MECHANICAL SPECIFICATIONS

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Scale: NTS	
Job No.: 183171-000	

ACCORDANCE WITH LOCAL STANDARDS. CONTRACTOR SHALL UTILIZE BASE BUILDING BALANCING CONTRACTOR OR APPROVED EQUAL, CONTACT BUILDING MANAGEMENT.

B. CONTRACTOR TO BALANCE ENTIRE SYSTEM TO AIR AND/OR WATER QUANTITIES AS SHOWN ON ALL RELATED DRAWINGS FOR THIS JOB, AND AS DESCRIBED HEREIN. BALANCING MUST BE DONE IN THE PRESENCE OF A BUILDING ENGINEER.

C. AIR BALANCING SHALL BE ACCOMPLISHED BY ADJUSTMENT OF FANS AND BRANCH DAMPERS FOR MAJOR ADJUSTMENTS. AIR SUPPLY OUTLETS TO BE BALANCED TO A UNIFORM SUPPLY ACROSS ENTIRE FACE. ADJUSTMENT OF TERMINAL DAMPERS AND DEVICES SHALL BE FOR TRIM OR MINOR ADJUSTMENT ONLY. THIS SHALL BE DONE TO PERMIT THE LEAST NOISE GENERATION IN THE TERMINAL AREAS AND UTILIZE MINIMUM FAN ENERGY.

D. WATER BALANCING SHALL BE ACCOMPLISHED BY ADJUSTMENT OF BALANCING VALVES AT PUMPS FOR PROPER FLOW. ADJUST FLOW THROUGH COILS AS REQUIRED.

E. UPON COMPLETION OF THE INSTALLATION, THE CONTRACTOR SHALL REBALANCE ANY EXISTING PORTIONS OF AIR DISTRIBUTION SYSTEM AND WATER DISTRIBUTION SYSTEM AFFECTED BY THE RENOVATION AND ALSO BALANCE ALL NEW WORK.

F. IF DISCREPANCIES EXIST IN THE REPORT THAT REQUIRE FIELD VERIFICATION, THE TESTING AND BALANCING COMPANY IN THE PRESENCE OF THE ENGINEER SHALL VISIT THE JOBSITE FOR FIELD VERIFICATION OF THE REPORT.

G. THE CONTRACTOR SHALL PROVIDE ALL LABOR, PRESSURE GAUGES, FLOW METERS, SHEAVES, AND BELTS REQUIRED TO BALANCE SYSTEMS.

H. BALANCING REPORT SHALL BE PROVIDED ON NEBB OR AABC–TYPE FORMS.

I. BALANCING AND TESTING SHALL BE PERFORMED AND SUPERVISED BY A CERTIFIED NEBB OR AABC TECHNICIAN.

J. BALANCING AND TESTING SHALL BE PERFORMED AND SUPERVISED BY AN INDEPENDENT FIRMS SPECIALIZING IN TESTING AND BALANCING.

K. THE PERFORMANCE AND CAPACITY OF ALL SYSTEMS AND EQUIPMENT TO BE DEMONSTRATED BY THE CONTRACTOR.

L. AFTER SUBMISSION OF THE FIELD VERIFIED BALANCING REPORT, THE AIR BALANCING COMPANY SHALL RETURN TO THE JOB SITE TO PERFORM TWO (2) OCCUPANT COMFORT BALANCES AS DIRECTED BY THE OWNER OR ENGINEER

M. THE FINAL REPORT AFTER THE COMFORT BALANCE IS TO BE INCLUDED IN PROJECT OPERATING AND MAINTENANCE MANUAL.

N. THE TESTING AND BALANCING AGENCY SHALL INCLUDE AS PART OF THEIR WORK AN EXTENDED WARRANTY OF 90 DAYS AFTER COMPLETION OF TEST AND BALANCE WORK. THE ENGINEER AT HIS DISCRETION DURING THE WARRANTY PERIOD MAY REQUEST A RECHECK, OR RESETTING OF ANY EQUIPMENT. THE MECHANICAL CONTRACTOR AND THE BALANCING CONTRACTOR SHALL PROVIDE THE NECESSARY TECHNICIANS TO FACILITATE THIS WORK.

O. BALANCING AGENCY SHALL PERMANENTLY MARK ALL ADJUSTMENT DEVICES (VALVES, DAMPERS, ETC.) TO ENABLE THE SETTING TO BE RESTORED.

P. AIR BALANCING:

1) HVAC CONTRACTOR SHALL ENSURE THAT A FIRST SET OF AIR FILTERS ARE IN PLACE, WHENEVER FANS ARE RUNNING AND REPLACED WITH A NEW CLEAN SET OF FILTERS BEFORE TESTING IS COMMENCED.

2) TEST, ADJUST, REPLACE SHEAVES, AND BALANCE ALL EQUIPMENT AND AIR DISTRIBUTION SYSTEMS TO PROVIDE AIR QUANTITIES INDICATED ON PLANS WITHIN PLUS OR MINUS 5 PERCENT.

3) TEST REPORT SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:

A. PROVIDE FOR ALL AIR CONDITIONING UNITS, SUPPLY CFM, OUTSIDE AIR CFM, RETURN AIR CFM, MIXED AIR CFM. PROVIDE OUTSIDE AIR, MIXED AIR AND SUPPLY AIR TEMPERATURES (DRY BULB – COOLING AND HEATING, WET–BULB–COOLING.) INDICATE UNIT OPERATING MODE DURING TEST.

B. LISTING OF DESIGN AND ACTUAL READINGS AS WELL AS ALL MANUFACTURER?S DATA FOR EQUIPMENT.

10. INSULATION – GENERAL REQUIREMENTS

A. ALL INSULATION MATERIALS, INCLUDING JACKETS, FACING, ADHESIVE, COATINGS, AND ACCESSORIES ARE TO BE FIRE HAZARD RATED AND LISTED BY UNDERWRITERS LABORATORIES, INC. USING STEINER TUNNEL TEST METHOD FOR FIRE HAZARD CLASSIFICATION OF BUILDING MATERIALS, STANDARD UL 723 (ASTM E–84), (ASA A2.5–1963). FLAMESPREAD: MAXIMUM 25. FUEL CONTRIBUTED AND SMOKE DEVELOPED: MAXIMUM 50. FLAMEPROOFING TREATMENTS SUBJECT TO DETERIORATION FROM MOISTURE OR HUMIDITY ARE NOT ACCEPTABLE.

B. PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.

C. DEFINITIONS:

1) EXPOSED: INDOOR DUCTS, PIPING OR EQUIPMENT LOCATED IN MECHANICAL EQUIPMENT ROOMS AND IN AREAS WHICH WILL BE VISIBLE WITHOUT REMOVING CEILINGS OR OPENING ACCESS PANELS.

2) CONCEALED: INDOOR DUCTS, PIPING OR EQUIPMENT WHICH IS NOT EXPOSED.

3) OUTDOOR: DUCTS, PIPING OR EQUIPMENT WHICH IS EXPOSED TO THE WEATHER.

11. DUCTWORK INSULATION

A. INSULATE ALL DUCTWORK IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED.

INSULATION SCHEDULE – DUCTWORK:

SUPPLY/RETURN (CONCEALED): 1–1/2 INCH THICK, D–1 MATERIAL, VAPORSEAL FINISH.

RETURN (CONCEALED IN UNCONDITIONED SPACES): 2 INCH THICK, D–1 MATERIAL, VAPORSEAL FINISH.

INTAKE (ALL LOCATIONS): 2 INCH THICK, D–3 MATERIAL, VAPORSEAL FINISH.

SUPPLY/RETURN (EXPOSED): 1–1/2 INCH THICK, D–1 MATERIAL, VAPORSEAL FINISH.

RETURN (EXPOSED IN UNCONDITIONED SPACES): 2 INCH THICK, D–2 MATERIAL, VAPORSEAL FINISH.

B. REINSULATE ALL DUCTWORK AND PIPING WHICH IS EXISTING AND DAMAGED DURING CONSTRUCTION OR SHOWN OR REQUIRED TO BE RELOCATED. INSULATE WITH SAME MATERIAL AND THICKNESS.

C. MATERIAL:

1) TYPE D–1: MINIMUM 1–LB DENSITY FIBERGLASS BLANKET, MAXIMUM 0.28 K–FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY–APPLIED FOIL–SKRIM–KRAFT FACING SIMILAR TO MANVILLE MICROLITE.

2) TYPE D–3: MINIMUM 6 LB FIBERGLASS BOARD. MAXIMUM 0.22 K–FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY APPLIED ALL PURPOSE OR ALL SERVICE FACING. SIMILAR TO MANVILLE 817 SPIN–GLAS AP.

D. INSTALLATION:

1) FIBERGLASS BLANKET: 2 INCH LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS OVER 24 INCH WIDE WITH MIN. 2 ROWS OF WELD PINS 12 INCH ON CENTER. SECURE ALL SEAMS WITH FOIL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE.

2) FIBERGLASS BOARD: SEAL JOINTS AND BREAKS IN FACING WITH 3 INCH WIDE TAPE TO MATCH FACING AND ADHERE WITH VAPOR SEAL ADHESIVE. APPLY 5 INCH WIDE TAPE AT CORNERS, WELD PINS ON TOP, SIDES AND BOTTOM.

12. PIPING INSULATION

A. INSULATE ALL PIPING IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED.

INSULATION SCHEDULE ? PIPING:

REFRIGERANT LIQUID & SUCTION LINES (ALL): 1 INCH THICK, P–6 MATERIAL, VAPORSEAL FINISH.

COLD CONDENSATE, EQUIPMENT DRAINS BELOW 60 DEG F (ALL): 1 INCH THICK, P–1 MATERIAL, VAPORSEAL FINISH.

B. PIPING, VALVES AND FITTINGS TO BE INSULATED:

1) LOW TEMPERATURE PIPING SYSTEMS – 40 TO 100 DEG F INCLUDING:

A. CONDENSATE DRAIN PIPING.

2) LOW TEMPERATURE HOT PIPING SYSTEMS – 100 TO 250 DEG F INCLUDING:

A. LOW TEMPERATURE HOT WATER SUPPLY AND RETURN.

C. MATERIAL:

1) TYPE P–1: MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.23 K–FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY–APPLIED FIRE–RETARDANT FOIL–SKRIM–KRAFT FACING. ALL SERVICE JACKET. SIMILAR TO OWENS–CORNING 650 ASJ.

2) TYPE P–6: MINIMUM 6 LB MOLDED FOAMED PLASTIC. MAXIMUM 0.27 K–FACTOR AT 75 DEG F MEAN TEMPERATURE. MAXIMUM 0.17 PERMEANCE. SIMILAR TO ARMSTRONG ARMAFLEX II.

D. FINISH:

1) TYPE F–1: FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON.

2) TYPE F–2: WHITE VAPOR BARRIER COATING WITH 10X10 OR 20X20 MESH WHITE GLASS, POLYESTER OR NYLON CLOTH REINFORCING MEMBRANE, MINIMUM 31 MIL DRY FILM THICKNESS, SIMILAR TO FOSTER TITE–FIT, UL LABEL.

3) TYPE F–4: ALUMINUM JACKETING WITH MINIMUM 0.016 INCH WALL THICKNESS AND LONGITUDINAL JOINTS WITH LOCK SEAMS.

4) TYPE F–6: WHITE FINISHING AND INSULATING CEMENT APPLIED OVER HEXAGONAL WIRE MESH. CEMENT SIMILAR TO KEENE SUPERSLICK.

E. INSTALLATION:

1) BEFORE APPLYING INSULATION ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED.

2) ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PROVIDE 2 INCH LAMP STRIPS AT ALL SEAMS SECURED WITH ADHESIVE. USE VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE WHERE REQUIRED. STAPLES NOT PERMITTED. REFRIGERANT PIPING INSULATION SHALL HAVE MITERED FITTINGS.

3) ALL INSULATION AND VAPOR BARRIERS SHALL BE CONTINUOUS PASSING THROUGH SLEEVES, HANGERS, ETC., OR OTHER OPENINGS. PROVIDE SADDLES OR SHIELDS FOR PROTECTION.

4) INSULATION FOR STRAINERS OR OTHER FITTINGS OR ACCESSORIES REQUIRING SERVICING OR INSPECTION SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE.

13. PIPING – GENERAL REQUIREMENTS

A. COMPLETE WITH: PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, HANGERS, SUPPORTS, GUIDE, SLEEVES, AND ACCESSORIES.

B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS:

1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).

2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM).

3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).

4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSS).

C. COPPER TUBE BRAZING

1) ALL BRAZING SHALL BE DONE IN ACCORDANCE WITH ALL CODES APPLICABLE TO THE PARTICULAR SERVICE. BRAZING FILLER METALS: AWS A5.8, BCUP SERIES, COPPER–PHOSPHORUS ALLOYS FOR JOINING COPPER WITH COPPER; OR BAG–1, SILVER ALLOY FOR JOINING COPPER WITH BRONZE OR STEEL.

2) QUALIFY PROCESS AND OPERATORS IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE, SECTION IX, ?WELDING AND BRAZING QUALIFICATIONS?.

3) BRAZERS SHALL BE QUALIFIED FOR ALL REQUIRED TUBE SIZES, MATERIAL, WALL THICKNESS, AND POSITION IN ACCORDANCE WITH THE AMERICAN SOCIETY OF MECHANICAL ENGINEERING (ASME), SECTION IX, BOILER AND PRESSURE VESSEL CODE.

A. COPIES OF THE CERTIFIED BRAZER QUALIFICATION REPORTS SHALL BE MAINTAINED BY THE RESPONSIBLE BRAZING AGENCY AND THE COMPANY PERFORMING THE BRAZING, AND SHALL BE SUBMITTED TO THE OWNER AND/OR ENGINEER UPON REQUEST.

B. ALL DEFECTIVE BRAZEMENTS SHALL BE CHIPPED OUT AND REPAIRED AT NO COST TO THE OWNER, BASED ON PROCEDURE TO BE SPECIFIED AT THE TIME.

D. GASKETS

1) PIPE–FLANGE GASKET MATERIALS: SUITABLE FOR CHEMICAL AND THERMAL CONDITIONS OF PIPING SYSTEM CONTENTS. ASME B16.21, NONMETALLIC, FLAT, ASBESTOS–FREE, 1/8–INCH MAXIMUM THICKNESS UNLESS THICKNESS OR SPECIFIC MATERIAL IS INDICATED.

E. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PSI OR 150% OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.1 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST.

F. EXPANSION COMPENSATION:

1) ALL PIPING SHALL BE INSTALLED TO COMPENSATE FOR EXPANSION TO PROTECT THE BUILDING, EQUIPMENT AND PIPING SYSTEMS. PROVIDE ALL GUIDES, ANCHORS, EXPANSION LOOPS, SUPPLEMENTAL STEEL AND APPROVED TYPE EXPANSION JOINTS AS INDICATED OR REQUIRED FOR CONTROL OF EXPANSION.

G. SYSTEM FILLING:

1) SYSTEMS OR PORTIONS OF SYSTEMS TO BE TESTED SHALL HAVE PROVISIONS FOR FILLING, VENTING (AIR REMOVAL), DRAINAGE AND TEST PRESSURE CONNECTION.

2) LIQUID USED FOR TESTING SHALL BE CLEAN CITY WATER MIXED WITH CHEMICALS SPECIFIED BY THE BASE BUILDING WATER TREATMENT CONTRACTOR. THE HVAC CONTRACTOR SHALL HIRE THE SERVICES OF THE BUILDING WATER TREATMENT CONTRACTOR AND PROVIDE ALL REQUIRED LABOR. PROVIDE TEMPORARY METERING AND MIXING DEVICES AS REQUIRED. THE HVAC CONTRACTOR SHALL OBTAIN ALL REQUIREMENTS FROM THE BUILDING MANAGEMENT.

H. FLUSHING AND CLEANING AND TREATMENT:

1) AFTER COMPLETION OF HYDROSTATIC TESTS AND EMPTYING, PROVIDE LABOR FOR INITIAL FLUSHING, CLEANING, AND PASSIVATING IN ACCORDANCE WITH THE OWNER?S WATER TREATMENT SPECIFICATION. THE HVAC CONTRACTOR SHALL HIRE THE SERVICES OF THE BASE BUILDING WATER TREATMENT CONTRACTOR AND PROVIDE ALL LABOR. COORDINATE WITH THE OWNER?S WATER TREATMENT COMPANY AND PROVIDE ALL SPECIFICATION REQUIREMENTS AND REQUIRED LABOR. COORDINATE ALL REQUIREMENTS WITH BASE BUILDING MANAGEMENT FOR BASE BUILDING VENDOR.

A. PROVIDE ONE YEAR?S SUPPLY OF NECESSARY WATER TREATMENT CHEMICALS FOR NEW SYSTEM TO THE OWNER OR TENANT INCLUDING THE FOLLOWING:

B. CLOSED SYSTEM TREATMENT (HOT WATER). PROVIDE AGENTS TO REDUCE SCALE DEPOSITS, TO ADJUST PH AND TO INHIBIT CORROSION. TREATMENT SHALL NOT CONTAIN ANY CHROMATE?S OR OTHER TOXIC SUBSTANCES. USE PROPER CHEMISTRY TO PROVIDE BACTERIA COUNTS BELOW 103 COLONIES PER MILLILITER (AEROBIC & NON AEROBIC). PH LEVELS TO BE BETWEEN 7.0 AND 9.0. CORROSION RATE TO BE LESS THAN 1/2 MILS/YEAR STEEL, 1/10 MILS/YEAR COPPER.

I. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED.

J. DRAIN DOWN FOR NEW PIPING CONNECTION INTO EXISTING:

1) CONTRACTOR TO OBTAIN SCHEDULE AND COORDINATE WITH BUILDING MANAGEMENT FOR SYSTEM DRAIN DOWN AND CONNECTION INTO EXISTING BUILDING PIPING. ALL COSTS ASSOCIATED WITH DRAIN DOWN ARE TO BE INCLUDED AS PART OF BID.

K. ALL INSTRUMENTATION (PRESSURE GAUGES AND THERMOMETERS) SHALL BE RATED FOR THE SAME PRESSURE AND TEMPERATURE AS PIPING SYSTEM AND RATED SPECIFICALLY FOR THE SAME SERVICE AS THE PIPING. PRESSURE GAUGES ARE TO BE LIQUID FILLED WITH 1% ACCURACY. SELECT GAUGES AND THERMOMETERS SO THAT THE MID–POINT IS AT THE WORKING PRESSURE AND TEMPERATURE. INSTRUMENTS TO BE MANUFACTURED BY WEISS INSTRUMENTS OR APPROVED EQUAL.

1) PROVIDE THERMOMETERS IN PIPING AS INDICATED ON THE DRAWINGS AND AT THE INLET AND OUTLET OF EACH HYDRONIC COIL, HEAT EXCHANGER AND PIECE OF EQUIPMENT THAT INVOLVES A DIFFERENTIAL TEMPERATURE. THERMOMETERS TO BE ORGANIC LIQUID FILLED.

2) PROVIDE PRESSURE GAUGES IN PIPING AS INDICATED ON THE DRAWINGS AND AT SUCTION AND DISCHARGE OF EACH PUMP AND AT INLETS AND OUTLETS OF EACH HYDRONIC COIL, HEAT EXCHANGER AND PIECE OF EQUIPMENT THAT INVOLVES A DIFFERENTIAL PRESSURE.

A. ACCESSORY STEEL.

14. REFRIGERANT SYSTEMS

A. PROVIDE ALL REFRIGERANT PIPING REQUIRED FOR A COMPLETE REFRIGERATION SYSTEM, WITH ALL VALVES, FITTINGS AND SPECIALTIES NECESSARY FOR SATISFACTORY OPERATION IN ACCORDANCE WITH ASHRAE STANDARD 15–LATEST EDITION AND ALL AUTHORITIES HAVING JURISDICTION. REFRIGERATION SYSTEM SHALL INCLUDE ALL REQUIRED ITEMS FOR CHARGING, DRAINING AND PURGING THE SYSTEM.

B. REFRIGERANT PIPING SHALL BE HARD COOPER, TYPE L OR ACR, ASTM B88 OR ASTM B 280, BRAZED.

C. JOINTS IN REFRIGERATION PIPING SHALL BE BRAZED.

D. REFRIGERANT PIPING SHALL BE OF THE SIZE AND NUMBER OF PIPES RECOMMENDED BY THE MANUFACTURER AND AS APPROVED BY THE ENGINEER.

E. HORIZONTAL PIPING OF THE COMPRESSOR SUCTION AND DISCHARGE LINES AND THE CONDENSER DISCHARGE LINES SHALL BE PITCHED A MINIMUM OF 1/2 INCH IN 10 FEET, IN THE DIRECTION OF REFRIGERANT FLOW. EACH SUCTION GAS VERTICAL RISER SHALL BE TRAPPED AT ITS EVAPORATOR WITH A TRAP AS RECOMMENDED BY THE COMPRESSOR MANUFACTURER.

F. INSTALL REFRIGERANT PIPING TO PREVENT EXCESSIVE OIL FROM BEING TRAPPED IN THE SYSTEM. ANY ADDITIONAL RISERS OR EQUALIZER LINES REQUIRED BY THE MANUFACTURER OF EQUIPMENT FOR THE PROPER SYSTEM OPERATION SHALL BE INSTALLED AS PART OF THIS CONTRACT. PROVIDE A FULLY PIPED OIL SEPARATOR FOR EACH REFRIGERANT SYSTEM AS PER MANUFACTURER'S RECOMMENDATIONS.

G. VALVES SHALL BE DESIGNED FOR REFRIGERANT SERVICE. SHUTOFF VALVES SHALL BE BRASS PACKLESS TYPE. UNIONS, FLANGED VALVES OR FITTINGS SHALL BE PROVIDED FOR DISCONNECTING EQUIPMENT, CONTROLS, ETC. FOR MAKING REPAIRS. PIPING SHALL BE RUN IN A SINGLE LAYER, WITH EACH LINE ISOLATED FROM ANOTHER TO PREVENT RUBBING. PROVISION SHALL BE MADE FOR EXPANSION AND CONTRACTION OF PIPING. ALL PIPING PASSING THROUGH WALLS, PARTITIONS, ETC., SHALL BE FURNISHED WITH SLEEVES AS REQUIRED.

H. REFRIGERANT PIPING PASSING THROUGH RATED FLOORS OR DEMISING WALLS SHALL BE ENCLOSED IN A RIGID AND GAS–TIGHT CONTINUOUS FIRE–RESISTING PIPE DUCT OR SHAFT VENTED TO THE OUTSIDE, IN ACCORDANCE WITH ASHRAE STANDARD 15–LATEST EDITION. PIPE CONDUIT SHALL BE COPPER TUBE TYPE L WITH SOLDERED FITTINGS.

15. ELECTRICAL WORK

A. GENERAL:

1) ELECTRICAL POWER WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACT. CONTROL WIRING SHALL BE PROVIDED BY THE HVAC CONTRACT. CONTROL WIRING SHALL BE DEFINED AS ANY WIRING 120V AND BELOW INSTALLED FOR PURPOSES OTHER THAN PROVIDING PRIMARY ELECTRICAL POWER TO EQUIPMENT.

2) MOTOR STARTERS AND VARIABLE FREQUENCY DRIVES (VFD) SHALL BE FURNISHED BY THE HVAC CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. REFER TO EQUIPMENT SECTION FOR VARIABLE FREQUENCY DRIVE SPECIFICATIONS.

3) DUCT MOUNTED SMOKE DETECTORS, WHERE REQUIRED, SHALL BE PROVIDED BY AND WIRED BY THE ELECTRICAL CONTRACTOR, AND MOUNTED BY THE HVAC CONTRACTOR.

A. THIS CONTRACTOR SHALL INSTALL THE SMOKE DETECTOR SAMPLING TUBES IN THE DUCT AS COORDINATED IN THE FIELD.

B. THIS CONTRACTOR SHALL ASSIST THE ELECTRICAL CONTRACTOR IN TESTING THE DUCT–MOUNTED SMOKE DETECTION SYSTEM.

4) ALL ELECTRICAL CONTROL WIRING SHALL COMPLY WITH LOCAL ELECTRICAL CODE, ALL AUTHORITIES HAVING JURISDICTION AND THE PROJECT ELECTRICAL SPECIFICATIONS.

5) MECHANICAL CONTRACTOR TO OBTAIN QUANTITY OF CONTROLLERS REQUIRED AND COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL OPERATING REQUIREMENTS, INTERLOCKS AND CONNECTIONS FOR STARTERS.

6) THE MECHANICAL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL POINT TO POINT, COMPLETELY COORDINATED WIRING DIAGRAMS AND INDICATE ALL SOURCE POWER REQUIREMENTS AND ALL FIELD WIRING TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR.

7) WHERE NEW STARTERS ARE TO BE PROVIDED TO REPLACE EXISTING, THIS CONTRACTOR SHALL SURVEY THE EXISTING CONTROL CONNECTIONS AND PREPARE AN EXISTING CONTROL WIRING DIAGRAM PRIOR TO DEMOLITION FOR SUBMITTAL TO THE ENGINEER. THE NEW STARTERS SHALL BE PROVIDED WITH THE NECESSARY CONTACTS AND RELAYS REQUIRED TO RECONNECT THE EXISTING CONTROLS. PROVIDE ALL REQUIRED CONTACTS FOR START/STOP AND FIRE ALARM.

16. MOTORS:

A. MOTORS SHALL HAVE THE ELECTRICAL CHARACTERISTICS AS LISTED ON THE DRAWINGS. COORDINATE ALL REQUIREMENTS WITH ELECTRICAL CONTRACTOR. ALL MOTORS SHALL COMPLY WITH NEMA MG–1 STANDARD AND SHALL BE OF THE HIGH EFFICIENCY TYPE AND MEET THE 1992 EPA ENERGY EFFICIENCY ACT AND UTILITY COMPANY REBATE REQUIREMENTS.

B. IF CONTRACTOR ELECTS TO SUBSTITUTE OR INCREASE MOTOR HORSEPOWER OVER THAT SPECIFIED, THE COST OF MOTOR AND ELECTRICAL CHANGES SHALL BE BORNE BY THIS CONTRACTOR.

C. MOTORS (UNDER HVAC WORK): IN ACCORDANCE WITH NEMA, IEEE AND ANSI C50 STANDARDS:

1) STANDARD EFFICIENCY UNLESS OTHERWISE NOTED.

2) 1.15 SERVICE FACTOR INCLUDING MOTORS SERVED FROM A VFD

3) SQUIRREL CAGE INDUCTION, OPEN DRIPPROOF TYPE, 1750 RPM, NEMA TYPE B INSULATION CLASS, CONTINUOUS DUTY, EXCEPT AS NOTED.

17. MOTOR CONTROLLERS

A. SUPPLIED BY HVAC CONTRACTOR AND INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

B. ENCLOSURES:

1) PROVIDE ENCLOSURES FOR STARTERS AND VFD?S SUITABLE FOR OPERATING ENVIRONMENT. ENCLOSURE?S SHALL BE NEMA 1 VENTILATED SHEETMETAL FOR INDOOR APPLICATION, NEMA 3R WITH ADDITIONAL GASKETING WEATHER–PROOF RAINTIGHT ENCLOSURE FOR EXPOSED OUTDOOR SERVICE OR INDOOR SERVICE EXPOSED TO MOISTURE.PROVIDE DISCONNECT SWITCH ON ENCLOSURE AS REQUIRED FOR SERVICE.

C. WITH SOLID–STATE (ELECTRONIC) OVERLOAD PROTECTION. COORDINATE ALL MOTOR CONTROLLER TYPES AND SIZES WITH MOTOR TYPES AND SIZES.

D. 1/3 HP AND SMALLER: PROVIDE MANUAL STARTER EXCEPT USE MAGNETIC TYPE WHERE AUTOMATICALLY CONTROLLED.

1) MANUAL TYPE: 2–POLE TOGGLE SWITCH WITH OVERLOAD PROTECTION AND PILOT LIGHT.

E. DISCONNECT SWITCHES ARE PROVIDED BY THE ELECTRICAL CONTRACTOR IF NOT INTEGRAL WITH EQUIPMENT.

F. ACCEPTABLE MANUFACTURERS:

1) EATON/ CUTLER HAMMER.

2) SQUARE D.

3) ALLEN BRADLEY.

4) ABB

18. EQUIPMENT

A. PROVIDE ALL EQUIPMENT AND ACCESSORIES OF THE SIZES AND CAPACITIES AS SCHEDULED AND AS INDICATED ON THE DRAWINGS.

B. INSTALL EQUIPMENT IN ACCORDANCE WITH APPROVED SHOP DRAWINGS, MANUFACTURERS INSTRUCTIONS AND ALL CODES AND REGULATIONS WHICH APPLY.

C. PROVIDE EQUIPMENT SUPPORTS AND/OR MOUNTINGS AS INDICATED ON THE DRAWING, IN VIBRATION SPECIFICATION AND AS FOLLOWS:

1) FLOOR MOUNTED EQUIPMENT – PROVIDE DIMENSIONS FOR A 4 INCH CONCRETE HOUSEKEEPING PAD WITH ALL REQUIRED WATERPROOFING TO THE CONSTRUCTION MANAGER.

2) EQUIPMENT ON FLOOR STANDS – PROVIDE FLOOR STAND OF STRUCTURAL STEEL OR STEEL PIPES AND FITTINGS ATTACHED TO FLOOR.

3) ROOF MOUNTED EQUIPMENT – PROVIDE PREFABRICATED ISOLATED ROOF CURB WITH INTEGRAL VIBRATION ISOLATORS.

4) CEILING MOUNTED EQUIPMENT – PROVIDE SUPPORTS WITH APPROVED SUITABLE ANCHORS SUSPENDED DIRECTLY FROM BUILDING STEEL STRUCTURE.

5) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED TO ADEQUATELY SUPPORT THE EQUIPMENT LOAD.

6) EQUIPMENT SHALL BE INSTALLED WITH VIBRATION ISOLATION, REFER TO VIBRATION ISOLATION SECTION.

D. RIGGING

1) THIS CONTRACTOR SHALL PROVIDE ALL REQUIRED RIGGING, HOISTING AND BRACING TO INSTALL THE EQUIPMENT AS INDICATED ON THE PLANS. THIS WORK SHALL BE PERFORMED BY AN INSURED CERTIFIED LICENSED RIGGING COMPANY THAT IS EXPERIENCED IN RIGGING EQUIPMENT OF THE TYPE INDICATED FOR THE AREAS SHOWN ON THE CONSTRUCTION DOCUMENTS. THIS CONTRACTOR SHALL SUBMIT RIGGING PLANS FOR APPROVAL PRIOR TO PROCEEDING WITH THE WORK.

2) ALL PERMITS REQUIRED FROM THE AUTHORITIES AND AGENCIES INVOLVED TO PERFORM THE RIGGING ARE THE RESPONSIBILITIES OF THIS CONTRACTOR.

3) ALL STRUCTURAL SUPPORTS, MODIFICATIONS OR ADDITIONS ARE TO BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO PROCEEDING WITH THE WORK. ALL SUPPLEMENTAL STRUCTURAL SUPPORTS, ELEVATOR CHARGES /MODIFICATIONS, BRACING AND PROTECTION REQUIRED FOR THE RIG IS THE RESPONSIBILITY OF THIS CONTRACTOR.

4) THE RIGGING CONTRACTOR SHALL HIRE AND PAY FOR ALL CHARGES AND SERVICES OF THE BUILDING ELEVATOR CONTRACTOR FOR THE RIGGING OF THE EQUIPMENT.

E. AIR COOLED AC UNIT: SPLIT SYSTEM

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Drawing Title

MECHANICAL SPECIFICATIONS

Issued 03/05/2019	Drawing No. M-401
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1) PROVIDE A FACTORY FABRICATED HORIZONTAL DRAW THROUGH AIR CONDITIONING UNITS SHIPPED IN SIZES SUITABLE FOR MOVING THROUGH AVAILABLE RIGGING ACCESS. PROVIDE CAPACITIES AS INDICATED ON SCHEDULE.

2) THE AC UNIT IS FIELD SPLITTABLE OR CAN BE SHIPPED PRE–SPLIT IN THE FACTORY.

3) FOR SPLIT UNITS THE CONTRACTOR IS TO PROVIDE ALL REQUIRED REFRIGERANT VALVING, DEVICES, PIPING, CONTROLS, ETC AS PER MANUFACTURERS REQUIREMENTS FOR A FULLY OPERATIONAL SYSTEM.

4) AC UNIT TO BE MANUFACTURED BY DAIKIN, TRANE, JCI OR CARRIER.

5) COMPRESSOR(S) – THE COMPRESSOR SHALL BE A HIGH EFFICIENCY HEAVY DUTY HEAT PUMP, FULL HERMETIC TYPE. THE COMPRESSOR SHALL BE INTERNALLY PROTECTED FROM OVER–HEATING. THE COMPRESSOR SHALL HAVE AN INTEGRAL CRANKCASE HEATER AS WELL AS AN EXTERNAL DISCHARGE MUFFLER. COMPRESSOR SHALL BE VIBRATION ISOLATED WITH EXTERNAL SPRING MOUNTING.

6) EVAPORATOR COIL – THE EVAPORATOR COIL IS OF ALUMINUM FIN AND COPPER TUBE CONSTRUCTION. THE COIL IS CONSTRUCTED OF HEAVY WALL, SEAMLESS COPPER TUBES THAT ARE MECHANICALLY EXPANDED TO THE ALUMINUM FINS TO PROVIDE THE HIGHEST EFFICIENCY. ALL REFRIGERANT COILS HAVE DRAW THROUGH AIRFLOW DESIGN WITH EXTREMELY LARGE FACE AREAS AND MULTIPLE ROWS.

7) CONDENSER COIL – THE CONDENSER COIL SHALL BE OF A DRAW THROUGH AIRFLOW DESIGN. THE COIL SHALL BE MADE WITH 3/8 INCH O.D. HEAVY WALL SEAMLESS COPPER TUBES. TUBING SHALL BE MECHANICALLY EXPANDED TO ALUMINUM FINS WITH DRAWN SELF–SPACING COLLARS. ALL COLLARS SHALL HAVE NO CRACKS OR DEFECTS.

8) BLOWER ASSEMBLY – THE BLOWER ASSEMBLY SHALL BE BELT DRIVEN WITH THE ABILITY TO DELIVER UP TO 1 INCH ESP WITH THE USE OF THE STANDARD MOTOR. THE BLOWER HOUSING SHALL BE A HEAVY–DUTY GAUGE STEEL DOUBLE INLET AND PAINTED TO PREVENT IT FROM CONTAMINATES. THE BLOWER WHEEL SHALL BE MOUNTED ON A SOLID STEEL KEYED SHAFT. THE SHAFT SHALL BE MOUNTED ON RESILIENTLY MOUNTED PERMANENTLY LUBRICATED BALL BEARINGS. THE BLOWER PULLEY SHALL BE OF CAST IRON CONSTRUCTION AND KEYED TO THE BLOWER SHAFT.

9) MOTOR ASSEMBLY – THE MOTOR SHALL BE RESILIENTLY MOUNTED WITH INTERNAL PROTECTION FROM OVERHEATING. MOTOR SHALL HAVE PERMANENTLY LUBRICATED BALL BEARINGS. THE MOTOR SHALL BE MOUNTED TO AN ADJUSTABLE MOTOR FRAME POSITIONED BEHIND THE BLOWER ASSEMBLY BOLTED TO THE BOTTOM PAN. NO MOTOR SHALL BE MOUNTED UPON A BLOWER HOUSING. MOTOR PULLEY SHALL BE CAST IRON, KEYED, AND VARIABLE PITCH DESIGN TO ALLOW FOR FIELD ADJUSTMENT OF SPECIFIC AIRFLOW AND STATIC REQUIREMENTS.'

10) ELECTRICAL – THE UNIT SHALL HAVE DUAL ELECTRICAL CONTROL PANELS, ONE IN THE EVAPORATOR SECTION AND THE OTHER IN THE CONDENSER SECTION. THIS SHALL ENABLE THE UNIT IF SPLIT IN THE FIELD TO BE POWER WIRED INDEPENDENTLY. ALL COMPONENTS (FAN MOTORS, COMPRESSORS) SHALL HAVE THEIR OWN DEFINITE PURPOSE CONTACT. COMPRESSOR(S) SHALL BE PROTECTED WITH A NONADJUSTABLE HIGH AND LOW PRESSURE CONTROL WITH AUTO RESET AND LOCK OUT RELAY IN EACH REFRIGERATION CIRCUIT. THE UNIT SHALL INCORPORATE AN AIR PRESSURE DIFFERENTIAL SWITCH. THIS SHALL ENABLE THE UNIT TO SHUT DOWN IN THE EVENT OF AN EVAPORATOR MOTOR, BLOWER OR BELT FAILURE.

11) A LOW VOLTAGE TRANSFORMER WITH INTEGRAL PROTECTION SHALL BE PROVIDED TO SUPPLY 24 VAC TO THE CONTROL CIRCUIT. CLEARLY LABELED LOW VOLTAGE TERMINAL STRIPS WILL BE PROVIDED FOR FIELD WIRING OF THERMOSTAT. TERMINAL BLOCKS SHALL BE PROVIDED ON THE ELECTRICAL CONTROL BOX FOR POWER WIRING. GROUND LUGS SHALL BE AFFIXED IN BOTH THE EVAPORATOR AND CONDENSER CONTROL PANELS. ALL CONTROLS ARE EASILY ACCESSIBLE.

12) REFRIGERATION CIRCUIT – THE REFRIGERATION CIRCUIT SHALL INCLUDE HIGH AND LOW SIDE SCHRADER ACCESS VALVES, SIGHT GLASS WITH INTEGRAL MOISTURE INDICATOR, FILTER–DRYER, HIGH/LO PRESSURE SWITCHES ALL LOCATED IN THE CONDENSER SECTION OF THE UNIT AND ARE EASILY ACCESSIBLE THE REFRIGERATION CIRCUIT SHALL BE CAPABLE OF BEING FIELD SEPARATED WITH REUSABLE QUICK–CONNECTS TO PREVENT LOSS OF FACTORY CHARGE WHEN SPLIT IN THE FIELD.

13) PROVIDE R–407C OR R–410A REFRIGERANT.

14) CABINET – THE CABINET SHALL BE CONSTRUCTED OF SCRATCH RESISTANT HEAVY DUTY G90 GALVANIZED STEEL. THE CONDENSER BOTTOM PANS SHALL BE CONSTRUCTED AS FOLLOWS: AN INNER PAN AND AN OUTER PAN WITH INTEGRAL SPACERS AND INSULATION BETWEEN THE TWO, TO ENSURE A VAPOR BARRIER. THE COMPLETE UNIT SHALL BE MOUNTED ON HEAVY DUTY CHANNELS TO ACCOMMODATE HANGING RODS FOR CEILING/SLAB FLOOR MOUNTING.

15) SERVICE ACCESS – THE UNIT SHALL BE ACCESSIBLE FROM THE SIDES. ACCESS DOORS SHALL BE HELD IN PLACE BY SHEET METAL SCREWS. ACCESS TO THE BLOWER AND MOTOR SHALL BE ON ONE SIDE OF THE UNIT. ACCESS TO THE REFRIGERATION CIRCUIT INCLUDING COMPRESSOR AND SIGHT GLASS SHALL BE ON THE OPPOSITE SIDE OF THE UNIT PROVIDE CLEARANCE FOR SERVICE ACCESS AS PER MANUFACTURERS REQUIREMENTS.

16) INSULATION – ACOUSTICAL INSULATION SHALL BE A MINIMUM DENSITY OF 5 LBS. AND BE INSTALLED ON THE INTERIOR TOP, SIDE AND BOTTOM PANS AND PANELS INSULATION MUST MEET NFPA 90A AND 90B/ASTM–C1071.

17) PROVIDE UNIT MANUFACTURERS MOUNTED DDC CONTROLLER FACTORY INSTALLED. CONTROLLER TO HAVE A 4 LINE BY 20–CHARACTER LCD DISPLAY IN PLAIN ENGLISH, INCLUDING ALARMS. MANUAL CONTROL FROM THE CONTROLLER KEYPAD WITH PASSWORD ENTRY TO PROTECT THE SETTINGS FROM BEING TAMPERED WITH. ON A POWER FAILURE CONDITION, THE SYSTEM RESTARTS AUTOMATICALLY. OPERATING CONTROL PANEL SHALL BE MOUNTED IN UNIT FACE AND BE COMPLETE WITH 24 VOLT CONTROL TRANSFORMER.

18) FACTORY TESTING: ALL COMPONENTS SHALL BE INDIVIDUALLY FACTORY TESTED PRIOR TO INSTALLATION, THE UNIT SHALL BE FACTORY RUN–TESTED

19) WARRANTY – PROVIDE MANUFACTURERS STANDARD ONE LIMITED WARRANTY WITH 5 YEAR COMPRESSOR WARRANTY.

20) UNITS SHALL BE PROVIDED WITH THE FOLLOWING OPTIONS:

A. LOW AMBIENT COOLING OPERATION DOWN TO 0 DEGREES FAHRENHEIT.

B. FILTER RACK.

C. ADAPTOR INTERFACE: KRP BOARD.

F. HEATING AND VENTILATION UNIT

1) MANUFACTURERS: TRANE, DAIKIN, AAON OR REZNOR

2) UNIT DESCRIPTION: HEATING AND VENTILATION UNITS SHALL INCLUDE VARIABLE CAPACITY COMPRESSORS (0–100%), FILTERS, VARIABLE SPEED SUPPLY FANS, LOW LEAKAGE DAMPERS, HYDRONIC HEATING, SUPPLY SIDE SMOKE DETECTOR, VARIABLE FREQUENCY DRIVES, AND UNIT CONTROLS. UNIT SHALL BE FACTORY ASSEMBLED AND TESTED INCLUDING LEAK TESTING OF THE DX COILS, PRESSURE TESTING OF THE REFRIGERATION CIRCUIT, AND RUN TESTING OF THE COMPLETED UNIT. RUN TEST REPORT SHALL BE SUPPLIED WITH THE UNIT IN THE SERVICE COMPARTMENT?S LITERATURE POCKET. LAMINATED COLOR–CODED WIRING DIAGRAM SHALL MATCH FACTORY INSTALLED WIRING AND SHALL BE AFFIXED TO THE INTERIOR OF THE CONTROL COMPARTMENT?S HINGED ACCESS DOOR. UNIT NAMEPLATE SHALL BE PROVIDED IN TWO LOCATIONS ON THE UNIT, AFFIXED TO THE EXTERIOR OF THE UNIT AND AFFIXED TO THE INTERIOR OF THE CONTROL COMPARTMENT?S HINGED ACCESS DOOR.

3) CONSTRUCTION:

A. CABINET: GALVANIZED STEEL, PHOSPHATIZED, AND FINISHED WITH AN AIR–DRY PAINT COATING WITH REMOVABLE ACCESS PANELS. STRUCTURAL MEMBERS SHALL BE 16 GAUGE WITH ACCESS DOORS AND REMOVABLE PANELS OF MINIMUM 20 GAUGE.

B. UNITS CABINET SURFACE SHALL BE TESTED 1000 HOURS IN SALT SPRAY TEST IN COMPLIANCE WITH ASTM B117.

C. CABINET CONSTRUCTION SHALL ALLOW FOR ALL SERVICE/ MAINTENANCE FROM ONE SIDE OF THE UNIT.

D. CABINET TOP COVER SHALL BE ONE PIECE CONSTRUCTION OR WHERE SEAMS EXITS, IT SHALL BE DOUBLE–HEMMED AND GASKET–SEALED.

E. ACCESS PANELS: WATER– AND AIR–TIGHT PANELS WITH HANDLES SHALL PROVIDE ACCESS TO FILTERS, HEATING SECTION, RETURN AIR FAN SECTION, SUPPLY AIR FAN SECTION, EVAPORATOR COIL SECTION, AND UNIT CONTROL SECTION.

F. DOWNFLOW UNIT'S BASE PANS SHALL HAVE A RAISED 1 1/8 INCH HIGH LIP AROUND THE SUPPLY AND RETURN OPENINGS FOR WATER INTEGRITY.

G. INSULATION: PROVIDE 1/2 INCH THICK COATED FIBERGLASS INSULATION ON ALL EXTERIOR PANELS IN CONTACT WITH THE RETURN AND CONDITIONED AIR STREAM.

H. PROVIDE OPENINGS EITHER ON SIDE OF UNIT OR THRU THE BASE FOR POWER, CONTROL AND GAS CONNECTIONS.

I. THE BASE OF THE UNIT SHALL HAVE PROVISIONS FOR FORKLIFT AND CRANE LIFTING.

4) FANS AND MOTORS

A. PROVIDE EVAPORATOR FAN SECTION WITH FORWARD CURVED, DOUBLE WIDTH, DOUBLE INLET, CENTRIFUGAL TYPE FAN.

B. PROVIDE SELF–ALIGNING, GREASE LUBRICATED, BALL OR SLEEVE BEARINGS WITH PERMANENT LUBRICATION FITTINGS.

C. PROVIDE UNITS 12 1/2 TONS AND ABOVE WITH BELT DRIVEN, SUPPLY FANS WITH ADJUSTABLE MOTOR SHEAVES.

D. FANS SHALL BE PERMANENTLY LUBRICATED AND HAVE INTERNAL THERMAL OVERLOAD PROTECTION.

E. OUTDOOR FANS SHALL BE DIRECT DRIVE, STATICALLY AND DYNAMICALLY BALANCED, DRAW THROUGH IN THE VERTICAL DISCHARGE POSITION.

F. PROVIDE SHAFTS CONSTRUCTED OF SOLID HOT ROLLED STEEL, GROUND AND POLISHED, WITH KEY–WAY, AND PROTECTIVELY COATED WITH LUBRICATING OIL.

G. VARIABLE FREQUENCY DRIVE – THE UNIT WILL BE SUPPLIED WITH A FIELD MOUNTED VFD AND STATIC PRESSURE CONTROLLER. THE CONTRACTOR WILL INSTALL AND WIRE BETWEEN THE UNIT AND THE VFD. THE UNIT WILL COME WITH TERMINAL BLOCKS TO ALLOW FOR EASIER WIRING BETWEEN THE VFD AND THE MOTOR. UNIT MANUFACTURER TO PROVIDE START UP SUPERVISION OF A/C UNIT AND VFD.

5) HYDRONIC HEATING

A. COMPLETELY ASSEMBLED AND FACTORY INSTALLED HEATING SYSTEM SHALL BE INTEGRAL TO UNIT, UL OR CSA APPROVED SPECIFICALLY FOR OUTDOOR APPLICATIONS FOR USE DOWNSTREAM FROM REFRIGERANT COOLING COILS. THREADED CONNECTION WITH PLUG OR CAP PROVIDED.

B. HEATING SECTION SHALL BE FACTORY RUN TESTED PRIOR TO SHIPMENT.

C. HYDRONIC HEATING COILS – COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS SPACED NO CLOSER THAN 0.1, RATED FOR A MINIMUM WORKING PRESSURE OF 200 PSIG AND A MAXIMUM ENTERING–WATER TEMPERATURE OF 220 DEG F. INCLUDE MANUAL AIR VENT AND DRAIN VALVE.

D. BLOWER SHALL BE CENTRIFUGAL TYPE FAN WITH BUILT– IN THERMAL OVERLOAD PROTECTION ON FAN MOTOR.

6) OUTDOOR AIR SECTION

A. PROVIDE 100% RETURN AIR.

B. PROVIDE DUAL ENTHALPY ECONOMIZER.

C. PROVIDE ADJUSTABLE MINIMUM POSITION CONTROL LOCATED IN THE ECONOMIZER SECTION OF THE UNIT.

D. PROVIDE SPRING RETURN MOTOR FOR OUTSIDE AIR DAMPER CLOSURE DURING UNIT SHUTDOWN OR POWER INTERRUPTION.

7) EXHAUST/RETURN SECTION

A. PROVIDE A FACTORY SUPPLIED FIELD INSTALLED POWER EXHAUST ASSEMBLY THAT SHALL ASSIST THE BAROMETRIC RELIEF DAMPER IN THE ECONOMIZER IN RELIEVING BUILDING PRESSURIZATION.

8) FILTERS

A. UNIT SHALL INCLUDE 2 INCH THICK, PLEATED PANEL FILTERS WITH AN ASHRAE EFFICIENCY OF 85% AND A MERV RATING OF 13, UPSTREAM OF THE COOLING COIL.

9) ROOF CURB

A. CONTRACTOR SHALL PROVIDE ROOF CURB ADAPTER, HEAVY GAUGE ZINC COATED STEEL WITH ALL WELDED CONSTRCUTION. CUSTOM FABRICATED TO FIT OVER EXISTING ROOF CURB WITH AIR AND WATER PROOF GASKETING.

B. CURB SHALL BE MANUFACTURED IN ACCORDANCE WITH THE NATIONAL ROOFING CONTRACTORS ASSOCIATION GUIDELINES.

10) CONTROLS: CONTROLS SHALL BE FACTORY INSTALLED AND PROVIDED.

A. PROVIDE FACTORY–WIRED ROOF TOP UNITS WITH 24 VOLT CONTROL CIRCUIT WITH CONTROL TRANSFORMERS, CONTACTOR PRESSURE LUGS OR TERMINAL BLOCK FOR POWER WIRING. CONTRACTOR TO PROVIDE DISCONNECT DEVICE. UNITS SHALL HAVE SINGLE POINT POWER CONNECTIONS. FIELD WIRING OF ZONE CONTROLS TO BE NEC CLASS II.

B. PROVIDE MICROPROCESSOR UNIT–MOUNTED CONTROL WHICH WHEN USED WITH AN ELECTRONIC ZONE SENSOR PROVIDES PROPORTIONAL INTEGRAL ROOM CONTROL. THIS UCM SHALL PERFORM ALL UNIT FUNCTIONS BY MAKING ALL HEATING, COOLING AND VENTILATING DECISIONS THROUGH RESIDENT SOFTWARE LOGIC.

C. PROVIDE FACTORY–INSTALLED INDOOR EVAPORATOR DEFROST CONTROL TO PREVENT COMPRESSOR SLUGGING BY INTERRUPTING COMPRESSOR OPERATION.

D. PROVIDE AN ANTI–CYCLE TIMING AND MINIMUM ON/OFF BETWEEN STAGES TIMING IN THE MICROPROCESSOR.

E. ECONOMIZER PREFERRED COOLING (IF SUPPLIED WITH ECONOMIZER) – COMPRESSOR OPERATION IS INTEGRATED WITH ECONOMIZER CYCLE TO ALLOW MECHANICAL COOLING WHEN ECONOMIZER IS NOT ADEQUATE TO SATISFY ZONE REQUIREMENTS. COMPRESSORS ARE ENABLED IF SPACE TEMPERATURE IS RECOVERING TO COOLING SETPOINT AT A RATE OF LESS THAN 0.2 DEGREES PER MINUTE. COMPRESSOR LOW AMBIENT LOCKOUT OVERRIDES THIS FUNCTION.

F. PROVIDE PROGRAMMABLE ELECTRONIC MICROCOMPUTER BASED ZONE CONTROL.

(1) ZONE CONTROL SHALL INCORPORATE:

(2) AUTOMATIC CHANGEOVER FROM HEATING TO COOLING.

(3) SET–UP FOR AT LEAST 2 – SETS OF SEPARATE HEATING AND COOLING TEMPERATURES PER DAY.

(4) INSTANT OVERRIDE OF SETPOINT FOR CONTINUOUS OR TIMED PERIOD FROM ONE HOUR TO 31 DAYS.

(5) SWITCH SELECTION FEATURES INCLUDING FAHRENHEIT DISPLAY, 12 OR 24 HOUR CLOCK, KEYBOARD DISABLE, REMOTE SENSOR, FAN ON–AUTO.

G. ZONE SENSOR DISPLAY SHALL BE CAPABLE OF:

(1) TIME OF DAY.

(2) ACTUAL ROOM TEMPERATURE.

(3) PROGRAMMED TEMPERATURE.

(4) PROGRAMMED TIME.

(5) DURATION OF TIMED OVERRIDE.

(6) DAY OF WEEK.

(7) SYSTEM MODE INDICATION: HEATING, COOLING, LOW BATTERY FAN ON.

H. PROVIDE REMOTE TEMPERATURE SENSOR CAPABILITY.

I. PROVIDE MIXED AIR SENSOR IN SUPPLY AIR TO CLOSE OUTSIDE AIR DAMPER.

19. AUTOMATIC CONTROLS: GENERAL REQUIREMENTS

A. WORK INCLUDED

1) FURNISH A COMPLETE STAND–ALONE DIRECT DIGITAL CONTROL (DDC) SYSTEM IN ACCORDANCE WITH THIS SPECIFICATION SECTION. THIS INCLUDES ALL SUPERVISORY CONTROLLERS, LOGIC CONTROLLERS, AND ALL INPUT/OUTPUT DEVICES. ITEMS OF WORK INCLUDED ARE AS FOLLOWS:

A. PROVIDE A SUBMITTAL THAT MEETS THE REQUIREMENTS BELOW FOR APPROVAL.

B. PROVIDE POWER FOR PANELS AND CONTROL DEVICES FROM A SOURCE DESIGNATED BY THE ELECTRICAL CONTRACTOR.

C. PROVIDE MISCELLANEOUS CONTROL WIRING FOR HVAC AND RELATED SYSTEMS REGARDLESS OF VOLTAGE.

D. COORDINATE INSTALLATION SCHEDULE WITH THE MECHANICAL CONTRACTOR AND GENERAL CONTRACTOR.

E. FURNISH, MOUNT, AND WIRE ALL ASSOCIATED PANELS AND DEVICES FOR THE SYSTEM TO BE COMPLETELY OPERATIONAL REGARDLESS OF FUNCTION OR VOLTAGE, UNLESS OTHERWISE STATED.

F. PROVIDE ENGINEERING AND TECHNICIAN LABOR TO PROGRAM AND COMMISSION SOFTWARE FOR EACH SYSTEM AND OPERATOR INTERFACE. SUBMIT COMMISSIONING REPORTS FOR APPROVAL.

G. ALL PRIMARY AND SECONDARY DDC CONTROLLERS SHALL COMMUNICATE USING THE PROTOCOLS AND NETWORK STANDARDS AS DEFINED BY THE LATEST VERSION OF THE ANSI/ASHRAE STANDARD 135 – BACNET. USE OF A PROPRIETARY PROTOCOL ON ANY PART OF THE NETWORK IS PROHIBITED.

H. THE ATC CONTROL WORK IN THIS PROJECT SHOULD BE STANDALONE WITH THE CAPABILITY FOR FURTHER BMS TIE–IN.

B. DEFINITIONS:

1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

6) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

7) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

C. SUBMITTALS

1) ONE (1) SUBMITTAL PACKAGE SHALL BE PROVIDED FOR THE PROJECT THAT INCLUDES INFORMATION FOR CONTROLS FOR ALL SYSTEMS BEING PROVIDED AS PART OF THE PROJECT. PARTIAL SUBMITTALS ARE NOT ACCEPTABLE AND SHALL NOT BE REVIEWED BY THE ENGINEER. FOR EXAMPLE, IT IS NOT ACCEPTABLE TO SUBMIT A CONTROL VALVE SCHEDULE AS PART OF ONE PACKAGE AND CONTROL DIAGRAMS AS PART OF A LATER PACKAGE.

2) PRODUCT DATA: INCLUDE MANUFACTURER'S TECHNICAL LITERATURE FOR EACH CONTROL DEVICE INDICATED, LABELED WITH SETTING OR ADJUSTABLE RANGE OF CONTROL. INDICATE DIMENSIONS, CAPACITIES, PERFORMANCE CHARACTERISTICS, ELECTRICAL CHARACTERISTICS, FINISHES FOR MATERIALS, AND INSTALLATION AND STARTUP INSTRUCTIONS FOR EACH TYPE OF PRODUCT INDICATED.

3) SHOP DRAWINGS: DETAIL EQUIPMENT ASSEMBLIES AND INDICATE DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

A. SCHEMATIC FLOW DIAGRAMS SHOWING FANS, PUMPS, COILS, DAMPERS, VALVES, THERMOSTATS AND CONTROL DEVICES.

B. WIRING DIAGRAMS: POWER, SIGNAL, AND CONTROL WIRING.

C. ARCHITECTURE DRAWING INCLUDING ALL COMMUNICATION WIRING, NETWORK DEVICES, ETC. INDICATE TYPE OF CABLING AND NUMBER OF CONDUCTORS.

D. ARCHITECTURAL FLOOR PLANS INDICATING PROPOSED LOCATIONS OF ALL WALL–MOUNTED DEVICES (I.E., DDC UNITS, CONTROL PANELS, SENSORS, THERMOSTATS, ETC.) AND MECHANICAL DRAWINGS INDICATING PROPOSED LOCATIONS OF ALL TEMPERATURE, FLOW AND PRESSURE TRANSMITTERS.

E. SYMBOL AND ABBREVIATION LIST FOR CONTROL DIAGRAMS.

F. POINTS LIST INCLUDING HARDWIRED AND SOFTWARE POINTS.

G. DETAILS OF CONTROL PANEL INTERIOR, INCLUDING CONTROLLERS, RELAYS, TERMINAL BLOCKS, AND LABELING OF DEVICES, ETC.

H. SCHEDULE OF VALVES INCLUDING THE VALVE SIZE, MODEL NUMBER, FLOW, DESIGN PRESSURE DROP, ACTUAL PRESSURE DROP, DESIGN CV, CALCULATED CV, VALVE BODY PRESSURE RATING, ACTUATOR, CLOSE–OFF PRESSURE RATING, LEAKAGE, FLOW CHARACTERISTICS AND LOCATION.

I. A COMPLETE BILL OF MATERIALS OF EQUIPMENT TO BE USED INDICATING QUANTITY, MANUFACTURER, MODEL NUMBER AND TAG NUMBER.

J. MANUFACTURER?S TECHNICAL CUT SHEETS WHICH INCLUDE A TABLE OF CONTENTS AND AN ASSOCIATED SHEET NUMBERING SYSTEM FOR ALL PAGES. MODEL NUMBER SHALL BE CIRCLED OR POINTED WITH AN ARROW.

4) FIELD QUALITY–CONTROL TEST REPORTS.

5) OPERATION AND MAINTENANCE DATA.

6) SUBMIT ON WIRING DIAGRAMS AND CONTROL DIAGRAMS FOR ALL EQUIPMENT LISTED HEREIN REGARDLESS OF WHETHER THE CONTROLS ARE PACKAGED, PROVIDED BY OTHERS, ETC. IT IS THE INTENT OF THIS SPECIFICATION THAT THIS CONTRACTOR SHALL PROVIDE THE OWNER WITH COMPLETE AND FINAL O & M MANUALS THAT INCLUDE CONTROLS FOR ALL EQUIPMENT REGARDLESS OF WHO PROVIDED IT.

D. QUALITY ASSURANCE

1) INSTALLER QUALIFICATIONS: A QUALIFIED INSTALLER WHO IS AN AUTHORIZED REPRESENTATIVE OF THE AUTOMATIC CONTROL SYSTEM MANUFACTURER FOR BOTH INSTALLATION AND MAINTENANCE OF UNITS REQUIRED FOR THIS PROJECT.

2) COMPLY WITH ALL CURRENT GOVERNING CODES, ORDINANCES, AND REGULATIONS INCLUDING UL, NFPA, THE LOCAL BUILDING CODE, NEC, ETC.

3) MATERIALS AND EQUIPMENT SHALL BE THE CATALOGUED PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN PRODUCTION AND INSTALLATION OF AUTOMATIC TEMPERATURE CONTROL SYSTEMS AND SHALL BE MANUFACTURER'S LATEST STANDARD DESIGN THAT COMPLIES WITH THE SPECIFICATION REQUIREMENTS.

4) THE BMS CONTRACTOR SHALL HAVE A MINIMUM OF TEN (10) YEARS OF EXPERIENCE IN THE INSTALLATION AND MAINTENANCE OF BMS SYSTEMS SIMILAR IN SIZE AND COMPLEXITY TO THIS PROJECT, BE CERTIFIED–TO–INSTALL, AND BE A DIRECT REPRESENTATIVE OF AN APPROVED CONTROL SYSTEM MANUFACTURER,

20. AUTOMATIC CONTROLS PRODUCTS

A. MANUFACTURERS

1) MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

A. ALERTON.

B. HONEYWELL

C. SCHNEIDER ELECTRIC

D. AUTOMATED LOGIC CORPORATION.

E. JOHNSON CONTROLS, INC.

F. SIEMENS BUILDING TECHNOLOGIES, INC.

2) THE BMS CONTRACTOR SHALL BE AN INDEPENDENT CONTRACTOR NOT AFFILIATED WITH THE MECHANICAL CONTRACTOR.

B. CONTROL PANELS

1) FULLY ENCLOSED, STEEL–RACK–TYPE CABINET WITH LOCKING DOORS OR LOCKING REMOVABLE BACKS. MATCH FINISH OF PANELS AND PROVIDE LAMINATED AS–BUILT WIRING DIAGRAMS, FLOW DIAGRAMS, ETC. RELATED TO THE SYSTEM BEING CONTROLLED INSIDE THE ASSOCIATED CABINET. EACH CONTROL PANEL SHALL BE CLEARLY AND PERMANENTLY LABELED WITH THE CONTROLLER DESIGNATION AND INDICATION OF THE MECHANICAL EQUIPMENT SERVED.

2) UNITIZE CABINET WITH SUITABLE BRACKETS FOR WALL OR FLOOR MOUNTING, LOCATED ADJACENT TO EACH SYSTEM UNDER AUTOMATIC CONTROL. PROVIDE COMMON KEYING FOR ALL PANELS.

3) FABRICATE PANELS OF FURNITURE–QUALITY STEEL OR EXTRUDED–ALUMINUM ALLOY, TOTALLY ENCLOSED, WITH HINGED DOORS AND KEYED LOCK AND WITH MANUFACTURER'S STANDARD SHOP–PAINTED FINISH. ALL PANELS SHALL HAVE COMMON KEYING.

4) PRIMARY CONTROL PANEL: PROVIDE MINIMUM NEMA 1 RATING FOR INDOOR APPLICATION AND NEMA 4X RATING FOR OUTDOOR APPLICATION OR THE APPROPRIATE NEMA RATING FOR APPLICATION. ELECTRICAL PIPING AND WIRING SHALL BE PENETRATED THROUGH THE BOTTOM OF THE PANEL WITH 4 INCHES NIPPLES AND 4 INCHES WIRING TROUGH.

5) SECONDARY CONTROL PANEL: PROVIDE MINIMUM NEMA 1 RATING FOR INDOOR APPLICATION.

6) SIZE CONTROL PANEL ENCLOSURES FOR TEN PERCENT (10%) SPARE MOUNTING CAPACITY FOR FUTURE EXPANSION.

7) ONLY ONE CONTROLLER SHALL BE ALLOWED IN A CONTROL PANEL WITH EXPANSION MODULES IF EXTRA POINTS ARE NEEDED. THE BMS VENDOR SHALL UTILIZE THE LARGEST CONTROLLER AVAILABLE IN THE PRODUCT LINE TO ACCOMMODATE THE POINTS REQUIRED. IF MAXED OUT, ONLY THEN SHOULD A SECOND CONTROLLER BE INSTALLED WITHIN THE PANEL.

8) CONTROL PANEL INTERNAL COMPONENTS:

A. PROVIDE IDENTIFICATION SLEEVES AT EACH TERMINATION AT THE TERMINAL STRIP.

B. ALL CONTROL PANELS SHALL BE PROVIDED WITH DIN RAIL MOUNTED SCREW TERMINAL BLOCKS. FIELD WIRING SHALL BE CONNECTED TO THE SCREW TERMINAL BLOCKS. IT IS NOT ACCEPTABLE TO TERMINATE ANY FIELD WIRING DIRECTLY TO THE DDC CONTROLLER OR ANY PANEL DEVICES SUCH AS RELAY AND TRANSDUCERS. THE SCREW TERMINAL BLOCKS LOCATED/ATTACHED TO THE DDC CONTROLLER ALONE DOES NOT COMPLY WITH THIS REQUIREMENT. TERMINAL BLOCKS SHALL BE RATED FOR 300 VOLTS, MEDIUM DUTY. PROVIDE PHOENIX FEED–THROUGH TERMINAL BLOCK UT 2,5 OR PRE–APPROVED EQUAL.

C. ALL CONTROL DEVICES SUCH AS RELAYS, TRANSFORMERS, TRANSDUCERS, POWER SUPPLIES, ASSOCIATED I/O DEVICES, ETC SHALL BE INSTALLED INSIDE THE PANEL, NOT AT THE STARTER OR ELECTRICAL JUNCTION BOX.

D. ALL PANEL WIRINGS SHALL IN BE INSTALLED IN PANDUIT AND WIRING DUCT. THIS SHALL INCLUDE BUT NOT BE LIMITED TO WIRING FROM THE DDC CONTROLLER TO THE TERMINAL BLOCK, BETWEEN DDC CONTROLLER AND RELAY (AND OTHER PANEL MOUNTED CONTROL DEVICES), POWER WIRING FOR THE CONTROLLER, COMMUNICATION, ETC.

E. MOUNTING ANY CONTROL DEVICES ON THE BACK OF THE CONTROL PANEL ENCLOSURE DOOR IS NOT ACCEPTABLE.

F. UTILIZING WIRE NUTS IN THE CONTROL PANEL IS ALSO NOT ACCEPTABLE.

9) POWER WIRING AND COMMUNICATION WIRING SHALL BE PROVIDED IN SEPARATE CONDUITS WITH SEPARATE HOT, NEUTRAL, AND GROUND WIRE RUNS AND SEPARATE BREAKERS.

10) ALL CONTROL PANELS SHALL SATISFY UL 508A.

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Project

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Mechanical Upgrades:

Eli Whitney School
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Drawing Title

MECHANICAL SPECIFICATIONS

Issued 03/05/2019	Drawing No. M-402
Scale NTS	
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11) COORDINATE INSTALLATION OF THE CONTROL PANELS WITH THE ENGINEER/ARCHITECT. COORDINATE POWER FOR THE PANELS WITH THE ELECTRICAL CONTRACTOR.

C. OPERATOR INTERFACE DISPLAY:

1) THE OPERATOR INTERFACE DISPLAY FUNCTIONS AS A CONTROLLER MOUNTED AND/OR PANEL MOUNTED INTERFACE FOR THE PRIMARY CONTROLLERS.

2) THE PANEL MOUNTED OPERATOR INTERFACE DISPLAY SHALL PROVIDES A SIMPLE, MENU-DRIVEN DISPLAY WITH EXTENSIVE FUNCTIONS TO VIEW AND MODIFY DATA, SUCH AS SETPOINT VALUES, ACTUAL TEMPERATURE VALUES, CONTROL STATUS, AND SWITCHING STATUS. LOCAL INTERROGATION SHALL INCLUDE BUT NOT BE LIMITED TO ALARMS, HISTORY AND TRENDING REPORTS. THE PANEL MOUNTED OPERATOR INTERFACE SHALL HAVE A MEMBRANE KEYPAD AND AN LCD DISPLAY.

3) ENGLISH LANGUAGE TEXT WITHOUT THE NEED FOR ANY POINT CODES TO PULL UP DATA. SIMPLE KEY FUNCTIONS TO REDUCE CUSTOMER TRAINING

4) PASSWORD PROTECTED OPERATION, FOR MULTIPLE LEVEL USERS.

5) ALARM HANDLING CAPABILITY TO DISPLAY CRITICAL ALARM FOR ON-SITE ACTION.

D. PRIMARY CONTROL PANEL HARDWARE

1) ASHRAE 135 COMPLIANCE: PRIMARY CONTROL PANELS SHALL USE THE LATEST VERSION OF BACNET/ASHRAE 135 PROTOCOL AND COMMUNICATE USING ISO 8802-3 (ETHERNET) DATALINK/PHYSICAL LAYER PROTOCOL.

2) PROVIDE ALL NECESSARY HARDWARE FOR A COMPLETELY INDEPENDENT CONTROLLER, AND INSTALL ALL HARDWARE IN A PRIMARY CONTROL PANEL.

3) ALL PRIMARY CONTROL PANELS SHALL BE INSTALLED WITH 10% SPARE POINTS (OF EACH TYPE) AND 10% SPARE MEMORY CAPACITY FOR FUTURE CONNECTIONS.

4) EACH PRIMARY CONTROL PANEL SHALL AT A MINIMUM, BE 32BIT, STAND-ALONE, MULTI-TASKING, MULTI-USER, REAL-TIME 48MHZ DIGITAL CONTROL MICROPROCESSOR MODULE APPROPRIATE FOR NETWORK FUNCTION WITH PORTABLE COMPUTER AND PRINTER CONNECTION PORTS.

5) CONTROLLER SHALL HAVE A MINIMUM OF 32 MB RAM, 1 MB OF FLASH, AND 16K EPROM OR EEPROM. CONTROLLER SHALL BE PROVIDED WITH BATTERY BACKUP CAPABLE OF SUPPORTING ALL RAM, CLOCK FUNCTIONS, DDC DATABASE AND OPERATING PROGRAMS WITHIN THE CONTROLLER FOR A MINIMUM OF 72 HOURS IN THE EVENT OF POWER FAILURE OR POWER INTERRUPTION (IF INFORMATION IS NOT STORED IN NON-VOLATILE MEMORY).

6) PROVIDE ALL NECESSARY SOFTWARE FOR A COMPLETE OPERATING SYSTEM AS REQUIRED. ALL SOFTWARE SHALL RESIDE IN EACH PRIMARY CONTROL PANEL. PRIMARY CONTROL PANELS SHALL NOT BE DEPENDENT UPON ANY HIGHER LEVEL COMPUTER OR ANOTHER CONTROLLER FOR OPERATION.

7) PROVIDE ONE (1) PRIMARY CONTROL PANEL FOR EACH OF THE FOLLOWING:

A. AIR HANDLING UNIT

E. SECONDARY CONTROL PANEL HARDWARE

1) ASHRAE 135 COMPLIANCE: SECONDARY CONTROL PANELS SHALL USE THE LATEST VERSION OF BACNET/ASHRAE 135 PROTOCOL OVER MS/TP.

2) EACH SECONDARY CONTROL PANEL SHALL OPERATE AS A STAND-ALONE CONTROLLER CAPABLE OF PERFORMING ITS USER SELECTABLE CONTROL ROUTINES INDEPENDENTLY OF ANY OTHER CONTROLLER IN THE SYSTEM.

3) EACH SECONDARY CONTROL PANEL SHALL, AT A MINIMUM, BE A MICROPROCESSOR-BASED, MULTI-TASKING, STAND-ALONE, REAL-TIME DIGITAL CONTROL MICROPROCESSOR MODULE, LOCAL DIGITAL INPUT/OUTPUT STATUS, AND A PORTABLE COMPUTER CONNECTION PORT.

4) CONTROLLERS SHALL INCLUDE ALL MEMORY AND POINT INPUTS AND OUTPUTS NECESSARY TO PERFORM THE SPECIFIED CONTROL SEQUENCES. AS A MINIMUM, 50% OF THE POINT OUTPUTS SHALL BE OF THE UNIVERSAL TYPE; THAT IS, THE OUTPUTS MAY BE UTILIZED EITHER AS MODULATING OR TWO-STATE, ALLOWING FOR ADDITIONAL SYSTEM FLEXIBILITY. IN LIEU OF UNIVERSAL OUTPUTS, PROVIDE A MINIMUM OF 50% SPARE OUTPUTS OF EACH TYPE VIA ADDITIONAL POINT TERMINATION BOARDS OR CONTROLLERS. ANALOG OUTPUTS SHALL BE INDUSTRY STANDARD SIGNALS SUCH AS 24 VAC FLOATING CONTROL, ALLOWING FOR INTERFACE TO A VARIETY OF MODULATING ACTUATORS. TERMINAL EQUIPMENT CONTROLLERS UTILIZING PROPRIETARY CONTROL SIGNALS AND ACTUATORS SHALL NOT BE ACCEPTABLE.

5) ALL DATABASES AND PROGRAMS SHALL BE STORED IN NON-VOLATILE EEPROM, EPROM AND PROM. CONTROLLER SHALL HAVE A MINIMUM OF 16K EPROM OR EEPROM.

6) PROVIDE ALL NECESSARY SOFTWARE FOR A COMPLETE OPERATING SYSTEM AS REQUIRED. ALL SOFTWARE SHALL RESIDE IN EACH SECONDARY CONTROL PANEL. SECONDARY CONTROL PANELS SHALL NOT BE DEPENDENT UPON ANY HIGHER LEVEL COMPUTER OR ANOTHER CONTROLLER FOR OPERATION.

7) LIMIT THE NUMBER OF SECONDARY CONTROLS TO 60 OR AS REQUIRED BY THE MANUFACTURER.

8) PROVIDE ONE (1) SECONDARY CONTROL PANEL FOR EACH OF THE FOLLOWING:

A. H & V UNIT.

F. SENSORS

1) ALL ELECTRONIC SENSORS SHALL BE VIBRATION AND CORROSION RESISTANT FOR WALL, IMMERSION, OR DUCT MOUNTING AS REQUIRED.

2) TEMPERATURE SENSORS USED IN DUCT OR SPACE SENSING APPLICATIONS SHALL BE THERMISTORS. TEMPERATURE SENSORS SHALL HAVE THE FOLLOWING CHARACTERISTICS.

A. ACCURACY: PLUS OR MINUS 0.5 DEGF.

B. WIRE: TWISTED, SHIELDED-PAIR CABLE.

C. INSERTION ELEMENTS IN DUCTS: SINGLE POINT; USE WHERE NOT AFFECTED BY TEMPERATURE STRATIFICATION OR WHERE DUCTS ARE SMALLER THAN 9SQ FT. (1 SQ M). THE LENGTH OF THE SENSOR SHALL BE A MINIMUM OF ONE-THIRD OF THE WIDTH OF THE DUCT WITH A MAXIMUM LENGTH OF EIGHTEEN (18) INCHES. PROVIDE DUCT MOUNTED METAL HOUSING WITH CONDUIT ENTRANCE.

D. AVERAGING ELEMENTS IN DUCTS: USE WHERE PRONE TO TEMPERATURE STRATIFICATION OR WHERE DUCTS ARE LARGER THAN 9SQ FT (1 SQ M); LENGTH AS REQUIRED. THE LENGTH OF THE SENSOR SHALL BE TWELVE (12) FEET MINIMUM OR ONE (1) LINEAR FOOT PER EVERY FOUR (4) SQ FT OF CUT CROSS SECTION, WHICHEVER IS GREATER. PROVIDE DUCT MOUNTED METAL HOUSING WITH CONDUIT ENTRANCE AND MOUNTING CLIPS.

E. PROVIDE ONE (1) AVERAGING TEMPERATURE SENSOR FOR EACH PREHEAT OR HEATING COIL SECTION IN AN AIR HANDLING UNIT. THE SENSOR SHALL BE INSTALLED ON THE DISCHARGE SIDE OF EACH PREHEAT COIL.

F. SPACE SENSORS:

(1) SET-POINT ADJUSTMENT AND INDICATION: EXPOSED

(2) LCD DISPLAY FOR TEMPERATURE READING

(3) OCCUPANCY OVERRIDE WITH AN ADJUSTABLE TIME PERIOD FROM 1/2 TO 3 HOURS.

(4) SPACE SENSORS PROVIDED IN EXISTING FACILITIES SHALL MATCH EXISTING SITE STANDARD.

(5) PROVIDE A COMMUNICATION PORT FOR CONNECTION OF A LAPTOP OR OTHER PORTABLE INTERFACE DEVICE.

3) HUMIDITY AND TEMPERATURE TRANSMITTER

A. HUMIDITY PARAMETERS SHALL INCLUDE WET BULB TEMPERATURE, DEWPOINT/FROST POINT, ENTHALPY, ABSOLUTE HUMIDITY, MIXING RATIO, VAPOR PRESSURE AND SATURATION VAPOR PRESSURE CALCULATIONS.

B. SHALL BE PROVIDED WITH A 3-POINT NIST TRACEABLE CALIBRATION CERTIFICATE

C. PROBE SHALL BE CHROME COATED ALUMINUM.

D. HOUSING SHALL BE A MINIMUM OF NEMA 4.

E. SENSOR PROTECTION SHALL BE PLASTIC GRID WITH MEMBRANE FILTER.

F. WALL MOUNTABLE WITH DISPLAY.

G. HUMIDITY SENSOR: 0-100 % RH, ACCURACY: ± 1.5 TO 2.5 % RH FOR TEMPERATURE RANGE FROM +32°F TO +104°F.

H. TEMPERATURE SENSOR: -40 TO 176°F, ± 0.32 °F (AT +59°F TO +77°F).

I. OUTPUT(S): DEW POINT, HUMIDITY, AND TEMPERATURE.

J. OUTPUTS: 4-20 MA.

K. OPTIONAL RAIN SHIELD, RADIATION SHIELD, AND/OR DUCT INSTALLATION KITS SHALL BE PROVIDED DEPENDING ON WHERE THE SENSOR AND TRANSMITTER IS INSTALLED.

4) STATIC-PRESSURE TRANSMITTER: NONDIRECTIONAL SENSOR WITH SUITABLE RANGE FOR EXPECTED INPUT, AND TEMPERATURE COMPENSATED.

A. ACCURACY: 1% OF FULL SCALE WITH REPEATABILITY OF 0.1%.

B. OUTPUT: 4 - 20MA.

C. BUILDING STATIC-PRESSURE RANGE: 0-0.25" WG (0-62 PA).

D. DUCT STATIC-PRESSURE RANGE: 0-5" WG (0-1243 PA).

E. PROVIDE A SETRA M264 OR PRE-APPROVED EQUAL.

F. THESE SENSORS SHALL BE USED FOR CONTROL OF FAN VFDS, MONITORING OF FILTER DP, ETC.

5) PRESSURE TRANSMITTERS: DIRECT ACTING FOR GAS, LIQUID OR STEAM SERVICE; RANGE SUITABLE FOR SYSTEM; PROPORTIONAL OUTPUT 4-20MA.

A. 2-WIRE CAPACITANCE.

B. RATED FOR 0% TO 95% RH AND 0°F - 140°F.

C. DUAL COMPONENT HOUSING WITH A MOISTURE BARRIER COMPLETELY ISOLATING THE ELECTRONIC CIRCUITRY FROM THE FIELD WIRING AND CALIBRATION TERMINALS.

D. ZERO AND SPAN ADJUSTMENTS.

E. ACCURACY SHALL BE + 0.25% OF CALIBRATED SPAN.

F. TRANSMITTER SHALL BE FURNISHED COMPLETE WITH FACTORY MOUNTED 5-VALVE MANIFOLD.

G. SETRA OR PRE-APPROVED EQUAL.

G. DAMPER ENDSWITCHES

1) PROVIDE A NON-MERCURY, SPDT SWITCH FOR MOUNTING ON DAMPER SHAFT. SWITCH MAKES AT 20° ABOVE HORIZONTAL. PROVIDE JOHNSON CONTROLS TS-475 SERIES OR PRE-APPROVED EQUAL.

H. EQUIPMENT OPERATION SENSORS AS FOLLOWS:

1) STATUS INPUTS FOR FANS: DIFFERENTIAL-PRESSURE SWITCH WITH ADJUSTABLE RANGE OF 0 TO 5 INCHES WG.

I. CURRENT SENSING RELAY: PROVIDE AND INSTALL CURRENT SENSORS FOR ALL MOTOR STATUS POINTS. CURRENT SENSOR SHALL BE SPLIT CORE AND SIZED FOR EXPECTED AMPERAGE. UNIT SHALL BE UL LISTED. PROVIDE STATUS LEDS FOR CURRENT SENSED BELOW SETPOINT AND CURRENT SENSED ABOVE SETPOINT. THE CURRENT SENSOR SHALL BE FIELD CALIBRATED TO DETECT BELT LOSS, COUPLING SHEAR AND MECHANICAL FAILURE. THE CURRENT SENSOR OUTPUT SHALL BE N.O., SOLID STATE AND RATED FOR 1.0A AT 30 VAC/DC. CURRENT SENSOR SHALL BE MANUFACTURED BY HAWKEYE OR PRE-APPROVED EQUAL.

J. AIR DIFFERENTIAL PRESSURE SWITCHES: DIAPHRAGM TYPE AIR DIFFERENTIAL PRESSURE SWITCHES WITH DIE-CAST ALUMINUM HOUSING, ADJUSTABLE SETPOINT AND MINIMUM 5A SWITCH RATING AT 120VAC, SPST SWITCHES AND THE SWITCH PRESSURE RANGE SHALL BE SUITED FOR THE APPLICATION. MANUAL RESET SWITCHES SHALL BE DWYER 1800 SERIES AND AUTOMATIC RESET SWITCHES SHALL BE DWYER 1900 SERIES. SWITCH SHALL BE AUTOMATIC OR MANUAL RESET TYPE. HIGH AND LOW PORTS SHALL BE 1/8 INCH NPT CONNECTED TO ANGLE TYPE TIPS DESIGNED TO SENSE PRESSURE.

K. CONTROL RELAYS: MECHANICAL RELAY: THE CONTROL RELAY SHALL BE RATED FOR 24 VAC OR 24VDC; MAXIMUM CONTACT RATING OF 10 AMP AT 30 VDC OR 250 VAC. OUTPUTS SHALL BE TRUE FORM C TYPE CONTACTS; SOLID STATE RELAYS ARE NOT ACCEPTABLE.

L. CONTROL TRANSFORMERS SHALL BE UL LISTED. FURNISH CLASS 2 CURRENT-LIMITING TYPE OR FURNISH OVER-CURRENT PROTECTION IN PRIMARY AND SECONDARY CIRCUITS FOR CLASS 2 SERVICE IN ACCORDANCE WITH NEC REQUIREMENTS. LIMIT CONNECTED LOADS TO 80% OF RATED CAPACITY.

M. THERMOSTATS

1) ELECTRIC, SOLID-STATE, MICROCOMPUTER-BASED ROOM THERMOSTAT WITH REMOTE SENSOR.

A. AUTOMATIC SWITCHING FROM HEATING TO COOLING.

B. PREFERENTIAL RATE CONTROL TO MINIMIZE OVERSHOOT AND DEVIATION FROM SET POINT.

C. SET UP FOR FOUR (4) SEPARATE TEMPERATURES PER DAY.

D. INSTANT OVERRIDE OF SET POINT FOR CONTINUOUS OR TIMED PERIOD FROM 1 HOUR TO 31 DAYS.

E. SHORT-CYCLE PROTECTION.

F. PROGRAMMING BASED ON EVERY DAY OF WEEK.

G. SELECTION FEATURES INCLUDE °F OR °C DISPLAY, 12- OR 24-HOUR CLOCK, KEYBOARD DISABLE, REMOTE SENSOR AND FAN ON-AUTO.

H. BATTERY REPLACEMENT WITHOUT PROGRAM LOSS.

I. 0-10 VDC ANALOG OUTPUT AND MULTI SPEED FAN CONTROLS.

2) ELECTRIC LOW-LIMIT DUCT THERMOSTAT: SNAP-ACTING, SINGLE-POLE, SINGLE-THROW, MANUAL- OR AUTOMATIC-RESET SWITCH THAT TRIPS IF TEMPERATURE SENSED ACROSS ANY 12 INCHES OF BULB LENGTH IS EQUAL TO OR BELOW SET POINT. SETPOINT SHALL BE ADJUSTABLE.

A. BULB LENGTH: MINIMUM 20 FEET.

B. QUANTITY: ONE THERMOSTAT FOR EVERY 20 SQ. FT. OF COIL SURFACE.

C. PROVIDE ONE (1) FREEZESTAT FOR EACH COOLING COIL IN AN AIR HANDLING UNIT.

D. PROVIDE JCI A70 SERIES OR PRE-APPROVED EQUAL.

N. AUTOMATIC CONTROL VALVES

1) ALL AUTOMATIC CONTROL VALVES SHALL MEET THE FOLLOWING REQUIREMENTS:

A. FULLY PROPORTIONING.

B. CAPABLE OF OPERATING AT VARYING RATES OF SPEED TO CORRESPOND TO THE EXACT DICTATES OF THE CONTROLLERS AND VARIABLE LOAD REQUIREMENTS.

C. BODY PRESSURE RATING AND CONNECTION TYPE CONSTRUCTION SHALL CONFORM TO PIPING AND FITTINGS IN WHICH THE VALVE IS TO BE INSTALLED AND TO THE VALVE SCHED?ULES.

D. ISOLATION VALVE SHALL BE LINE SIZE, FULL PORT BALL VALVE WITH STAINLESS STEEL BALL AND STEM. ISOLATION VALVE 4" AND LARGE SHALL BE BUTTERFLY VALVES.

E. CONTROL VALVES 2" AND SMALLER SHALL HAVE SCREWED CONNECTIONS.

F. CONTROL VALVES LARGER THAN 2 1/2" SHALL HAVE FLANGED CONNECTIONS.

2) WATER CONTROL VALVES: CHILLED WATER, HOT WATER, GLYCOL, AND CONDENSER WATER

A. TWO-POSITION VALVES SHALL BE QUICK OPENING TYPE WITH THE FOLLOWING CHARACTERISTICS:

(1) VALVES SHALL HAVE REPLACEABLE SEAT, PLUG, OR DISC.

(2) VALVES SHALL BE LINE SIZE.

(3) VALVE BODY SHALL BE BRONZE, CAST IRON, FORGED BRASS, OR RED BRASS.

(4) BALL VALVE SHALL HAVE STAINLESS STEEL STEM, STAINLESS STEEL BALL, AND PTFE SEATS.

(5) GLOBE VALVE SHALL HAVE STAINLESS STEEL STEM AND SINGLE STAINLESS STEEL SEAT.

(6) THE PRESSURE DROP SHALL NOT EXCEED 10-20% OF THE PIPING SYSTEM PRESSURE DIFFERENTIAL, LEAVING THE OTHER 80-90% FOR THE LOAD AND PIPING CONNECTIONS.

(7) TWO-WAY VALVE

i. VALVE ACTUATOR AND TRIM SHALL PROVIDE CLOSE-OFF (DIFFERENTIAL) PRESSURE RATINGS GREATER THAN OR EQUAL TO 150% OF THE TOTAL SYSTEM (PUMP) HEAD.

B. MODULATING CONTROL VALVES SHALL HAVE THE FOLLOWING CHARACTERISTICS:

(1) VALVE SHALL BE ONE SIZE BELOW PIPE SIZE.

(2) VALVE SHALL HAVE REPLACEABLE SEAT, PLUG, OR DISC.

(3) EQUAL PERCENTAGE FLOW CHARACTERISTIC (CHARACTERIZED BALL OR GLOBE TYPE VALVES).

(4) VALVE BODY SHALL BE BRONZE, CAST IRON, FORGED BRASS OR RED BRASS.

(5) BALL VALVE SHALL HAVE STAINLESS STEEL STEM, STAINLESS STEEL BALL, AND PTFE SEATS.

(6) GLOBE VALVE SHALL HAVE STAINLESS STEEL STEAM AND SINGLE STAINLESS STEEL SEAT.

C. TWO-WAY VALVE

(1) CALCULATE CV BASED UPON MAXIMUM DESIGN FLOW AND A PRESSURE DROP EQUAL TO THE PRESSURE DROP THROUGH THE COIL WITH A MAXIMUM OF 5 PSI (35 KPA).

(2) VALVE ACTUATOR AND TRIM SHALL PROVIDE CLOSE-OFF (DIFFERENTIAL) PRESSURE RATINGS GREATER THAN OR EQUAL TO 150% OF THE TOTAL SYSTEM (PUMP) HEAD.

3) PROVIDE ONE (1) CONTROL VALVE FOR EACH PREHEAT OR HEATING COIL AT A MINIMUM.

4) CONTROL VALVES 4? AND LARGER SHALL BE BUTTERFLY VALVES FOR ISOLATION APPLICATIONS AND GLOBE VALVES FOR MODULATING APPLICATIONS.

5) CONTROL VALVES SHALL BE BELIMO, HONEYWELL, JOHNSON CONTROLS, SIEMENS OR PRE-APPROVED EQUAL.

6) ALL VALVE ACTUATORS SHALL MEET THE FOLLOWING REQUIREMENTS:

A. ALL VALVE ACTUATION SHALL BE ELECTRIC. PNEUMATIC ACTUATION IS NOT ACCEPTABLE.

B. VALVE ACTUATOR SHALL BE BY SAME MANUFACTURER AS VALVE BODY UNLESS PRE-APPROVED.

C. VALVE ACTUATORS SHALL:

(1) PROVIDE SMOOTH MODULATION AT DESIGN FLOW AND PRESSURE CONDITIONS.

(2) BE QUIET IN OPERATION.

(3) BE SIZED TO CLOSE AGAINST A DIFFERENTIAL PRESSURE EQUAL TO THE DESIGN PUMP HEAD PLUS 15%. WHERE PRESSURE AND FLOW COMBINATIONS EXCEED RATINGS FOR COMMERCIAL VALVES AND ACTUATORS, INDUSTRIAL CLASS VALVES AND ACTUATORS SHALL BE PROVIDED.

(4) BE CAPABLE OF OPERATING IN SEQUENCE WITH OTHER VALVES AND/OR DAMPER ACTUATORS WHEN REQUIRED BY THE SEQUENCE OF OPERATION.

D. VALVE ACTUATORS SHALL FAIL-SAFE IN EITHER THE NORMALLY OPEN OR NORMALLY CLOSED POSITION IN THE EVENT OF POWER FAILURE, SIGNAL FAILURE OR COMPRESSED AIR FAILURE. FAIL SAFE POSITIONS ARE AS FOLLOWS:

(1) PREHEAT VALVES NORMALLY OPEN

(2) COOLING VALVES NORMALLY CLOSED

(3) HEATING VALVES NORMALLY OPEN

(4) DUCT-MOUNTED REHEAT NORMALLY CLOSED COIL VALVES

7) INCREMENTAL ELECTRONIC ACTUATOR FOR TERMINAL EQUIPMENT VALVE ACTUATION

A. INCREMENTAL ACTUATORS SHALL BE ALLOWED FOR TERMINAL EQUIPMENT ONLY.

B. ACTUATORS SHALL BE PROPORTIONAL, ELECTRONIC, DIRECT-COUPLED ACTUATORS USED FOR MODULATING SERVICE. ACTUATORS SHALL BE EQUIPPED WITH METAL HOUSINGS AND VISUAL STROKE INDICATORS.

C. ACTUATORS SHALL BE EQUIPPED WITH A PERMANENT MANUAL ADJUSTMENT. SPRING RETURN POSITION SHOULD BE FIELD ADJUSTABLE WITH A SWITCH.

D. MINIMUM TORQUE: 35" LB; OPERATING VOLTAGE: 24VAC; POWER CONSUMPTION: 1.5VA MAXIMUM; SPRING RETURN TIME: 20 SEC MAXIMUM.

8) ELECTRIC VALVE ACTUATION

A. ACTUATOR SHALL HAVE ELECTRONIC, PROPORTIONAL CONTROL AND SHALL BE DIRECT-COUPLED WITH SPRING RETURN.

B. ACTUATORS SHALL BE EQUIPPED WITH A PERMANENT MANUAL OVERRIDE HAND WHEEL AND VISUAL AND ELECTRONIC STROKE INDICATORS.

C. OPERATING VOLTAGE: 24VAC; INPUT SIGNAL: 0-10VDC, 4 - 20MA; POWER CONSUMPTION: 18VA MAXIMUM (VALVES 2" AND UNDER), 28VA MAXIMUM (VALVES 2-1/2" - 4"); SPRING RETURN TIME: 15 SECONDS MAXIMUM;

D. SPRING RETURN POSITION SHOULD BE FIELD ADJUSTABLE WITH A SWITCH.

E. NOMINAL FORCE: 225LB MINIMUM (VALVES 2? AND UNDER), 610LB. (VALVES 2-1/2"-4")

F. STROKE: 3/4" (20MM) MAXIMUM (VALVES 2" AND UNDER), 1-1/2" (VALVES 2-1/2"-4").

O. DAMPERS

1) DAMPERS: AMCA-RATED DESIGN; 0.1084" MINIMUM, GALVANIZED-STEEL FRAMES WITH HOLES FOR DUCT MOUNTING; DAMPER BLADES SHALL NOT BE LESS THAN 0.0635" GALVANIZED STEEL WITH MAXIMUM BLADE WIDTH OF 8".

2) BLADES SHALL BE SECURED TO 1/2" DIAMETER, ZINC-PLATED AXLES USING ZINC-PLATED HARDWARE, WITH NYLON BLADE BEARINGS, BLADE-LINKAGE HARDWARE OF ZINC-PLATED STEEL AND BRASS, ENDS SEALED AGAINST SPRING-STAINLESS-STEEL BLADE BEARINGS AND THRUST BEARINGS AT EACH END OF EVERY BLADE.

3) OPERATING TEMPERATURE RANGE: FROM -40°F - 200°F.

4) FOR STANDARD APPLICATIONS, INCLUDE OPTIONAL CLOSED-CELL NEOPRENE EDGING.

5) FOR LOW-LEAKAGE APPLICATIONS, USE PARALLEL- OR OPPOSED-BLADE DESIGN WITH INFLATABLE SEAL BLADE EDGING, OR REPLACEABLE RUBBER SEALS, RATED FOR LEAKAGE AT LESS THAN 10CFM/SQ FT OF DAMPER AREA, AT DIFFERENTIAL PRESSURE OF 4" WG WHEN DAMPER IS BEING HELD BY TORQUE OF 50 IN X LB; WHEN TESTED ACCORDING TO AMCA 500D.

6) DAMPERS USED IN A 2-POSITION APPLICATION SHALL BE PARALLEL BLADE DESIGN. DAMPERS USED IN A MODULATING APPLICATION SHALL BE OPPOSED BLADE DESIGN.

P. DAMPER ACTUATION

1) ALL DAMPER ACTUATION SHALL BE ELECTRIC. PNEUMATIC ACTUATION IS NOT ACCEPTABLE.

2) ALL DAMPER ACTUATORS SHALL MEET THE FOLLOWING REQUIREMENTS:

A. ALL DAMPER ACTUATORS SHALL HAVE SUFFICIENT POWER TO OVERCOME FRICTION OF DAMPER LINKAGE AND AIR PRESSURE ACTING ON LOUVERS AND TO OPERATE THE DAMPER SMOOTHLY THROUGHOUT THE ENTIRE DAMPER RANGE.

B. ACTUATORS SHALL BE SIZED WITH A TORQUE GREATER THAN 150% OF THE DESIGN DAMPER TORQUE.

C. ACTUATORS SHALL HAVE MOUNTING ARRANGEMENT FOR LOCATION OUTSIDE OF THE AIR STREAM. THE DAMPER ACTUATORS SHALL BE MOUNTED ON THE DAMPER EXTENSION SO THAT IT IS NOT BURNED IN THE WALL CONSTRUCTION.

3) DAMPER ACTUATORS SHALL FAIL-SAFE IN EITHER THE NORMALLY OPEN OR NORMALLY CLOSED POSITION IN THE EVENT OF POWER FAILURE, SIGNAL FAILURE OR COMPRESSED AIR FAILURE. FAIL SAFE POSITIONS ARE AS FOLLOWS:

A. OUTSIDE AIR DAMPERS NORMALLY CLOSED

B. RETURN AIR DAMPERS NORMALLY OPEN

C. EXHAUST AIR DAMPERS NORMALLY CLOSED

D. ISOLATION DAMPERS NORMALLY CLOSED

4) ELECTRIC DAMPER ACTUATION

A. PROVIDE PROPORTIONAL, ELECTRONIC, DIRECT-COUPLED SPRING RETURN ACTUATORS FOR ALL AUTOMATIC DAMPERS USED FOR MODULATING SERVICE. EACH ACTUATOR SHALL BE EQUIPPED WITH A BRUSHLESS DC MOTOR, SELF CENTERING SHAFT COUPLING, METAL HOUSING, PERMANENT MANUAL OVERRIDE, VISUAL STROKE INDICATORS AND BUILT IN ADJUSTABLE START AND SPAN CONTROLS WITH THE FOLLOWING SPECIFICATIONS:

(1) OPERATING VOLTAGE: 24VAC; INPUT SIGNAL: 0-10VDC, 4 - 20MA (MODULATING), ON/OFF (2-POSITION); POWER CONSUMPTION: 9 VA MAXIMUM.

(2) SPRING RETURN TIME: 15 SECONDS MAXIMUM. SPRING RETURN POSITION SHOULD BE FIELD ADJUSTABLE WITH A SWITCH.

(3) MINIMUM TORQUE: 133" LB.

5) DAMPER ACTUATORS SHALL BE BELIMO OR PRE-APPROVED EQUAL.

21. AUTOMATIC CONTROLS EXECUTION

A. INSTALLATION

1) CONNECT AND CONFIGURE EQUIPMENT AND SOFTWARE TO ACHIEVE SEQUENCE OF OPERATION SPECIFIED.

2) VERIFY LOCATION OF THERMOSTATS, HUMIDISTATS, AND OTHER EXPOSED CONTROL SENSORS WITH PLANS AND ROOM DETAILS BEFORE INSTALLATION. LOCATE ALL 60 INCHES ABOVE THE FLOOR OR AS OTHERWISE REQUIRED BY ADA.

3) INSTALL AVERAGING ELEMENTS IN DUCTS AND PLENUMS IN CROSSING OR ZIGZAG PATTERN.

4) INSTALL DAMPER MOTORS ON OUTSIDE OF DUCT IN WARM AREAS, NOT IN LOCATIONS EXPOSED TO OUTDOOR TEMPERATURES.

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Project

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Drawing Title

MECHANICAL SPECIFICATIONS

Issued 03/05/2019	Drawing No. M-403
Scale NTS	
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5) WATER LINE MOUNTED SENSORS SHALL BE REMOVABLE WITHOUT SHUTTING DOWN THE SYSTEM IN WHICH THEY ARE INSTALLED.

6) FOR DUCT STATIC PRESSURE SENSORS, THE HIGH PRESSURE PORT SHALL BE CONNECTED TO A METAL STATIC PRESSURE PROBE INSERTED INTO THE DUCT POINTING UPSTREAM. THE LOW PRESSURE PORT SHALL BE LEFT OPEN TO THE PLENUM AREA AT THE POINT THAT THE HIGH PRESSURE PORT IS TAPPED INTO THE DUCTWORK.

7) AVERAGING TEMPERATURE SENSORS (I.E. FREEZESTATS, MIXED AIR TEMPERATURE SENSOR, ETC.) SHALL BE PROVIDED WITH FASTENERS OR MOUNTING CLIPS TO PREVENT SHEARING DUE TO VIBRATIONS IN THE DUCTWORK.

B. ELECTRICAL WIRING AND CONNECTION INSTALLATION

1) INSTALL, CONNECT AND WIRE THE ITEMS INCLUDED UNDER THIS SECTION. THIS WORK INCLUDES PROVIDING REQUIRED CONDUIT, WIRE, FITTINGS AND RELATED WIRING ACCESSORIES.

2) ALL EXPOSED WIRING AND WIRING IN MECHANICAL EQUIPMENT ROOMS SHALL BE INSTALLED IN CONDUIT.

3) PLENUM RATED CABLE SHALL BE ACCEPTABLE IN HUNG CEILINGS, WALLS, AND RAISED FLOORS.

4) ALL WIRING LOCATED OUTSIDE SHALL BE INSTALLED IN RIGID CONDUIT, SEAL TITE, OR EMT WITH COMPRESSION FITTINGS.

5) FASTEN FLEXIBLE CONDUCTORS, BRIDGING CABINETS AND DOORS, ALONG HINGE SIDE; PROTECT AGAINST ABRASION. TIE AND SUPPORT CONDUCTORS.

6) NUMBER-CODE OR COLOR-CODE CONDUCTORS FOR FUTURE IDENTIFICATION AND SERVICE OF CONTROL SYSTEM, EXCEPT LOCAL INDIVIDUAL ROOM CONTROL CABLES.

7) WIRES AND CABLES SHALL BE AS FOLLOWS:

A. SINGLE CONDUCTOR (120VAC): TYPE THWN 12AWG STRANDED COPPER WITH 600V INSULATION

8) PRIMARY AND SECONDARY COMMUNICATIONS NETWORK CABLING

A. CABLE SHALL BE OF TYPE RECOMMEND BY THE DDC SYSTEM MANUFACTURER AND 20AWG AT A MINIMUM.

B. CABLE SHALL BE SHIELDED.

9) ROOM SENSOR CABLING

A. CABLE SHALL CONSIST OF COPPER CONDUCTORS NOT LESS THAN NO. 24 AWG.

10) CABLES FOR 120VAC WIRING AND LOW LEVEL SIGNAL WIRING (I.E., 4 – 20MA ANALOG) SHALL ALWAYS BE RUN IN SEPARATE RACEWAYS.

C. FIELD QUALITY CONTROL

1) OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER UNIT OPERATION. REMOVE MALFUNCTIONING UNITS, REPLACE WITH NEW UNITS, AND RETEST.

2) TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT, AND RETEST.

3) ADJUST, CALIBRATE, AND FINE TUNE CIRCUITS AND EQUIPMENT TO ACHIEVE SEQUENCE OF OPERATION SPECIFIED.

D. TRAINING

1) THE BMS CONTRACTOR SHALL PROVIDE COMPETENT INSTRUCTORS TO GIVE FULL INSTRUCTION TO DESIGNATED PERSONNEL IN THE ADJUSTMENT, OPERATION, AND MAINTENANCE OF THE SYSTEM INSTALLED RATHER THAN A GENERAL TRAINING COURSE.

2) PROVIDE EIGHT (8) HOURS OF TRAINING FOR OWNER'S OPERATING AND MAINTENANCE PERSONNEL. ALL TRAINING SHALL BE ON-SITE TRAINING. VIDEOTAPE ALL SESSIONS AND EDIT EACH SESSION TO 1-HOUR DVDS. TURN OVER TWO (2) COPIES EACH UNEDITED AND EDITED DVD TO THE OWNER. TRAINING SHALL INCLUDE:

A. EXPLANATION OF DRAWINGS, OPERATORS AND MAINTENANCE MANUALS.

B. WALK-THROUGH OF THE JOB TO LOCATE ALL CONTROL COMPONENTS.

C. OPERATOR WORKSTATION AND PERIPHERALS.

D. DDC CONTROLLER OPERATION/FUNCTION.

E. OPERATOR CONTROL FUNCTIONS INCLUDING GRAPHIC GENERATION, IF DESIGN INCLUDES COLOR GRAPHICS AND FIELD PANEL PROGRAMMING.

F. EXPLANATION OF ADJUSTMENT, CALIBRATION AND REPLACEMENT PROCEDURES.

E. RECORD DOCUMENTATION

1) OPERATION AND MAINTENANCE MANUALS

A. THREE (3) COPIES OF THE OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER'S REPRESENTATIVE UPON COMPLETION OF THE PROJECT. THE ENTIRE OPERATION AND MAINTENANCE MANUAL SHALL BE FURNISHED ON COMPACT DISC MEDIA AND INCLUDE THE FOLLOWING FOR THE BMS PROVIDED:

(1) TABLE OF CONTENTS.

(2) AS-BUILT SYSTEM RECORD DRAWINGS. RECORD DRAWINGS SHALL REPRESENT THE AS-BUILT CONDITION OF THE SYSTEM AND INCORPORATE ALL INFORMATION SUPPLIED WITH THE APPROVED SUBMITTAL.

(3) MANUFACTURERS PRODUCT DATA SHEETS OR CATALOG PAGES FOR ALL PRODUCTS INCLUDING SOFTWARE.

(4) SYSTEM OPERATOR'S MANUALS.

(5) ARCHIVE COPY OF ALL SITE-SPECIFIC DATABASES AND SEQUENCES.

(6) BMS NETWORK DIAGRAMS.

(7) INTERFACES TO ALL THIRD-PARTY PRODUCTS AND WORK BY OTHER TRADES.

2) THE OPERATION AND MAINTENANCE MANUAL CD SHALL BE SELF-CONTAINED AND INCLUDE ALL NECESSARY SOFTWARE REQUIRED TO ACCESS THE PRODUCT DATA SHEETS. A LOGICALLY ORGANIZED TABLE OF CONTENTS SHALL PROVIDE DYNAMIC LINKS TO VIEW AND PRINT ALL PRODUCT DATA SHEETS. VIEWER SOFTWARE SHALL PROVIDE THE ABILITY TO DISPLAY, ZOOM AND SEARCH ALL DOCUMENTS.

F. ON-SITE ASSISTANCE

1) OCCUPANCY ADJUSTMENTS: WITHIN ONE YEAR OF DATE OF SUBSTANTIAL COMPLETION, PROVIDE UP TO THREE PROJECT-SITE VISITS, WHEN REQUESTED BY OWNER, TO ADJUST AND CALIBRATE COMPONENTS AND TO ASSIST OWNER'S PERSONNEL IN MAKING PROGRAM CHANGES AND IN ADJUSTING SENSORS AND CONTROLS TO SUIT ACTUAL CONDITIONS.

22. SEQUENCES OF OPERATIONS

A. GENERAL

1) ALL SAFETY DEVICES SHALL BE HARDWIRED TO THE STARTER AND SHALL HAVE A SECOND CONTACT FOR MONITORING VIA THE BMS.

2) A FAILURE ALARM, AS INCLUDED IN THE POINT LIST, SHALL INDICATE THE TYPE OF EQUIPMENT THAT HAS FAILED (PUMP, FAN, VALVE, ETC.) INCLUDING THE SPECIFIC DESIGNATION OF THE PIECE OF EQUIPMENT (E.G., SUPPLY FAN SF-1). IT IS NOT ACCEPTABLE TO GENERATE A GENERAL FAILURE ALARM.

3) ALARMING DEVICES SUCH AS FREEZESTATS, PRESSURE SAFETIES, ETC. SHALL BE WIRED SO THE CONTACTS OPEN IN THE ALARM CONDITION. ALL ALARM POINTS SHALL BE ANNUNCIATED AT THE BMS AUDIBLY AND VISUALLY. ALL ALARM POINTS ASSOCIATED WITH VARYING VALUES SHALL BE PROVIDED WITH ADJUSTABLE LIMITS.

4) FREEZESTATS SHALL BE AUTOMATIC RESET TYPE AND SHALL BE INSTALLED WITH TIME DELAY AND LATCHING RELAYS. A FREEZESTAT MUST SEE A FREEZE CONDITION FOR A PERIOD OF 180 SECONDS (ADJ.) PRIOR TO SHUTTING DOWN AN AIR HANDLING UNIT. ONCE THE FREEZESTAT HAS BEEN ACTIVATED, MANUAL RESET AT THE BMS PANEL SHALL BE REQUIRED TO ALLOW THE SYSTEM TO RESTART.

5) AIR PRESSURE SWITCHES SHALL BE MANUAL RESET TYPE AND A MANUAL RESET AT THE SWITCH SHALL BE REQUIRED TO ALLOW THE SYSTEM TO RESTART.

6) ALL SETPOINTS INCLUDING SETPOINTS INTERNAL TO CONTROL ALGORITHMS SHALL BE ADJUSTABLE FROM ALL BMS OPERATOR INTERFACES. ALL COMMANDS SHALL BE OVERRIDEABLE FROM ALL BMS OPERATOR INTERFACES. ALL CONTROL POINTS SHALL BE ADJUSTABLE OR OVERRIDEABLE FROM THE SAME GRAPHIC PAGE THAT DISPLAYS THE POINTS.

7) ALL POINTS FOR A SPECIFIC MECHANICAL SYSTEM SHALL BE CONNECTED TO AND CONTROLLED BY THE SAME DDC CONTROLLER UNLESS OTHERWISE SPECIFIED. FOR EXAMPLE, IT IS NOT ACCEPTABLE TO CONTROL A SUPPLY FAN WITH ONE (1) DDC CONTROLLER LOCATED AT A MOTOR CONTROL CENTER AND TO CONTROL THE REST OF THE AIR-HANDLING UNIT POINTS WITH A DDC CONTROLLER LOCATED AT THE AIR-HANDLING UNIT.

8) ALL POINTS REQUIRED BY THE SEQUENCE OF OPERATION INCLUDING, BUT NOT LIMITED TO, THE POINTS LISTED IN THE SEQUENCES OF OPERATION BELOW, AS WELL AS ALL OF THE POINTS' ASSOCIATED VALUES, SHALL BE CONNECTED TO THE BMS AND AVAILABLE TO THE BMS OPERATORS ON ALL OPERATOR WORKSTATIONS AND ALL OPERATOR INTERFACE DEVICES AS PART OF A GRAPHICAL DISPLAY THAT DEPICTS THE MECHANICAL SYSTEM CONTROLLED.

9) ALL VALVES, DAMPERS, CONTROLLERS, CONTROL DEVICES, ETC. EXPOSED TO OUTSIDE AIR CONDITIONS SHALL BE SPECIFICALLY DESIGNED FOR OUTSIDE AIR CONDITIONS INCLUDING, BUT NOT LIMITED TO, NEMA 4X ENCLOSURES, WEATHERPROOF ENCLOSURES AND ALL OTHER WEATHER PRECAUTIONS RECOMMENDED BY THE MANUFACTURER.

10) ALL ALARMS ASSOCIATED WITH EQUIPMENT THAT IS DISABLED SHALL BE INHIBITED.

11) WHEN THE MOTOR CONTROLLER IS EQUIPPED WITH AN HOA, THE MOTORS SHALL ONLY BE CONTROLLED BY THE BMS WHEN THE HOA SWITCH IS IN THE AUTO POSITION.

12) FREEZESTATS, PRESSURE SAFETIES, INTERLOCKED DAMPERS, ETC. SHALL BE WIRED TO SHUTDOWN MOTORS WHEN THE HOA SWITCH IS IN BOTH THE HAND AND AUTO POSITIONS. IT SHALL NOT BE POSSIBLE TO OVERRIDE THESE OR ANY OTHER SAFETY DEVICES OR ANY FIRE ALARM SYSTEM CONTROL FUNCTIONS, EXCEPT IN THE CASE OF AN ENGINEERED SMOKE CONTROL SYSTEM IN WHICH CASE FREEZE PROTECTION SAFETIES SHALL BE OVERRIDDEN.

13) WHERE FANS AND DAMPERS ARE TO BE HARDWIRE INTERLOCKED, PROVIDE HARDWIRE INTERLOCKS BETWEEN THE MOTOR TERMINAL STRIP AND DAMPERS SUCH THAT THE DAMPER SHALL BE DRIVEN OPEN THEN THE MOTOR IS REQUIRED TO START. MOTOR START-UP SHALL NOT OCCUR UNTIL THE DAMPER END SWITCH INDICATES THE DAMPER IS IN THE FULL OPEN POSITION. WHERE FANS AND DAMPERS ARE HARDWIRE INTERLOCKED, THE INTERLOCKS SHALL APPLY IN BOTH THE "HAND" AND "AUTO" POSITIONS OF THE HOA SWITCH AT THE MOTOR CONTROLLER.

14) THE POINT LISTS ARE PROVIDED FOR CONVENIENCE AND ARE NOT INTENDED TO BE ALL-INCLUSIVE. ALL POINTS REQUIRED TO PROVIDE THE SEQUENCE OF OPERATION SHALL BE INCLUDED AS IF LISTED.

B. SPLIT AIR CONDITIONING UNIT (TYPICAL FOR FCU-1/ACCU-1)

1) THE ATC CONTRACTOR SHALL:

A. MOUNT AND WIRE ALL CONTROL COMPONENTS THAT ARE SHIPPED WITH THE AC UNIT THAT ARE NOT FACTORY INSTALLED. COORDINATE WITH THE AC UNIT MANUFACTURER FOR ALL FIELD INSTALLATION REQUIREMENTS.

B. FURNISH, MOUNT AND WIRE ANY ADDITIONAL COMPONENTS NOT PROVIDED BY THE AC UNIT MANUFACTURER TO ACHIEVE A COMPLETELY OPERATIONAL SYSTEM. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, A WALL-MOUNTED THERMOSTAT, LEAK DETECTOR AND MOTORIZED DAMPER ACTUATORS (OUTSIDE AIR, RETURN AIR). THE THERMOSTAT SHALL HAVE TWO OCCUPIED AND UNOCCUPIED, 7 DAYS PROGRAMS WITH COOL/HEAT/OFF AND FAN-AUTO/ON SWITCHING.

C. PROVIDE INTERLOCK WIRING BETWEEN THE FCU-1 UNIT AND THE CONDENSER ACCU-1.

D. PROVIDE A LIQUID LEAK DETECTOR FOR THE AIR CONDITIONING UNIT. THE LEAK DETECTOR SHALL BE INSTALLED AT THE LOWEST POINT OF THE DRAIN PAN. UPON DETECTION OF WATER, THE UNIT?S COMPRESSOR SHALL STOP. THE AC UNIT SHALL STOP.

E. FURNISH CONDENSATE HIGH LEVEL SWITCH TO SHUT DOWN THE AC UNIT UPON A HIGH WATER LEVEL.

F. A LOCAL VISUAL AND AUDIBLE ALARM SHALL SEND TO THE REMOTE ANNUNCIATOR MODULE. THE CONDENSATE PUMP HIGH LEVEL ALARM SHALL BE WIRED IN PARALLEL WITH THE LEAK DETECTOR. THE REMOTE ANNUNCIATOR SHALL BE MOUNTED OUTSIDE OF THE MER.

2) THE AC UNIT SHALL BE CONTROLLED VIA A WALL MOUNTED 7-DAYS ELECTRONIC PROGRAMMABLE THERMOSTAT WITH TWO OCCUPIED AND UNOCCUPIED PROGRAMS. THE UNIT SHALL BE INDEXED ON BASED UPON A TIME OF DAY SCHEDULE OR MANUAL COMMAND THROUGH THE THERMOSTAT.

3) UPON A COMMAND TO START, THE OUTDOOR AIR DAMPER/RETURN AIR DAMPER SHALL OPEN. WHEN THE OUTDOOR AIR DAMPER IS IN ITS FULLY OPEN POSITION, AS SENSED BY A DAMPER END SWITCH, THE AC UNIT SHALL BE ENERGIZED. THE OUTDOOR AIR DAMPER END SWITCH SHALL BE HARDWIRE INTERLOCKED TO THE CONDENSER FAN. IN THE OCCUPIED MODE, THE AC UNIT SUPPLY FAN RUNS CONTINUOUSLY.

4) THE AC UNIT SHALL BE CONTROLLED BY ITS OWN A 7-DAY PROGRAMMABLE THERMOSTAT. THE THERMOSTAT SHALL CYCLE THE COMPRESSORS AS NECESSARY TO MAINTAIN THE SPACE TEMPERATURE.

5) UPON A COMMAND TO STOP, THE COMPRESSOR SHALL BE CYCLED OFF, THE SUPPLY FAN SHALL BE STOPPED AND THE OUTDOOR AIR DAMPER SHALL BE CLOSED.

A. PROVIDE THE FOLLOWING POINTS HARDWIRED TO THE UNIT CONTROLLER:

1. DI ? AC UNIT COMMON ALARM.
2. DI ? AC UNIT STATUS (ON/OFF).
3. DI ? LEAK DETECTOR STATUS (ONE (1) FOR EACH UNIT).
4. DO ? COMPRESSOR STAGING (ONE FOR EACH CIRCUIT).

B. PROVIDE THE FOLLOWING POINTS IN ADDITION TO THE HARDWIRED POINTS INDICATED ABOVE:

1. HIGH AND LOW SPACE TEMPERATURE ALARMS.
2. COMMON ALARM.
3. AC UNIT FAILURE.
4. LEAK DETECTED ALARM.

1.2 HEATING AND VENTILATORS (BASE SCOPE: HV-1; MECHANICAL ADD ALTERNATE #1: HV-2)

A. GENERAL

1. PROVIDE AN ALTERNATE PRICING FOR REPLACING THE EXISTING HEATING AND VENTILATOR (HV-2).
2. THE BMS CONTRACTOR SHALL FURNISH, INSTALL, AND WIRE A NEW SECONDARY CONTROLLER FOR EACH H&V UNIT.
3. EACH UNIT IS EQUIPPED WITH A SUPPLY AIR FAN, RETURN AIR FAN, HOT WATER HEATING COIL, FILTER. EACH FAN SHALL HAVE A VFD.

B. SAFETIES

1. A HIGH DISCHARGE AIR PRESSURE SWITCH LOCATED DOWNSTREAM OF THE SUPPLY FAN AND UPSTREAM OF THE CLOSEST DAMPER SHALL STOP THE SUPPLY FAN WHEN DUCT PRESSURE EXCEEDS DESIGN.

2. A LOW SUCTION AIR PRESSURE SWITCH LOCATED UPSTREAM OF THE RETURN/EXHAUST FAN AND DOWNSTREAM OF THE CLOSEST DAMPER SHALL STOP THE SUPPLY AND RETURN/EXHAUST FANS WHEN DUCT PRESSURE DECREASES BELOW DESIGN.

3. FREEZESTATS INSTALLED DOWNSTREAM OF THE HEATING COIL SHALL DISABLE THE UNIT UPON SENSING A TEMPERATURE BELOW 38°F (ADJ.) FOR A PERIOD OF 180 SECONDS (ADJ.). ONCE THE FREEZESTAT HAS BEEN ACTIVATED, MANUAL RESET AT THE BMS PANEL SHALL BE REQUIRED TO ALLOW THE SYSTEM TO RESTART.

C. OCCUPIED MODE

1. THE H AND V UNIT SHALL BE STARTED BASED UPON A START TIME OPTIMIZATION PROGRAM, TIME OF DAY SCHEDULE, OR MANUAL COMMAND AND RUN CONTINUOUSLY.

2. UPON A COMMAND TO START, THE OUTSIDE AIR DAMPER AND ALL ASSOCIATED ISOLATION DAMPERS AND FIRE/SMOKE DAMPERS LOCATED AT THE UNIT SHALL OPEN. OUTSIDE AIR DAMPER, ISOLATION DAMPERS AND FIRE/SMOKE DAMPERS SHALL BE HARDWIRE INTERLOCKED TO THE SUPPLY FAN STARTER BY THE BMS CONTRACTOR. HARDWIRED DAMPER END SWITCHES ON ALL 2-POSITION DAMPERS SHALL ENERGIZE THE SUPPLY FAN STARTER WHEN ALL ASSOCIATED DAMPERS ARE IN THEIR FULLY OPEN POSITION.

3. IN THE OCCUPIED MODE, THE SUPPLY FAN RUNS CONTINUOUSLY.

4. SUPPLY AND RETURN FAN VARIABLE FREQUENCY DRIVES SHALL START UNLOADED AND SLOWLY RAMP UP TO SPEED AS REQUIRED. IN THE OCCUPIED MODE, THE SUPPLY AND RETURN FANS RUN CONTINUOUSLY. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL BE CONTROLLED TO MAINTAIN THE SUPPLY STATIC PRESSURE SETPOINT, AS SENSED AT A POINT 2/3 DOWNSTREAM OF THE SUPPLY FAN. THE RETURN FAN VARIABLE FREQUENCY DRIVE SHALL BE CONTROLLED BY TRACKING THE SUPPLY FAN VFD WITH AN OFFSET. THE OFFSET SHALL BE DETERMINED DURING BALANCING.

5. THE HOT WATER HEATING VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT. CONFIGURE THE INITIAL SETPOINT TO 65 DEGF (ADJ.). REFER TO THE MECHANICAL SCHEDULE FOR THE DESIGN SETPOINTS.

D. UNOCCUPIED MODE

1. THE SUPPLY FAN SHALL REMAIN OFF. ALL 2-POSITION DAMPERS SHALL CLOSE. THE HOT WATER HEATING VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN A HEATING COIL DISCHARGE AIR TEMPERATURE OF 45°F (ADJ.).

E. PROVIDE THE FOLLOWING POINTS HARDWIRED TO THE BMS PANEL:

1. AI – FILTER DIFFERENTIAL PRESSURE (VIA DIFFERENTIAL PRESSURE TRANSMITTER).
2. AI – SUPPLY AIR STATIC PRESSURE.
3. AI – RETURN AIR STATIC PRESSURE.
4. AI – SUPPLY AIR TEMPERATURE.
5. AO – HOT WATER VALVE CONTROL (0-100%; PER VALVE).
6. DI – FREEZESTAT STATUS (FOR EACH).
7. DI – SUPPLY FAN HIGH DISCHARGE PRESSURE SWITCH STATUS.
8. DI – SUPPLY FAN STATUS (VIA CURRENT SENSING RELAY).
9. DO – SUPPLY FAN COMMAND (ENABLE/DISABLE).
10. DI – SUPPLY FAN LOW DISCHARGE PRESSURE SWITCH STATUS.
11. DI – RETURN FAN STATUS (VIA CURRENT SENSING RELAY).
12. DO – RETURN FAN COMMAND (ENABLE/DISABLE).
13. AO – SUPPLY FAN VFD SPEED CONTROL (0-100%).
14. AO – RETURN FAN VFD SPEED CONTROL (0-100%).

F. PROVIDE THE FOLLOWING SOFTWARE POINTS IN ADDITION TO THE HARDWIRED POINTS INDICATED ABOVE:

1. AHU COMMAND (ENABLE/DISABLE).
2. DIRTY FILTER ALARM (INDICATED IF FILTER DIFFERENTIAL PRESSURE EXCEEDS 1? (ADJ.)).
3. FREEZESTAT ALARM.
4. HIGH AND LOW HEATING COIL DISCHARGE AIR TEMPERATURE ALARMS.
5. HIGH AND LOW SPACE TEMPERATURE ALARMS.
6. HIGH AND LOW SUPPLY AIR TEMPERATURE ALARMS.
7. OCCUPIED/UNOCCUPIED HEATING COIL DISCHARGE AIR TEMPERATURE SETPOINT.
8. OUTSIDE AIR TEMPERATURE (GLOBAL POINT).
9. SPACE TEMPERATURE SETPOINT.
10. SUPPLY AIR TEMPERATURE SETPOINT.
11. SUPPLY FAN FAILURE.
12. RETURN FAN FAILURE.
13. SUPPLY FAN HIGH DISCHARGE PRESSURE ALARM.

END OF SECTION

Revisions

01/11/2019	ISSUED FOR 80% REVIEW
03/05/2019	ISSUED FOR BID

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Project

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Mechanical Upgrades:
Eli Whitney School
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Drawing Title

MECHANICAL SPECIFICATIONS

Issued: 03/05/2019	Drawing No.: M-404
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