COMMUNITY COLLEGE
system of New Hampshire

REQUEST

FOR

BIDS

Berlin MEP Upgrades

at White Mountains Community College

2020 Riverside Drive, Berlin NH 03570

A COMPONENT OF THE

Community College System of New Hampshire

26 College Drive, Concord, NH

Project# WMC24-02

August 5th, 2024

DOCUMENT 00015

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END OF SECTION

SECTION 00010 - INVITATION TO BID – CCSNH

Paper Bids will be accepted (no electronic bids will be accepted) by delivering to Matthew Moore, Director of Capital Planning and Development at memoore@ccsnh.edu until **2:00pm August 27th, 2024** for the following project:

Berlin MEP Upgrades

at White Mountains Community College, 2020 Riverside Drive, Berlin NH 03570

A component of the Community College System of New Hampshire

26 College Drive, Concord, NH

Project Number WMC24-02

Description: Replacing the existing roof top air handlers and the kitchen makeup air unit. This includes Absolute Air make-up air unit serving the kitchen connected to the existing fire alarm and fire suppression systems, GE Electric R-22 packaged rooftop unit serving the business offices at the main entrance, Trane LP gas fired packaged rooftop unit serving the library office area, Trane R-22 packaged rooftop unit serving rooms, York R-22 gas-fired packaged rooftop unit serving the library study rooms, Nordyne R-22 split-system AC serving the business office, Kitchen roof mounted Greenheck upblast exhaust fan and integration of energy recovery systems will be considered. This will include plumbing and mechanical demolition of existing equipment and installation of new equipment. It will also include the replacement and installation of new mechanical and electrical equipment including two additional panels and a 2000A switchboard. Additionally, there will be upgrades to the Welding lab including installation of additional electrical equipment, installation of an air compressor and its required piping. Finally, there will be additional HVAC upgrades including the installation of new gas lines and its support, RTU upgrade, and ductwork.

The Project will include but not be limited to the Disciplines of: Mechanical, Gas, Electrical, Plumbing

Plans and specifications will be available via website from the Community College System of New Hampshire, Thursday, **August 5th, 2024 on the CCSNH website** www.ccsnh.edu/about-ccsnh/bidding-rfp/

Plans and specifications will also be available at the following printers:

- Signature Press and Blueprinting, Inc., 45 Londonderry Turnpike, Rte. 28 Bypass, Hooksett, NH 03106;
- Construction Summary of NH: Inc., 734 Chestnut Street, Manchester, NH 03104;
- Infinite Imaging: 933 Islington Street, Portsmouth, NH 03801
- Minuteman Press: 109 Gosling Road, Newington, NH 03801;
- Community College System of New Hampshire website www.ccsnh.edu/about-ccsnh/bidding-rfp/

BIDDERS SHOULD ACT PROMPTLY AND SUBMIT ALL QUESTIONS IN WRITING TO: MATTHEW MOORE, DIRECTOR OF CAPITAL PLANNING AND DEVELOPMENT, E-MAIL memoore@ccsnh.edu .

A MANDATORY SITE VISIT WILL NOT BE HELD: To schedule a non-mandatory site visit contact

Scott Locke at slocke@ccsnh.edu cell ph. (603) 348-4941.

Project Substantial Completion Date for work: April 30th, 2025

Proposals must be completed in both words and figures on forms furnished by the College, or on previously-approved, substantially-identical forms generated by computer software, which shall be submitted electronically in an e-mail titled: **"Bid for: WMC24-02 White Mountains Community College Berlin MEP Upgrades"** received by MATTHEW MOORE at **memoore@ccsnh.edu** as specified no later than **2:00 PM**, **August 27th, 2024.**

Companies, corporations, or trade names, except sole proprietorships must be registered with the Secretary of State (Corporate Division, Telephone No. 603/271-3244) in order to do business with the State of New Hampshire.

Bidders must show three recent years' experience with installations of a similar complexity and cost and prior experience with installations of the materials within 100 miles of the project site.

The successful bidder will be required to comply with State of New Hampshire RSA#21-1:81-a. The successful bidder will be required to furnish a 100% payment and 100% performance bond prior to execution of contract.

The award will be based on the proposal that best meets the needs of the college. Factors included will be the cost, completeness of the proposal, quality of the technology provided, and experience of the contractor and installation team. The college reserves the right to waive any informality in or to reject any or all proposals.

All contract documents can be found on the CCSNH website at:
www.ccsnh.edu/about-ccsnh/bidding-rfp/
Before your submission, always check for any addenda or other materials that may have been issued which would affect the invitation to bid by checking the CCSNH website at www.ccsnh.edu/about-ccsnh/bidding-rfp/

CCSNH reserves the right to waive any and all informalities in its best interest or to reject any or all proposals.

Matthew Moore, PE,
Contract Representative
Director of Capital Planning & Development
Community College System of New Hampshire

END OF DOCUMENT

DOCUMENT 001153 - REQUEST FOR QUALIFICATIONS

1.1 PURPOSE, LAWS, AND REGULATIONS

A. The purpose of the Prequalification Procedure described in this Document is to provide Owner with a mechanism to evaluate and determine whether Prospective Bidders are qualified to participate in the construction of Project. Evaluation will be limited to that office of the Prospective Bidder that is proposed to perform the Work.

1.2 DEFINITIONS

A. Prospective Bidder: A Prospective Bidder is a person or entity who submits a Submittal of Qualifications to Owner.

1.3 QUALIFICATION PROCEDURES

A. Prospective Bidders shall complete all required forms and attachments described in the Prequalification Documents, entering "Not Applicable" where information does not apply. Absence of any of the forms included in the Prequalification Documents will be reason for possible disqualification. All required qualification forms to be submitted with Bid forms.

B. Status of Prospective Bidders:

1. Proprietors submitting bids shall indicate their status as proprietors.
2. Prospective Bidders submitting qualifications for partnerships shall indicate their status as partners and shall submit a certified copy of the power of attorney authorizing the executor of the submittal to bind the partnership.
3. Prospective Bidders submitting qualifications for corporations shall indicate their status as corporations and shall submit a certified copy of the board of directors' authorization for the Prospective Bidder to bind the corporation and shall affix the corporate seal on the submittal.
4. Prospective Bidders shall provide the following:

    a. Names and addresses of proprietors, of all members of a partnership, or of the corporation's officers.
    b. Name of jurisdiction where the partnership is registered or where the corporation is incorporated. Corporations must be licensed to do business in Project state at the time of executing the Contract.

1.4 WITHDRAWAL

A. A Qualification Statement may be withdrawn on personal request received from the Prospective Bidder.

1.5 QUALIFICATION STATEMENT

A. The undersigned submits answers to the following questions to enable the Community College System of New Hampshire to judge experience and ability in the work proposed to be done.

1. The work, if awarded to you, will have the resident personal supervision of whom? State his/her name, title, and their special qualifications.

_____
_____
_____
_____

2. (a) Provide a brief history of your firm. (b) Demonstrate that your firm has provided satisfactory work on similar projects.

a)_____
_____
_____
_____

b)_____
_____
_____
_____

3. How many years has your organization been in business as a contractor under the name in which you propose to execute this contract?

_____

4. Has your present organization ever failed to complete any work awarded to it? If so, state when, where and why:

_____

5. Provide three (3) Examples of Experience with full responsibility for work of a similar size to this project and within 100 miles of the project site.

Qualifications to perform the work: List Three
Experience with full responsibility for work of a similar size and within 100 miles of the project site.
Bidders are to provide evidence of qualifications with the bid.

NAME OF REFERENCE PROJECT _____ _____

Location of Project _____ _____

Date work performed _____ _____

Name of Owner
Contact Name & Phone Number _____ _____

Description of Project _____ _____

Approx. Contract value _____ _____

NAME OF REFERENCE PROJECT _____ _____

Location of Project _____ _____

Date work performed _____ _____

Name of Owner
Contact Name & Phone Number _____ _____

Description of Project _____ _____

Approx. Contract value _____ _____

NAME OF REFERENCE PROJECT _____

Location of Project _____ _____

Date work performed _____ _____

Name of Owner
Contact Name & Phone Number _____ _____

Description of Project _____ _____

Approx. Contract value _____ _____

END OF DOCUMENT

Revised 4/17/18

DOCUMENT 00204

INSTRUCTIONS TO BIDDERS – Community College System of New Hampshire (CCSNH)
Issued 2-05-2004; Revised as noted

PART 1 DEFINITIONS

1.1 Refer to Document 00708: General Conditions – CCSNH:

PART 2 PREPARATION AND SUBMISSION OF BIDS

2.1 The Bidder is required to bid on all items called for in the Proposal. If Alternates are included, the Bidder shall set forth in the space provided the amount to be added to or deducted from the Lump Sum Base Bid or the Lump Sum Grand Total. If an Alternate called for does not involve a change in price, the Bidder shall so indicate in the space provided.

2.2 Bids shall be submitted upon the Proposal Form furnished and shall be signed in ink. The Bidder shall specify a unit price, both in words and figures, for each item called for in the Lump Sum Grand Total Proposal. All of the words and figures shall be in ink or typed. If a unit price or a Lump Sum Grand Total already entered by the Bidder on the Proposal Form is to be altered, it should be crossed out with ink, the new unit price and the Lump Sum Grand Total bid entered above or below it and initialed by the Bidder; also in ink. In case of discrepancy between the prices written in words and those written in figures, the prices written in words shall govern. Bids containing any conditions, omissions, unexplained erasures or alterations, or items not called for in the Proposal or irregularities of any kind may be rejected by the Chancellor as being incomplete non-conforming, or non-responsive. All required qualification forms to be submitted with Bid forms.

2.3 Each bid must contain the full business address of the Bidder and be signed by him/her with his/her usual signature.

A. Bids by a partnership of any form must furnish the full names of all partners, and must be signed in the partnership name by one of the members of the partnership or by an authorized representative, followed by the designation of the person signing. All Contracts with partnerships must include a certificate of authorization demonstrating that the partner(s) or authorized individuals have been authorized by the partnership to enter into the Contract on behalf of the partnership.

B. Bids by a corporation of any form must be signed with the legal name of the corporation, followed by the name of the State of incorporation and by the signature and designation of the president, secretary or other person authorized to bind it in the matter. The name of each person signing shall also be typed or printed below the signature. [*A bid by a person who affixes to his/her signature, the word "President," "Secretary," "Agent" or other designation, without disclosing whom he/she is representing if other than the contracting entity noted above, may be held to the bid of the individual signing.*]

C. Bids by proprietorships (individuals), or by individuals with a registered trade name, or doing business under an assumed name (aka d/b/a), shall be executed by the individual in their name, with reference to the trade name or assumed name.

2.4 Bids to be scanned and transmitted by electronic mail to memoore@ccsnh.edu no later than the bid deadline.

PART 3 RECEIPT AND OPENING OF BIDS

3.1 The bid opening officer will decide when the specified time has arrived, and no bid received or presented thereafter will be considered. No responsibility or liability will be attached to any officer for the premature opening of a bid not properly addressed and identified.

PART 4 WITHDRAWAL OF BIDS

4.1 A bid may be withdrawn upon written request received from the bidder at the Director of Capital Planning and Development office at 26 College Drive, Concord, NH 03301-7407, with reasonable time prior to the time fixed for opening. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

PART 5 PROPOSAL GUARANTY (intentionally omitted)

PART 6 CONDITIONS AT SITE OR BUILDING

6.1 Bidders shall visit the site and be responsible for having ascertained pertinent local conditions; such as location, accessibility and general character of the site or building, the character and extent of existing work within or adjacent to the site, and any other work being performed thereon at the time of submitting the bid.

PART 7 EXPLANATION TO BIDDERS

7.1 No oral explanation in regard to the meaning of the Bidding Documents will be made and no oral instructions will be given before the award of the Contract. Discrepancies, omissions or doubts as to the meanings of Bidding Documents shall be communicated in writing to the Director of Capital Planning and Development for interpretation no later than five (5) working days before the hour and date set for the bid opening. Any interpretations will be in the form of an Addendum to the Bidding Documents that will be forwarded to all Bidders of record and sent to all other locations identified in the Invitation to Bid where documents are made available.

PART 8 REJECTION OF BIDS

8.1 The Chancellor reserves the right to reject any or all bids, to waive technicalities or to advertise for new bids, if in his/her judgment, the best interests of the State will be promoted thereby. The Chancellor reserves the right to reject the bid of a Bidder who is not in a position to perform the Contract.

8.2 The Chancellor reserves the right to waive any informality in bids received, if in the best interest of the CCSNH.

8.3 The Chancellor reserves the right to reject any Bidders not meeting all stated requirements.

PART 9 CONTRACT BOND

9.1 The successful Bidder, at the time of the execution of the Contract, must deposit with the Chancellor, Surety in the sum equal to one hundred percent (100%) of the amount of the Contract as required by RSA 447:16. The form of Bond shall be that provided for by the CCSNH and the Surety shall be acceptable to the Chancellor. The Contract Bond must be written by a Company licensed to do business in New Hampshire at the time the policy is issued. In addition, the Company issuing the bond shall be listed on the current list of "Surety Companies Acceptable on Federal Bonds" as published by the U.S. Department of the Treasury, Financial Management Services, Circular Number 570. see http://www.fms.treas.gov/c570/index.html

PART 10 CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

10.1 The Contractor shall deliver to the Chancellor at the time of submitting a signed Contract, certificates of all insurance required hereunder. The certificates of insurance shall contain a description of the project, including the project name and number, and shall state that the companies issuing insurance will mail to the Chancellor thirty (30) days' notice of cancellation, alteration of material change of any listed policies or ten (10) days in cases of non-payment of premium. The Contractor shall keep in force the insurance required herein for the period of the Contract, through the Warranty period. and Owners and Contractors Protective (OCP) Liability coverage shall be kept in force through the date of Substantial Completion, or longer at the Director of Capital Planning and Development's direction. The Contractor shall have a continuing duty to provide new certificates of insurance as policies are amended or renewed. At the request of the Chancellor, the Contractor shall promptly make available a copy of any and all listed insurance policies. The required insurance must be written by a Company licensed to do business in the State of New Hampshire at the time the policy is issued. In addition, the company must have a rating of no less than A- based on the current A.M. Best with a size of VIII and satisfying and the terms and conditions described below or the minimum limits required of the Prime Contractor under the Contract Documents.

10.2 Prior to the start of the Contractor's Work, the Contractor and any subcontractors, consultants or third parties approved to perform Services pursuant to this contract, will carry, in full force and effect during the entire term of this Agreement, insurance with a carrier rated at minimum "A-" by A.M. Best with a size of VIII and satisfying and the terms and conditions described below or the minimum limits required of Prime Contractor under the Contract Documents.

A. Commercial General Liability (CGL) with limits of Insurance of not less than $1,000,000 each occurrence and $2,000,000 Annual Aggregate.

.1) If the CGL coverage contains a General Aggregate Limit, such General Aggregate shall apply separately to each project.

.2) CGL coverage shall be written on ISO Occurrence form CG 00 01 (10/93) or a substitute form providing equivalent coverage and shall cover liability arising from premises, operations, independent contractors, products- completed operations, and personal and advertising injury, include the City of Keene.

3) Owner, City of Keene, and all other parties required of the Contractor, shall be included as insured's on the CGL, using ISO Additional Insured Endorsement CG 2010 (11/85) or CG 2010 (10/93) **AND** CG 20 37 (10/01) or CG2033(10/01) **AND** CG2037 (10/01) or an endorsement providing equivalent coverage to the additional insured's. This insurance for the additional insured's shall be as broad as the coverage provided for the named insured Contractor. It shall apply as Primary and non-contributing Insurance before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insured.

.4) Contractor shall maintain CGL coverage for itself and all additional insured's, including the City of Keene, for the duration of the project and maintain Completed Operations coverage for itself and each additional insured for at least 7 years after completion of the Work.

.5) If Contractor is performing snow removal the policy must include the addition of CG 22 92 12 07 for Snow Removal Operations Coverage or equivalent

10.3 Commercial Automobile Liability

.1) Business Auto Liability with limits of at least $1,000,000 for each accident.

.2) Business Auto coverage must include coverage for liability arising out of all owned, leased, hired and non-owned automobiles.

.3) Owner and all other parties required of the Contractor, shall be included as additional insured's on the auto policy.

10.4 Commercial Umbrella

.1) Umbrella limits must be at least $2,000,000.

.2) Umbrella coverage must include as insured's all entities that are additional insured's on the CGL and coverage shall be as broad as provided on the underlying coverages.

10.5 Workers Compensation and Employers Liability

.1) Employers Liability Insurance limits of at least $500,000 each accident for bodily injury by accident and $500,000 each employee for injury by disease.

.2) Where applicable, U.S. Longshore and Harborworkers Compensation Act Endorsement shall be attached to the policy.

.3) Where applicable, the Maritime Coverage Endorsement shall be attached to the Policy.

.4) All employees, including the Owner, partners and officers, shall provide proof of workers' compensation coverage prior to working on the job site.

10.6 Waiver of Subrogation

.1) To the fullest extent permitted by law, Contractor waives all rights against Owner and Architect and their agents, officers, directors and employees for recovery of damages to the extent these damages are covered by commercial general liability, commercial umbrella liability, business auto liability or workers compensation and employers liability insurance where acceptable by law.

10.7 Pollution Liability Insurance

.1) Pollution Limits with at least $1,000,000 each occurrence, claim or wrongful act with an aggregate of $1,000,000 for bodily injury, property damage, pollution or environmental harm arising out of the work, asbestos, lead, or silica related claims, claims arising out of microbial matter or bacteria, testing, monitoring, measuring operations or laboratory analyses, or liability arising out of treatment facility. If a motor vehicle is used in connection with the work,

the business automobile policy will include coverage at least as broad as ISO CA 99 48 and be endorsed to include Motor Carrier Act Endorsement MCS 90.

.2) The policy must meet all other insurance requirements applicable to general liability, including, but not limited to additional insured, waiver of subrogation and cancellation notification.

.3) If there is a retroactive date, claims made will apply back to the first date of services provided to the Owner.

.4) The coverage shall be effective for 5 years following completion of the engagement.

.5) Proof of Pollution Liability Insurance shall be provided on a certificate acceptable to the Owner.

10.8 Attached to each certificate of insurance shall be a copy of the Additional Insured Endorsement that is part of the Contractor's Commercial General Liability Policy. These certificates and the insurance policies required shall contain a provision that coverage 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. Any subcontractors, consultants or third parties performing services for Contractor as contemplated herein, shall also maintain insurance as required above. Notwithstanding the foregoing, the Owner, in its sole and absolute discretion and taking into account the scope and character of the Services to be provided by Contractor, may reduce the required liability insurance minimums. Such reduction in the required liability insurance minimum of Contractor

shall be evidence by a written instrument specifically referencing this Exhibit I and signed by the Owner.

10.9 The Contractor shall require each Subcontractor employed on the Project to maintain the coverage listed above unless the Contractor's insurance covers activities of the Subcontractor on the Project.

10.10 No operations under this Contract shall commence until certificates of insurance attesting to the above listed requirements have been filed with the Chancellor and a Notice to Proceed is issued.

A. If blasting and/or demolition is required by the Contract, the Contractor or subcontractor shall obtain the respective coverage for those activities, and shall furnish to the Chancellor a Certificate of Insurance evidencing the required coverages prior to commencement of any operations involving blasting or demolition or both.

B. Owner's and Contractor's Protective Liability (OCP) coverage for the benefit of the Community College System of New Hampshire.
1. Limits of Liability:
   a. $2,000,000 Each Occurrence
   b. $3,000,000 Aggregate

****** [OR] ******

   c. $2,000,000 Bodily Injury & Property

C. Property and Builder's Risk Insurance (Fire and Extended Coverage):
1. The Community College System of New Hampshire shall insure the work included in the Contract, including extras and change orders, on an "All Risk" basis, on one hundred percent (100%) completed value basis of the Contract, as modified. Builder's Risk coverage shall include materials located at the Contractor's premises, on-site, in-transit, and at any temporary site. The policy by its own terms or by endorsement shall specifically permit partial or beneficiary occupancy prior to completion or acceptance of the entire work. The policies shall be in the names of the Community College System of New Hampshire and the Contractor. The policies shall provide for the inclusion of the names of all other Contractors, Subcontractors, and others employed on the premises as insureds. The policies shall stipulate that the insurance companies shall have no right of subrogation against any Contractors, Subcontractors or other parties employed on the premises.
2. CCSNH is not responsible to insure Contractor's owned or leased equipment/property.

D. General Insurance Conditions
1. Failure to secure and maintain, or add by endorsement, Owner and all subsidiaries, agents, and employees as required shall not act as a defense to the enforcement of the terms of this Contract. Any such insurance policy shall apply separately to each insured against whom claim is made or suit is brought and shall contain no provision which excludes coverage of a claim made by one insured under the policy against another insured under the policy.
2. Each policy shall contain a clause prohibiting cancellation or modifications of the policy earlier than thirty (30) days or ten (10) days in cases of non-payment of premium after written notice thereof has been received by CCSNH.

E. Indemnification:

1. To the fullest extent of the law the Contractor shall indemnify, defend, and hold harmless the Community College System of New Hampshire, its Officers, and its agents and employees from and against any and all claims, liabilities, suits or penalties arising out of (or which may be claimed to arise out of) acts or omissions of the Contractor or subcontractors in the performance of work covered by the Contract. This covenant shall survive the termination of the Contract. Notwithstanding the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the Community College System of New Hampshire, which immunity is hereby reserved by the Community College System of New Hampshire. The covenant in paragraph I shall survive the termination of this Agreement.

F. Additional Insurance for Design/Build Contracts:

1. In addition to the insurance requirements listed in the above paragraphs, the Designer/Builder Team shall provide the following coverage.
   a. The Designer/Builder Team, or the Designer shall purchase and maintain professional liability coverage for this project. The coverage shall provide the CCSNH with protection against design errors and omissions and shall have an annual aggregate limit of no less than $2,000,000. The coverage shall be maintained through the legal stature of repose period, currently stipulated to be three (3) years from the date of Substantial Completion. If the professional liability coverage is maintained by other than the firm holding the prime contract with the CCSNH for this project, the prime contractor shall provide evidence of indemnifications, approved by the CCSNH, that indicate that this insurance coverage is in place and available for the protection of the CCSNH. The indemnification may not create a re-assignment of contractual responsibilities between the CCSNH and the prime contractor.

PART 11 BIDDING DOCUMENTS

11.1 Bidders shall use only complete sets of Bidding Documents in preparation of bids; the CCSNH assumes no responsibility for mistakes due to the use of incomplete sets of Bidding Documents.

PART 12 SUBSTITUTIONS

12.1 Where Bidding Documents stipulate particular Products, substitution requests will ONLY be considered before receipt of Bids. Refer to specification section 01600 – Product Requirements.

PART 13 AWARD OF CONTRACT

13.1 The Contract will be Awarded as soon as possible to the Responsible Bidder on the basis of the Highest Score, see Score Sheet in Section 00300.

A. The CCSNH may request a Negotiated Price from the Highest Score Responsible Bidder.

13.2 The signed Contract, together with the Contract Bond, and certificate of insurance shall be returned to the CCSNH within 10 days after the date of notice that the Proposal has been accepted.

A. If the successful bidder fails to execute the Contract and submit acceptable bond and required attachments within 20 days after the date of notice of acceptance of the Proposal, the CCSNH may cancel the notice of award. Contract award may then be made to the next lowest responsible bidder or the Work may be re-advertised.

13.3 Prior to the issuance of Notice to Proceed, each Bidder shall be prepared, if so requested by the Chancellor, to present evidence of his/her experience, qualifications, and financial ability to carry out the terms of the Contract.

13.4 A Contract that has been Awarded with required attachments is not executed until submitted and approved by the CCSNH Board of Trustees, if required, and issuance of the Notice to Proceed by the CCSNH.

PART 14 PERMITS AND FEES

14.1 CCSNH shall secure and pay for all Permits and Fees required by the Work of this Contract.

END OF DOCUMENT 002004

SECTION 00300 – BID PROPOSAL FORM – CCSNH

PROPOSAL – STIPULATED BASE LUMP SUM GRAND TOTAL BID – GENERAL CONSTRUCTION

PROPOSAL TO: **Received no later than 2 PM, Thursday, April 27, 2023.**

Matthew Moore, PE
memoore@ccsnh.edu
Director of Capital Planning & Development
Community College System of New Hampshire
26 College Drive
Concord, New Hampshire 03301

SUBJECT: **Project #: WMC24-02**
Project Name: Berlin MEP Upgrades

1. CERTIFICATION: The undersigned Prime Contractor

   Name of Firm: _____

   Address of Firm: _____

   Phone Number: _____

   Email: _____

   Signature: _____

   Name and Title: _____
   (Contractor's Name Printed Here)

FOR

BERLIN MEP UPGRADES
IN BERLIN, NEW HAMPSHIRE

CCSNH PROECT NO. WMC24-02

To the Community College System of New Hampshire (CCSNH), hereinafter called the "OWNER", requests bids for the furnishing of all labor, equipment, and materials required for the Berlin MEP Upgrades project in accordance with the Plans and Specifications prepared by *Colby Company Engineering.* of Portland, Maine and by *Yeaton Associates.* of Bedford, New Hampshire.

The undersigned, as bidder, declares that the only person or parties interested in this Proposal as

principals are those named herein; that this Proposal is made without collusion with any other firm; that the undersigned has carefully examined the location of the proposed work, the proposed Form of Contract and the Plans and Specifications therein referred to; and the undersigned proposes and agrees if this Proposal is accepted, he will contract with the awarding authority to provide all necessary labor, machinery, tools, apparatus, and other means of construction and to do all the work and furnish all the materials specified in the Contract in the manner and time therein described and according to the requirements of the ENGINEER therein set forth; and the undersigned will take in full payment, therefore, the following unit and total prices, to write:
SCHEDULE OF PRICES: NOTE: THIS PROPOSAL SHALL BE PREPARED BY THE BIDDER, WITH THE UNIT PRICES SPECIFIED IN BOTH WORDS AND FIGURES, AND THE EXTENSIONS MADE BY THE BIDDER.

QUANTITIES SHOWN ARE FOR THE CONVENEINCE OF THE CONTRACTOR AND SHALL BE VERIFIED BY THE CONTRACTOR AND ARE NOT GURARANTEED QUANITY VALUES.

THIS IS NOT A UNIT BID CONTRACT, AND THE CONTRACT PAYMENT AND TERMS AND CONDITIONS SHALL BE GOVERNED BY THE CONTRACT GENERAL PROVISIONS.

UNIT BIDS ARE SOLELY FOR THE PURPOSE OF COMPARING BIDS AND MAKING PARTIALLY PAYMENTS TO CONTRACTORS.

UNIT PRICES AND TOTAL AMOUNT MUST BE EXPRESSED IN BOTH WRITTEN AND FIGURES.

IN THE EVENT OF DISCREPANCY, THE AMOUNT IN WORDS SHALL GOVERN.

1. AWARD OF CONTRACT

Bidders must show three recent years' experience with installations of a similar complexity and cost and prior experience with installations of the materials within 100 miles of the project site.

The successful bidder will be required to comply with State of New Hampshire RSA#21-1:81-a. The successful bidder will be required to furnish a 100% payment and 100% performance bond prior to execution of contract.

2. <u>BASE BID(Stipulated sum)</u>

The award will be based on the proposal that best meets the needs of the college. Factors included will be the cost, completeness of the proposal, quality of the technology provided, and experience of the contractor and installation team. The college reserves the right to waive any informality in or to reject any or all proposals.

Item No.	Quantity	Item Descriptions and Unit Prices Bid In Words	Unit Prices Dollars	Cents	Amount Dollars	Cents
1	1	5 TON, JOHNSON CONTROLS CORE SINGLE PACKAGED R-410A AIR CONDITIONER, SINGLE STAGE COOLING, 14.1 SEER / 12.1 EER, 208/230-3-60 at _____ Dollars and _____ Cents per UNIT				
2	1	4 TON, JOHNSON CONTROLS CORE SINGLE PACKAGED R-410A AIR CONDITIONER, SINGLE STAGE COOLING, 14.0 SEER / 12.0 EER, 208/230-3-60 at _____ Dollars and _____ Cents per UNIT				
3	1	3 TON, SINGLE STAGE COOLING, JOHNSON CONTROLS CORE SINGLE PACKAGED R-410A AIR CONDITIONER, 14.0 SEER / 12.2 EER, 70 MBH SINGLE STAGE INPUT LOW HEAT ALUMINIZED GAS, GAS HEAT, 208/230-3-60 at _____ Dollars and _____ Cents per UNIT				
4	1	PROPANE CONVERSION KIT at _____ Dollars and _____ Cents per UNIT				

Item No.	Quantity	Item Descriptions and Unit Prices Bid In Words	Unit Prices Dollars	Cents	Amount Dollars	Cents
5	1	FRASER-JOHNSTON BRAND, 3.5 TON, AIR CONDITIONER, R-410A REFRIGERANT, 13 SEER / 1-STAGE, 208/230-3-60 at _____ Dollars and _____ Cents per UNIT				
6	1	3.5 TON, SINGLE PIECE AIR HANDLER, STANDARD MULTI-POSITION ECM MOTOR, 21" CABINET WIDTH, 208/230-1-60, FLEX - COILS at _____ Dollars and _____ Cents per UNIT				
7	1	KIT,TXV,R-410A,3/4 INCH CHATLEFF CO at _____ Dollars and _____ Cents per UNIT				
8	1	5 TON, SINGLE STAGE COOLING, JOHNSON CONTROLS CORE SINGLE PACKAGED R-410A AIR CONDITIONER, 14.1 SEER / 12.1 EER, 145 MBH TWO STAGE INPUT HIGH HEAT ALUMINIZED GAS, GAS HEAT, 208/230-3-60 at _____ Dollars and _____ Cents per UNIT				

Item No.	Quantity	Item Descriptions and Unit Prices Bid In Words	Unit Prices Dollars	Cents	Amount Dollars	Cents
9	1	TRANE PRECEDENT 5.0 TON YHC060F3ROA at _____ Dollars and _____ Cents per UNIT				
10	2	KITCHEN EXHAUST FANS at _____ Dollars and _____ Cents per UNIT				
11	3	TRANSFER GRILLE (SURFACE MOUNT) MODEL CC15-1 at _____ Dollars and _____ Cents per UNIT				
12	3	TRANSFER GRILLE (WALL MOUNT) MODEL 4500 at _____ Dollars and _____ Cents per UNIT				
13	3	HANKISON REFRIDGERATED COMPRESSED AIR DRYER MODEL HPER25, 25 SCFM, 120-1-60, ¾" NPT at _____ Dollars and _____ Cents per LF				
14	1	HANKISON NGF SERIES POST FILTER MODEL F07-HF-DP1,¾" NPT at _____ Dollars and _____ Cents per UNIT				

Item No.	Quantity	Item Descriptions and Unit Prices Bid In Words	Unit Prices Dollars	Cents	Amount Dollars	Cents
15	1	HANKISON NGF SERIES PRE FILTER MODEL F07-PF-DP1, ¾" NPT at _____ Dollars and _____ Cents per UNIT				
16	1	INGERSALL RAND RECIPROCATING 2 STAGE ELECTRIC AIR MODEL 2475N7.5, 7.5 HP TO SUPPLY 24.3 CFM at _____ Dollars and _____ Cents per UNIT				

TOTAL BASE BID LUMP SUM GRAND TOTAL BID:

_____
(Words)

_____DOLLARS ($_____)
(Figures)

It is agreed that the Grand Total Price calculated above represents the Contractor's Total Price for all the project work.

The undersigned as bidder understands and agrees that the quantities of work as given for each item (except lump sum items) in this proposal are only approximate and are assumed solely for the comparison of proposals. They are not guaranteed to be accurate statements of estimates of the quantities of work to be performed under this Contract, and any departure therefrom will not be accepted as valid grounds for any claim for loss of profits. In case of variation between unit prices and total prices stated by bidder, the unit prices will be considered to be his bid.

The undersigned further agrees to comply with the requirements as to conditions of employment, wage rates and hours of labor set forth in the Contract Documents.

The undersigned hereby agrees to reach final completion of all the work, shown or specified under this Contract and as shown on the Contract Drawings as follows:

1. Final completion by **April 30, 2025**

The undersigned agrees that, if he is selected as CONTRACTOR, he will, within five (5) days after the award, execute a Contract in the form attached hereto and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of New Hampshire and satisfactory to the Awarding authority and each in the sum of one hundred percent (100%) of the Contract price, the premiums for which are to be paid by the CONTRACTOR and are included in the various unit prices bid.

The undersigned understands that the OWNER reserves the right to reject any or all bids and to waive any informalities in the bidding.

ADDENDUM RECEIPT

The undersigned Contractor acknowledges the receipt of the following Addenda to the Bidding and Contract Documents, but he agrees that he is bound by all Addenda, whether or not listed herein:

Addendum No._____Dated:_____

Addendum No._____Dated:_____

Addendum No._____Dated:_____

All required qualification forms found in

DOCUMENT 001153 - REQUEST FOR QUALIFICATIONS

to be submitted with Bid forms.

_____

Contractor (Bidder) (Seal)

_____

(Signature and Title)

Address _____

_____

Being a (corporation incorporated)

(under the laws of the)
(State of _____)
(Partnership)
(Individual)

Composed of officers, partners, or owner, as follows:

_____
_____
_____

STATEMENT OF NON-COLLUSION

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief: (1) The prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition as to any matter relating to such prices with any other bidder or with any competitor; (2) Unless required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any other competitor, and (3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNATURE:_____

NAME:_____

TITLE:_____

DATE:_____

PHONE:_____

EMAIL:_____

Corporate Seal:

End of Document

DOCUMENT 00708

GENERAL CONDITIONS – COMMUNITY COLLEGE SYSTEM OF NEW HAMPSHIRE (CCSNH)

PART 1 DEFINITIONS

A. **Addendum.** Written and/or graphic information issued before opening *Proposals* that modifies or interprets the *Bidding Documents* by additions, deletions, clarifications or corrections.

B. **Advertisement.** A public announcement in the form of an *Invitation to Bid*, inviting *Bids* for *Work* to be performed and/or *Materials* to be furnished.

C. **Alteration Order.** A written agreement between the *Contractor* and the *Community College System of New Hampshire* that amends the *Contract* and identifies *Work* that affects either the *Contract Sum, Completion Date*, *Credit*, or any combination thereof.

D. **Alternate.** A proposed change in the *Work* described in the *Contract Documents* providing the *Community College System of New Hampshire* with an option to select between alternative materials, products or systems, or to add or delete portions of *Work*.

E. **Architect.** As defined in RSA 310-A:28, a person who, by reason of having acquired through professional education and practical experience an advanced training in building construction and architectural design and an extensive knowledge of building standards created to safeguard the public from hazards such as fire, panic, structural failure, and unsanitary conditions, is technically and legally qualified to practice architecture and who is licensed by the State of New Hampshire Board of Licensure for Architects to engage in the practice of architecture. The Architect has no contractual agreement with the *Contractor* and therefore shall not directly interact with the *Contractor*.

F. **Award.** The acceptance of a *Bid* prior to execution of *Contract*.

G. **Bid.** A complete and properly signed *Proposal*, submitted in accordance with the *Bidding Requirements*, to perform the *Work* for the amount or amounts stipulated therein.

H. **Bid Bond.** One form of a *Proposal Guaranty* executed by the *Bidder* and a *Surety* to guarantee that the *Bidder* will enter into a *Contract* within a specified time.

I. **Bid Opening Officer.** An authorized representative of the Community College System of New Hampshire, who is responsible for opening and reading of *Bids*.

J. **Bidder.** A *Corporation*, *Partnership*, or *Proprietorship* submitting a *Proposal*, subsequent to meeting the Community College System of New Hampshire's *Bidding Requirements*.

K. **Bidding Documents.** Collectively, the *Invitation to Bid*, *Bidding Requirements*, *Specifications*, *Drawings*, and *Addendum*.

L. **Bidding Requirements.** The documents that contain information regarding bidding procedures with which a *Bidder* must conform and a *Proposal* that a *Bidder* shall use to submit a *Bid*.

M. **Builders Risk Insurance.** A specialized form of property insurance that provides coverage for loss or damage during the course of construction.

N. **Calendar Day.** A day shown on the calendar.

O. **Certificate of Occupancy.** A document issued by the Office of the State Fire Marshal or its authorized representative certifying that all of, or a designated portion of a building, is approved for its designated use.

P. **Certificate of Full or Partial Substantial Completion.** A document prepared by the *Community College System of New Hampshire* when the *Project* reaches *Substantial Completion and only* issued after review and acceptance of the *Contractor's Request for Certificate of Full or Partial Substantial Completion*.

Q. **Chancellor.** The Chancellor of the Community College System of New Hampshire.

R. **Change Order.** A written agreement between the *Contractor* and the *Community College System of New Hampshire* that identifies *Work* to be completed as part of an Allowance Item. Any change that affects either the *Contract Sum*, Contract Time or *Credit* shall be processed as an *Change Order*.

S. **Clerk of the Works.** An authorized representative identified by the *Community College System of New Hampshire*, responsible for observing construction on the *Community College System of New Hampshire*'s behalf for conformance with the *Contract Documents*.

T. **College.** The college who is responsible for the facility and/or will occupy the facility after and/or during the Work. The College(s) has/have no contractual agreement with the *Contractor* and therefore shall not direct the *Contractor* in any way.

U. **Commercial General Liability Insurance.** A broad form of liability insurance covering claims for bodily injury and property damage which combines under one policy coverage for business liability exposures, except those specifically excluded.

V. **Completion Date.** The last day of the time allotted or the specific date established as identified in the *Contract Documents* for *Substantial Completion* of the *Work*, including any authorized extensions.

W. **Consultant.** The *Architect*, *Engineer*, and/or professional engaged to develop/provide *Drawings, Specifications* and/or other services for the *Project*. The Consultant has no contractual agreement with the *Contractor* and therefore all interaction between any Consultant and the *Contractor* shall be done thru the *Contract Representative*.

X. **Contract.** The written agreement between the *Community College System of New Hampshire* and the *Contractor* setting forth the obligations of the parties as outlined in the *Contract Documents*.

Y. **Contract *Representative*.** The *Community College System of New Hampshire's* appointed representative is the CCSNH Director of Capital Planning and Development having specific authority to act on the *Community College System of New Hampshire's* behalf and shall be responsible for general supervision, control, and direction over all matters pertaining to design, construction, maintenance standards, preservation, and administration of the *Contract*. The Architect does not have such authority.

Z. **Contract Bond.** The approved form of security to the Community College System of New Hampshire (political subdivision) in compliance with RSA 447:16 executed by the *Contractor* and their *Surety* or Sureties, guaranteeing complete execution of the contract and all supplemental agreements pertaining thereto including the payment of all legal debts pertaining to the construction of the *Project*.

AA. **Contract Documents.** Collectively, the *Invitation To Bid*, *Bidding Requirements*, *Contract Bond*, *Specifications*, *Drawings*, *Addendum*, and other documents included in the *Contract*, and modifications, clarifications, authorized *Alteration Orders* and *Change Orders* issued after the execution of the *Contract,* to complete the *Project*. All documents shall be written in English.

BB. **Contract Sum.** The amount stated in the *Contract*. This sum shall be derived from the *Lump Sum Base Bid*, *Lump Sum Grand Total*, or *Negotiated Price*; modified to reflect the acceptance of any *Alternates*. The *Notice to Proceed* shall state the amount that the *Community College System of New Hampshire* is obligated to pay the *Contractor*.

CC. **Contractor.** The *Corporation*, *Partnership*, or *Proprietorship,* or any combination thereof, contracting with the Community College System of New Hampshire for performance of prescribed work.

DD. **Contractor's Request for Certificate of Full or Partial Substantial Completion.** A document prepared by the *Contractor* when the *Project* reaches *Substantial Completion*.

EE. **Contractual Liability.** Liability assumed by the *Contractor* under a *Contract*.

FF. **Corporation.** A legal entity organized under the laws of a particular jurisdiction who is legally authorized to do business in the State.

GG. **Credit.** Any Change that results in a reduction in the *Contract Sum* or *Lump Sum Grand Total* Items. All credits shall be processed by an *Alteration Order* and may include modifications to *Lump Sum Grand Total* Items.

HH. **Day.** Unless designated as a *Working Day*, or unless otherwise indicated, this term will mean a *Calendar Day*.

II. **Drawings (Plans).** The graphic and pictorial documents or reproductions thereof, which show the location, character, dimensions, and details of the prescribed work.

JJ. **Final Completion.** Term denoting that the *Work* has been completed in accordance with the terms and conditions of the *Contract Documents* and all *Punch List* items have been completed.

KK. **Final Payment.** Payment made by the *Community College System of New Hampshire* to the *Contractor*, upon *Final Completion*.

LL. **General Conditions.** The part of the *Contract Documents* establishing the rights, responsibilities and relationships of the parties.

MM. **Hazardous Material.** Shall include any material regulated by federal or state law and shall include but not limited to asbestos, toxic or hazardous waste, PCBs, combustible gases and materials, petroleum or radioactive material, or any other substances under any conditions and in such quantities as would pose a substantial danger to persons or property exposed to such substances.

NN. **Indemnification.** A contractual obligation by which one person or entity agrees to reimburse others for loss or damage arising from specified liabilities.

OO. **Invitation to Bid.** A portion of the *Bidding Documents*; the *Advertisement* for *Proposals* for *Work* or *Materials* on which *Bids* are requested. The *Advertisement* will indicate the time and place of the opening of *Proposals*, the type and location of *Work* to be performed, the character and quantity of the *Material* to be furnished and provide information on how to obtain *Drawings*, *Specifications* and *Proposal*.

PP. **Liability Insurance.** A contract under which an insurance company agrees to protect a person or entity against claims arising from a real or alleged failure to fulfill an obligation or duty to a third party who is a named or an incidental beneficiary.

QQ. **Lump Sum Base Bid.** One type of *Proposal* where the *Bid* is established by a single item price to perform all *Work* excluding any *Alternates* that may or may not become part of the *Contract*.

RR. **Lump Sum Grand Total.** One type of *Proposal* where the *Bid* is established as a total of various items to perform all *Work* excluding any *Alternates* that may or may not become part of the *Contract*.

SS. **Low Bid.** The *Bid* stating the lowest price proposed for performance of the *Work*, conforming to the *Bidding Documents*.

TT. **Lowest Responsible Bidder.** The *Bidder* who submits the lowest bona fide *Bid* and is considered by the Community College System of New Hampshire to be fully responsible and qualified to perform the *Work* for which the *Bid* is submitted.

UU. **Material(s).** Any substance and/or product specified for use in the construction of the *Project* and its appurtenances.

VV. **Negotiated Price.** A *Proposal* modified by the *Lowest Responsible Bidder* thru communication with the Community College System of New Hampshire in which changes are made to the *Proposal* and/or *Completion Date* as required to meet budget, funding or scheduling requirements.

WW. **Notice to Proceed.** A written notice to the *Contractor* to proceed with a portion of or all of the Contract Work; including the beginning of *Contract* time when applicable. The Notice to Proceed shall act as the final step in awarding the *Contract* or portion thereof.

XX. **Occurrence Policy.** An insurance policy that covers acts or omissions occurring during the policy term, regardless of when a claim against the insured is first asserted, even if the policy is no longer in existence.

YY. **Owner's Protective Liability Coverage.** Third-party legal liability insurance coverage protecting the *Community College System of New Hampshire* from claims arising from the construction process.

ZZ. **Partnership.** An association of two or more persons or entities to conduct a business that shares profits and losses at a certain proportion.

AAA. **Professional Engineer.** Referred to as Engineer. As defined in RSA 310-A:2, a person who by reason of advanced knowledge of mathematics and the physical sciences, acquired by professional education and practical experience, is technically and legally qualified to practice engineering, and who is licensed by or otherwise authorized by State of New Hampshire Professional Engineers Board to engage in the practice of engineering. The Engineer has no contractual agreement with the *Contractor* and therefore shall not directly interact with the *Contractor.*

BBB. **Project.** The total construction of the *Work* to be performed.

CCC. **Proposal.** A *Bidder's* offer, on *Community College System of New Hampshire* prescribed forms, to perform stated work at the quoted price(s).

DDD. **Proposal Guaranty.** The security furnished with a *Proposal*, which shall be a *Bid Bond*, certified check or cashier's check and which provide that the *Bidder* if awarded the *Contract* will execute such *Contract* in accordance with the requirements of the *Bidding Documents*.

EEE. **Proprietorship (Individual).** A form of business organization that is owned entirely by one person.

FFF. **Provide.** To furnish and install a product, materials, systems, and/or equipment, complete in place, fully tested and approved.

GGG. **Punch List.** A written document attached to the *Certificate of Substantial Completion* listing items to be completed or corrected prior to the *Community College System of New Hampshire* approval of *Final Payment*.

HHH. **Specifications.** The volume that is part of the *Contract Documents* which contain the *General Conditions*, *Supplementary General Conditions*, *Invitation to Bid*, and individual sections that consist of written requirements for material, equipment, construction systems, standards and workmanship, and other documents or reports as applicable.

III. **State.** The State of New Hampshire.

JJJ. **Subcontractor.** A *Corporation*, *Partnership*, *Proprietorship,* Joint Venture or any combination thereof, to whom the *Contractor* sublets any part of the *Contract*.

KKK. **Substantial Completion.** As determined by an inspection by the *Contract Representative* that the work or portion thereof is substantially complete, in accordance with the *Contract Documents*, such that the *Community College System of New Hampshire* may occupy or utilize the *Work* for its intended use without disruption or interference by the *Contractor* in completing or correcting any remaining unfinished or unacceptable *Work*.

LLL. **Substitution.** A *Material*, product or item of equipment in place of that specified.

MMM. **Superintendent.** The *Contractor's* authorized representative responsible for field supervision, coordination, and completion of the *Work*.

NNN. **Supplementary General Conditions.** A part of the *Contract Documents* which supplements and may also modify, change, add to or delete from provisions of the *General Conditions*.

OOO. **Surety.** A *Corporation*, *Partnership*, or *Proprietorship* other than the *Contractor*, executing a bond furnished by the *Contractor*.

PPP. **Umbrella Liability Insurance.** Insurance providing coverage in an amount above existing liability policies.

QQQ. **Unit Price.** An amount stated in a *Lump Sum Grand Total Bid* as a price per unit for an item or portion of the contract or for specific materials and/or services described in the *Contract Documents*.

RRR. **Work.** The construction and services required by the *Contract Documents* to furnish all labor, materials, equipment, and incidentals necessary to complete the duties, obligations, and requirements imposed by the *Contract*.

SSS. **Workers' Compensation Insurance.** Insurance covering the liability of an employer to employees for compensation and other benefits required by workers' compensation laws with respect to injury, sickness, disease or death arising from their employment.

TTT. **Working Day.** Any calendar day, except Saturdays, Sundays, and Contract designated legal holidays.

PART 2 CONTRACT DOCUMENTS

2.1 The Contract Documents consist of the Invitation to Bid, Contract Agreement, General Conditions, Supplementary General Conditions, Drawings and Specifications, including all Addenda issued prior to execution of the Contract, wage scales where applicable, Bonds where required, insurance certificates, other documents listed in the Agreement and Modifications issued after the execution of the Contract, Change Orders and Alteration Orders issued in accordance with Part 12 of the General Conditions.

A. Hierarchy of the Contract Documents shall be interpreted according to the following classes:
1. Community College System of New Hampshire approved modifications to the Contract Documents after execution of the Contract.
2. Addenda.
3. Supplemental General Conditions.
4. General Conditions.
5. Division 1 – General Requirements.
6. Remaining Specifications.
7. Larger Scale Drawings & Details.
8. Remaining Drawings.

2.2 A fully executed Contract shall not be in effect until the contract is approved and an issuance of the Notice to Proceed by the Community College System of New Hampshire.

2.3 This Contract is executed in a number of counterparts, each of which is an original and constitutes the entire agreement between the parties. This Contract shall be construed according to the laws of the State. No portion of this Contract shall be understood to waive the sovereign immunity of the *Community College System of New Hampshire.* This Contract shall not be amended, except as specified in Parts 13 and 20.

2.4 The Contract Documents are complementary and anything called for by one of the Contract Documents and not called for by the others shall be of like effect as if required by all.

2.5 Should the Contract Documents contain inconsistencies within a class identified in Item 2.1A, the Contractor shall provide the better quality or greater quantity of work and/or materials. The Contractor shall identify any perceived discrepancies to the Contract Representative prior to proceeding.

2.6 The Contractors and all Subcontractors shall refer to all of the Contract Documents, including those not specifically showing the work of their specialized trades, and shall perform all work reasonably inferable from them as being necessary to produce the intended results in compliance with applicable Federal, State, and Local codes.

2.7 All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the work, except where a contrary result is clearly indicated by the Contract Documents.

2.8 Where codes, standards, requirements, and publications of public and private bodies are referred to in the Contract Documents, such references shall be understood to be to the latest final and complete

revision at the time of receiving Bids unless specifically identified, except where otherwise indicated.

2.9 Where no explicit quality or standards for materials or workmanship is established for work, such work is to be consistent with the best quality workmanship standards of the applicable trade.

2.10 All manufactured articles, materials, and equipment shall be applied, assembled, installed, connected, erected, tested, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions, unless specifically indicated otherwise in the Contract Documents.

2.11 The Drawings are made to scale as identified therein, but all working dimensions shall be taken from the figured dimensions and by actual measurements at the job; in no case by scaling. The Contractor shall study and compare all of the Drawings and verify all figures before laying out or constructing work. The Contractor shall be responsible for errors in his/her work that might have been avoided thereby. Whether or not an error is believed to exist, deviation from the Drawings and the dimensions given thereon shall be made only after approval in writing from the Contract Representative.

2.12 All Drawings and Specifications and copies thereof are the property of the Community College System of New Hampshire and shall not be used by the Contractor or Subcontractor on other Projects.

PART 3 NOTICE

3.1 Any written notice by either party to the Contract shall be sufficiently given if delivered to or at the last known business address of the person, partnership or corporation constituting the other party to the Contract, or to his/her, their, or its duly authorized agent, representative, or officer, or when sent by registered mail to such last known business address. The last known business address shall be that location which is last provided in writing.

3.2 The parties shall provide their physical location/address, mailing address, telephone number, fax number, and, where available, pager number(s), email address(es), and other methods of contact for all persons associated with the Contract.

PART 4 ACCESS TO THE WORK

4.1 The Contractor shall provide for access to the work, at all times, for observation and/or inspection by the Community College System of New Hampshire, Architect, Consultant, Engineer and City of Keene government officials having jurisdiction. The Contractor shall provide proper facilities for such access and inspection.

PART 5 ACCIDENT PROTECTION

5.1 It is a condition of this Contract, and shall be made a condition of each subcontract entered into pursuant to the Contract, that the Contractor, any Subcontractors, or Independent Contractors shall not require any laborer or mechanic employed in the performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to the laborer's health or safety as determined by construction safety and health standards of the Occupational Safety and Health Administration, United States Department of Labor, which standards include, by reference, the established Federal Safety and Health Regulations for Construction. These standards and regulations comprise Part 1910 and Part 1926 respectively of Title 29 of the Code of Federal Regulations, as may be revised from time to time. In the event any revisions in the Code of Federal Regulations are published, such revisions will be deemed to supersede the appropriate Part 1910 and Part 1926, and be effective as of the date set forth in the revised regulation.

PART 6 HAZARDOUS MATERIALS

6.1 The Contractor shall also be aware of laws and regulations relating to hazardous materials that may be encountered during construction operations, either within project limits or at material sites off the project. The health and safety of employees, the general public, and the potential of damage to the overall environment is possible if hazardous materials are not recognized, reported, and the appropriate action taken to dispose of, remove from the site, or otherwise contain the possible contaminants.

6.2 If any abnormal condition is encountered or exposed that indicates the presence of a hazardous material or toxic waste, construction operations shall be immediately suspended in the area and the Contract Representative notified. No further work shall be conducted in the area of the contaminated material until the site has been investigated and the Community College System of New Hampshire has given approval to continue the work in the area. The Contractor shall fully cooperate with the Community College System of New Hampshire and perform any remedial work as directed. Work shall continue in other areas of the Project unless otherwise directed.

6.3 Exposure to hazardous materials may result from contact with, but not necessarily limited to, such items as drums, barrels, and other containers, waste such as cars, batteries, and building construction debris. Containers leaking unknown chemicals or liquids, abandoned cars leaking petroleum products, batteries leaking acid, construction debris which may include asbestos, or any other source of suspected hazardous material found within excavation areas or stockpiled on land within construction limits shall be referred to the Department of Environmental Services and Contract Representative so that a proper identification of the materials may be made and disposal procedures initiated as required.

6.4 Disposition of the hazardous material or toxic waste shall be made under the requirements and regulations of the Department of Environmental Services. Work required to dispose of these materials and any remedial work shall be performed under a Supplemental Agreement or Contract item, if included in the Contract.

PART 7 SUBCONTRACTS

7.1 Nothing contained in the Specifications or Drawings shall be construed as creating any contractual relationship between any Subcontractor and the Community College System of New Hampshire. The Sections of the Specifications are not intended to control the Contractor in dividing the work among Subcontractors or to limit the work performed by any trade.

7.2 The Contractor shall be as fully responsible for the acts and omissions of Subcontractors and of persons employed by them, as he/she is for the acts and omissions of persons directly employed by him/her.

7.3 The Contractor shall, without additional expense to the Community College System of New Hampshire, utilize the services of specialty Subcontractors, as required to complete the work.

7.4 The Contract Representative will not undertake efforts to settle or resolve any differences between the Contractor and Subcontractors or between Subcontractors.

7.5 The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the work of Subcontractors and to give the Contractor the same power to terminate any subcontract that the Contract Representative may exercise over the Contractor under any provisions of the Contract Documents.

PART 8 RESPONSIBILITY OF CONTRACTOR TO ACT IN EMERGENCY

8.1 In case of any emergency that threatens loss or injury of property, and/or safety of life, the Contractor shall act as the situation may warrant. He/she shall notify the Contract Representative thereof immediately thereafter. Any compensation claimed by the Contractor together with substantiating documents in regard to expense, shall be submitted to the Contract Representative and the amount of compensation shall be determined by agreement.

8.2 In the event the Community College System of New Hampshire learns of an emergency that threatens loss or injury of property, and/or safety of life, the Community College System of New Hampshire shall notify the Contractor using the contact information provided pursuant to PART 3 herein. The Community College System of New Hampshire may, but shall have no duty to take reasonable steps to mitigate the damage or loss to the Contractor. In either event, the Community College System of New Hampshire shall have no duty to undertake any specific acts and shall have no liability for actions or inactions taken absent gross negligence.

PART 9 MUTUAL RESPONSIBILITY OF CONTRACTORS

9.1 If the Contractor or any of his/her Subcontractors or employees causes loss or damage to any separate Contractor or Subcontractor on the work, the Contractor or Subcontractor agrees to settle with such separate Contractor or Subcontractor by agreement, if he/she will so settle. If such separate Contractor or Subcontractor sues the Community College System of New Hampshire because of any loss so sustained, the Contract Representative shall notify the Contractor and/or their Subcontractors, who shall indemnify and hold harmless the Community College System of New Hampshire against any expenses or judgment arising therefrom.

PART 10 PAYMENTS TO CONTRACTOR

10.1 The Community College System of New Hampshire will process payments to the Contractor each month on the basis of duly certified and approved estimates of the work performed during the preceding period. In preparing estimates, the material delivered on the site and any preparatory work done may be taken into consideration. Payments will only be approved in an amount no greater than the percentage of project completion, as determined by the Contract Representative.

10.2 At least ten (10) days before the end of the billing period, the Contractor shall submit to the Contract Representative, an itemized Requisition for Payment, supported by such data substantiating the Contractor's right to payment as the Contract Representative may require. If payment is to be made for materials or equipment not incorporated in the work, but delivered and suitably stored at the site, or at some other location agreed upon in writing, such payment shall be conditional upon inspection and/or observation by the Community College System of New Hampshire and submission by the Contractor of bills of sale or such other procedure satisfactory to the Contract Representative to establish the Community College System of New Hampshire's title to such materials or equipment or otherwise protect the Community College System of New Hampshire's interest including applicable insurance and transportation to the site.

10.3 Immediately upon receipt of the Monthly Requisition for Payment, Contractor shall post same at the Contractor's Field Office or project site in a location where Subcontractors have clear access.

10.4 Retainage:

A. Contract Payment Withheld: A 5% retainage shall be withheld from each Progress Payment until issuance of a Certificate of Substantial Completion. The balance remaining after the specified percentage has been retained, less all previous payments, will be certified for payment on each partial estimate.

****** [OR] ******

B. Intentionally omitted.

10.5 Retainage will be released at Final Payment.

A. After the Certificate of Substantial Completion has been issued, upon written application by the Contractor and with the approval of the Surety, the Contract Representative may release a portion of the retained amount.

10.6 Payment for Material On Hand:

A. Partial payments are made for materials to be incorporated in the Work, provided the materials meet the requirements of the Contract and are delivered on, or in the vicinity of, the Project site and stored in acceptable places. Partial payments will not exceed 90 percent of the Contract unit price for the item or the amount supported by copies of paid invoices, freight bills, or other supporting documents required by the Community College System of New Hampshire. The quantity paid will not exceed the corresponding quantity estimate in the Contract. No partial payment will be made on living or perishable materials until incorporated in the Work.

B. When material payments exceed $100,000 or 10 percent (10%) of the total contract amount, whichever is less, notarized copies of paid invoices or copies of canceled checks

for all such materials must be submitted to the Contract Representative within 45 days of the end date of the estimate on which the material allowance was paid. Failure to provide such documentation will result in the deduction of such material allowance from future estimates until documentation is provided.

C. All material and work covered by partial payments made shall thereupon become the sole property of the Community College System of New Hampshire, but this provision shall not be construed as relieving the Contractor of the sole responsibility of all materials and work upon which payments have been made or the restoration of any damaged work or as a waiver of the right of the Community College System of New Hampshire to require the fulfillment of all the terms of the Contract.

10.7 Payment for Material Not on Hand:

A. Upon receipt of a written request by the Contractor, partial payment may be made for acceptable, fully-fabricated, nonperishable materials not delivered that are unique to the Project provided the materials meet the requirements of the Contract and are stored in excess of 30 days at locations approved by the Community College System of New Hampshire, and provided all required certificates of compliance, mill test reports, shop inspector's acceptance and any other required materials certification have been furnished. Materials shall be identifiable and accessible for inspection. Storage areas shall provide adequate protection so that such materials will meet the Contract requirements upon delivery to the site.

B. Partial payment will be based on the actual cost to the Contractor as indicated on invoices furnished to the Contract Representative. When material payments exceed $100,000 or 10 percent of the total contract amount, whichever is less, notarized copies of paid invoices or copies of canceled checks for all such materials must be submitted to the Contract Representative within 45 days of the end date of the estimate on which the material allowance was paid. Failure to provide such documentation will result in the deduction of such material allowance from future estimates until documentation is provided. Payment shall not exceed 90 percent of the bid price. NO payment will be made on materials for any item in the contract whose total dollar value is less than $5,000. Approval of partial payment will not constitute final acceptance of the materials for use in completing items of work.

10.8 Release of Claims:

A. Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver a complete release of all claims arising under and by virtue of this Contract, including claims releasing the City of Keene and for all Subcontractors and suppliers of either materials or labor, plus a release of the Contract Bond and a statement that all Subcontractors and suppliers have been paid. The Chancellor, may pay any and all such claims, in whole or in part, and deduct the amount or amounts so paid from any partial or final payment.

10.9 Final Payment:

A. Application for Final Payment received from the Contractor will be processed for payment not less than 90 days after project acceptance and final completion unless accompanied by

a release of the Contract Bond. This payment shall be the amount of the Contract, amended by approved alteration orders, less previous payments minus liquidated damages, additional penalties or holdbacks. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

10.10 Acceptance of Final Payment Constitutes Release:

A. The acceptance of the Final Payment by the Contractor shall be and shall operate as a release to the Contractor of all claims and of all liability to the Community College System of New Hampshire for all things done or furnished in connection with this work. No payment, however, final or otherwise, shall operate to release the Contractor and its Sureties from any obligations under this Contract or the Contract Bond. Acceptance of Final Payment shall not impact any warrantees provided by the Contractor with respect to this project.

PART 11 CONTRACTOR'S TITLE TO MATERIALS

11.1 No materials or supplies for the work shall be purchased by the Contractor or any Subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that good title has been obtained for all materials and supplies for which partial payment has been accepted. If any claim is made with respect to materials provided by the Contractor, Subcontractors, or Independent Contractors, the Contractor shall defend any such claim and shall pay any judgment or settlement thereon.

PART 12 CHANGES IN WORK

12.1 No charge for any extra work or material will be allowed without a fully executed Alteration Order. (Refer to Specification Section 01200-Price and Payment Procedures)

12.2 The Chancellor may at any time, by a written order, and without notice to the Sureties, make changes in the Drawings and Specifications and Completion Date of the Contract and within the general scope thereof.

12.3 If any part of the work as installed be at variance with the Contract requirements, the Contract Representative may allow all or any part of such work to remain in place, if found to be in the best interest of the Community College System of New Hampshire, subject to proper adjustment in the Contract Price. Acceptance of installed work in one instance or in any instance does not constitute a waiver of Specifications, General Conditions or contract requirements.

12.4 The Contractor shall hold the Community College System of New Hampshire and its officers, agents, servants, and employees harmless from liability of any nature including cost and expenses, for or on account of any patented or unpatented invention, process, article or applicable items

manufactured or used in the performance of the Contract, including its use, unless otherwise specifically stipulated in the Contract Documents.

PART 13 ASSIGNMENTS

13.1 The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due, hereunder, without the written consent of the Chancellor and of all Sureties executing any Bonds on behalf of the Contractor if in connection with said Contract.

PART 14 SUPERINTENDENCE BY CONTRACTOR

14.1 The Contractor shall have on the project site, at all times when work is being performed, a competent English speaking Superintendent capable of reading and thoroughly understanding the contract documents and thoroughly experienced in the type of work being performed, satisfactory to the Community College System of New Hampshire. The Contractor shall not change superintendents without permission from the Contract Representative and shall submit a request in writing with justification for such a change.

A. The Superintendent shall be responsible for verifying that all materials, installation, coordination, and workmanship are in conformance with the contract documents.

B. The Contract Representative has granted, the Superintendent shall, himself, engage in "hands-on" construction work.

C. Intentionally omitted

PART 15 FAILURE TO COMPLETE WORK ON TIME

15.1 If the Contractor fails to complete all of the work or sections of the Project, if sections are indicated, within the time specified in the Contract or within any additional time allowed, for each working day the Liquidated Damages identified in 16.3 will be deducted from any money due the Contractor. This deduction will be made, not as a penalty, but as fixed, agreed liquidated damages for inconvenience to the Community College System of New Hampshire and for reimbursing the Community College System of New Hampshire the cost of the Administration of the Contract, including personnel, time, engineering and inspection. Should the amount of money otherwise due the Contractor be less than the amount of such liquidated damages, the Contractor and its Surety shall be liable to the Community College System of New Hampshire for such deficiency.

15.2 If the Community College System of New Hampshire permits the Contractor to continue and finish the work after the time fixed for its completion, it shall in no way operate as a waiver on the part of the Community College System of New Hampshire of any of its rights under the Contract. When the final acceptance has been duly made by the Contract Representative, any liquidated damage charges shall end.

15.3 The fixed, agreed, liquidated damages shall be assessed in accordance with the following schedule:

Original Contract Amount, Plus Any Extras, Alteration Orders, and Alternates		Amount of Liquidated Damages Per Working Day
From More Than:	To and Including:	
$0	$25,000.00	$200.00
$25,000.00	$50,000.00	$250.00
$50,000.00	$100,000.00	$400.00
$100,000.00	$500,000.00	$450.00
$500,000.00	$1,000,000.00	$800.00
$1,000,000.00	$2,000,000.00	$1,200.00
$2,000,000.00	$5,000,000.00	$1,600.00
$5,000,000.00	$10,000,000.00	$2,000.00
$10,000,000.00	and above	$2,400.00

PART 16 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

Revised 12/08/04

16.1 The Contractor shall provide a signed Substantial Completion Application to the Contract Representative when the work is believed to be substantially complete, in accordance with specification section 01700, accompanied by a list of items, referred to as the Punch List, to be completed or corrected. The failure to include any items of such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents. On the basis of an inspection by the Contract Representative who determines that the work is substantially complete, a Certificate of Substantial Completion will be issued.

A. The Certificate of Substantial Completion shall:
   1. Include any modifications to the Punch List or value as determined by the Contract Representative.
   2. Establish the Date of Substantial Completion.
      a. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion unless otherwise provided in the Certificate of Substantial Completion.
   3. Identify the responsibilities of the Community College System of New Hampshire and the Contractor for security, maintenance, heat, utilities, and damage to the work and insurance.
   4. Fix the time limit within which the Contractor shall complete the items listed herein.

16.2 Partial Occupancy or Use: The Community College System of New Hampshire may take occupancy or use of completed or partially completed portions of the work upon written agreement between the Chancellor and the Contractor. Said partial occupancy or use shall have the approval of the insurer and Code enforcement authorities having jurisdiction. Said partial occupancy or use, (whether substantial completion has been obtained or not) provided the Contract Representative and Contractor have agreed upon written terms detailing each of the entities responsibilities in their entirety, may be exercised under these General Conditions.

A. A Written agreement shall stipulate the time period for completion of all Work and the commencement date for all applicable contract warranties. Said written agreement shall be preceded by a Contractor generated listing of all incomplete Work, meeting with the approval of the Contract Representative, before partial occupancy or use is taken by the Community College System of New Hampshire with prior approval of the Division.

16.3 If the Contractor fails to complete the items on the "punch list," by the date specified on the Substantial Completion Certificate, then in addition to the corrective measures listed in the Certificate of Substantial Completion, the Community College System of New Hampshire may use the monies still due the Contractor to have such items completed and the Contractor shall lose any claim to the monies so used. The Surety may be notified of any delay or failure to complete the work.

16.4 Upon written notice that the work is ready for final inspection and acceptance, the Contract Representative shall promptly make such inspection, to determine the work is acceptable under the Contract Documents and the Contract fully performed. The Contractor shall submit a request for payment, specifically identifying Final Payment. The Contractor shall provide all certificates and reports, as required, throughout the contract and shall coordinate their preparation and submission

prior to request for final payment. Failure to submit such certificates and reports shall be considered default of contract.

PART 17 DEFAULT AND TERMINATION OF CONTRACT

17.1 If the Contractor:

A. Fails to begin work under Contract within the time identified in specification section 01100.

B. Fails to perform the work with sufficient workers and equipment, or with sufficient materials to assume prompt completion of said work, or

C. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or

D. Discontinues the prosecution of the work, or

E. Fails to resume work, which has been discontinued, within a reasonable time after notice to do so, or

F. Becomes insolvent or has declared bankruptcy, or commits any act of bankruptcy or insolvency, or

G. Makes an assignment for the benefit of creditors, or

H. For any other causes whatsoever, fails to carry on the work in an acceptable manner.

17.2 The Chancellor will give notice, in writing, to the Contractor and his Surety for such delay, neglect, and default for any item identified above.

A. Upon receipt of Notification of Default and the Contractor or Surety does not proceed in accordance with said Notification, then the Chancellor will Terminate the Contract. Upon which, the Chancellor shall have full power and authority, without violating the Contract, to assume the prosecution of the work. The Chancellor may enter into one or more agreements for the completion of said Contract according to the terms and conditions thereof, or use such other methods as will be required for the completion of said Contract in an acceptable manner.

1. All extra costs and charges incurred by the Community College System of New Hampshire as a result of such delay, neglect or default, together with the cost of completing the work under the Contract will be deducted from any monies due or which may become due said Contractor. If such expenses exceed the sum that would have been payable under the Contract, then the Contractor and the Surety shall be liable and shall pay to the Community College System of New Hampshire, the amount of such excess.

PART 18 TERMINATION OF CONTRACT WITHOUT FAULT

18.1 Except in cases controlled by the preceding section, the Chancellor, for any cause, including, but not limited to an order of any Federal authority or petition of the Contractor due to circumstances beyond its control may, by written notice to the Contractor and the Surety, with the concurrence of the Governor and Council, terminate the Contract or any portion thereof subject to the Condition(s) A, B, C, and D provided below.

18.2 Notwithstanding anything to the contrary contained in these conditions, it is understood and agreed by the parties hereto that all obligations of the Community College System of New Hampshire hereunder, including the continuance of payments, are contingent upon the availability and continued appropriation of State and/or Federal Funds, and in no event shall the Community College System of New Hampshire be liable for any payments hereunder in excess of such available or appropriated funds. In the event of a reduction, termination or failure to appropriate any or all such available funds or appropriations or a reduction of expenditures of Community College System of New Hampshire funds by the Advisory Budget Control Committee, the Chancellor may, by written notice to the Contractor and Surety, immediately terminate this Contract in whole or in part in accordance with the following conditions:

A. When a Contract, or portion thereof, is terminated before completion of all items of work in the Contract, payment will be made for the actual items of work completed. Payment of items of work not completed at time of termination shall be the greater of the following amounts:
   1. A percentage of the Contract unit price, which percentage shall be the percentage of completion of the particular item at time of termination.
   2. Such amount as shall be mutually agreed upon by the parties. No claim for loss of anticipated profits on items or units of work not completed will be allowed.

B. Reimbursement for organization of the work and mobilization, when not otherwise included in the Contract, shall be made where the volume of work completed is too small to compensate the Contractor for these expenses under the Contract; the intent being that an equitable settlement be made with the Contractor.

C. Acceptable materials, obtained or ordered by the Contractor for the work, and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor based upon the delivered cost of the materials at such points of delivery as may be designated by the Contract Representative. The Contractor shall do everything possible to cancel unfilled orders.

D. Termination of a Contract, or a portion thereof, shall not relieve the Contractor of its responsibilities for the work completed nor shall it relieve the Surety of its obligations for and concerning any claims arising out of the work performed.

PART 19 ASSIGNMENT PROVISION

19.1 The Contractor hereby agrees that it will assign to the Community College System of New Hampshire, all causes of action that it may acquire under the anti-trust laws of New Hampshire and

the United States as a result of conspiracies, combinations of contracts in restraint of trade which affect the price of goods or services obtained by the Community College System of New Hampshire under this Contract, if so requested by the Community College System of New Hampshire.

END OF SECTION

SECTION 01100

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.

B. Work by College.

C. College supplied products.

D. Contractor's use of site.

E. Work sequence.

F. College occupancy.

G. Specification Conventions.

1.2 CONTRACT DESCRIPTION

A. Description

Replacing the existing roof top air handlers and the kitchen makeup air unit. This includes Absolute Air make-up air unit serving the kitchen connected to the existing fire alarm and fire suppression systems, GE Electric R-22 packaged rooftop unit serving the business offices at the main entrance, Trane LP gas fired packaged rooftop unit serving the library office area, Trane R-22 packaged rooftop unit serving rooms, York R-22 gas-fired packaged rooftop unit serving the library study rooms, Nordyne R-22 split-system AC serving the business office, Kitchen roof mounted Greenheck upblast exhaust fan and integration of energy recovery systems will be considered. This will include plumbing and mechanical demolition of existing equipment and installation of new equipment. It will also include the replacement and installation of new mechanical and electrical equipment including two additional panels and a 2000A switchboard. Additionally, there will be upgrades to the Welding lab including installation of additional electrical equipment, installation of an air compressor and its required piping. Finally, there will be additional HVAC upgrades including the installation of new gas lines and its support, RTU upgrade, and ductwork.

1. Project Includes but not limited to the Disciplines: Mechanical, Gas, Electrical, Plumbing
2. Correction and Clarification: None

B. The Project will include but not be limited to the Disciplines of: Mechanical, Gas, Electrical, Plumbing

C. Perform Work of Contract under stipulated lump sum grand total contract with the College in accordance with Conditions of Contract.

D. The Contractor shall, except as otherwise specifically stated in the Contract Documents, provide and pay for all materials, labor, tools, equipment, water, heat, fuel, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

1.3 WORK BY COLLEGE

1. None

1.4 COLLEGE SUPPLIED PRODUCTS

1. None

1.5 CONTRACTOR'S USE OF SITE [AND PREMISES]

A. Limit use of site and premises to allow:
   1. College occupancy.
   2. Work by Others and Work by College.

B. Access to Site: Limited to Normal working hours.

C. Construction Operations: Limited to areas as designated in the plans and specifications.

D. Time Restrictions for Performing Work: Normal working hours of [7:30] am to [4:30] pm, Monday through Friday with the following restrictions:
   1. No access during the following observed holidays:
      a. New Year’s Day.
      b. Martin Luther King Jr./Civil Rights Day.
      c. Presidents’ Day.
      d. Memorial Day.
      e. Juneteenth Holiday (June 19).
      f. Independence Day (Fourth of July).
      g. Labor Day.
      h. Veterans’ Day.
      i. Thanksgiving Day.
      j. Day after Thanksgiving.
      k. Chancellor’s Holiday/Winter Recess (Christmas Eve).
      l. Christmas Day.
      m. Winter Recess Days (December 26-31).

2. Access for work outside of normal working hours shall be requested in writing to the Contract Representative, at least one week in advance. The Contract Representative may accept or reject the request.

E. Utility Outages and Shutdown: Shall be coordinated with the building users to minimize disruption of services and may require work to take place outside of normal working hours with request and approval.

1.6 WORK SEQUENCE

A. Work shall commence within 7, days after issuance of Notice to Proceed. Failure to comply shall constitute Default of Contract.

B. Construct Work to accommodate College's occupancy requirements during construction period, coordinate construction schedule and operations with CCSNH Contract Administrator:

1.7 COLLEGE OCCUPANCY

A. The College intends to occupy the campus during the Project. The Contractor’s guarantee of work identified in Section 1700 shall not commence until the Contractor is granted a Certificate of Substantial Completion.

B. Cooperate with College to minimize conflict, and to facilitate College's operations.

C. Schedule the Work to accommodate College occupancy.

D. Partial Occupancy. The College will be permitted to partially occupy the premises as phases of the project are completed. Warranties for items contained within the areas subject to partial occupancy shall commence upon the College’s use of those premises identified in the Partial Occupancy. Warranties on systems extending beyond the area subject to the Partial Occupancy shall not commence until all areas utilizing those system(s) are complete and fully functional.

1.9 SPECIFICATION CONVENTIONS

E. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01200

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Allowances (intentionally omitted).

B. Testing and inspection allowances. (intentionally omitted)

C. Schedule of values.

D. Requisition for payment.

E. Change procedures.

F. Defect assessment.

G. Unit prices.

H. Alternates (intentionally omitted).

1.2 ALLOWANCES (intentionally omitted).

1.3 TESTING AND INSPECTION ALLOWANCES (intentionally omitted)

1.4 SCHEDULE OF VALUES

A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702. Contractor's standard form or electronic media printout will be considered.

B. Submit Schedule of Values in duplicate within 15 days after date of issuance of Notice to Proceed. Failure to submit within specified time period will constitute Default of Contract.

C. Format: Utilize Table of Contents of these Specifications. Identify each line item with number and title of major specification Section. Identify bonds and insurance, allowances, and alternates

D. Include a separate line item for the amount of each Allowance and Alternates specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.

E. Revise schedule to list approved Change Orders, with each Requisitions For Payment.

1.5 REQUISITION FOR PAYMENT

A. Submit one copy of each application.

B. Content and Format: Items on the Requisition for Payment shall be consistent with the items on the Proposal Form. Utilize the Schedule of Values as documentation for payment items.

C. Submit updated construction schedule with each Requisition for Payment.

D. Payment Period: Submit at intervals stipulated in Document 00708 General Conditions. CCSNH

E. Substantiating Data: When the Contract Representative requires substantiating information, submit data justifying dollar amounts in question.

F. Include the following with Requisition for Payment, payment will not be processed if any items are missing or incomplete:

1. Record documents as specified in Section 01700, for review by the Contract Representative, which will be returned to Contractor.
2. Affidavits attesting to off-site stored products.
3. Construction progress schedules revised and current as specified in Section 01330.

1.6 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. The Contract Representative will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time, or that may be necessary to carry out the work included in the Contract, by issuing supplemental instructions.

C. The Contract Representative may issue a Proposal Request including a detailed description of proposed change(s) with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. The Contractor will prepare and submit estimate within ten days.

D. Contractor may propose changes by submitting a request for change(s) to the Contract Representative, describing proposed change and its full effect on the Work. Each request shall be a separate item and sequentially numbered. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors.

E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by the Contract

Representative. Submit the breakdown of the following items on a Stipulated Sum/Price Change Order Form for review and approval by the Contract Representative:

1. The Contractor shall include the following indirect costs for work performed by the General Contractor as part the Contractors' price:
   a. Worker's Compensation and Employee Liability.
   b. Unemployment and Social Security Taxes.
2. In addition to the above indirect costs the General Contractor shall be allowed the following markups:
   a. Ten percent (10%). Said ten percent (10%) shall be all inclusive for overhead, supervision, and profit for Work performed by the General Contractor
   b. Five percent (5%) on that part of work performed by Subcontractors.
   c. The same percentages above shall apply to Subcontractors.
3. On any change that involves a net credit to the State, no allowance for overhead, supervision and profit shall be figured.
4. Extension of Contract Time: State any requests for extension of Contract Time with justification for such a request.

F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

G. Construction Change Directive : The Contract Representative may issue directive, signed by the Bureau Administrator or Assistant Administrator, instructing the Contractor to proceed with change in the Work, for subsequent inclusion in a Time and Material Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change. Failure to comply will result in Default of Contract.

H. Time and Material Change Order: Submit itemized account and supporting data within 10 days of completion of change. The Contract Representative will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.

1. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
2. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation. If acceptable, a Change Order for a Not to Exceed Amount will be prepared.
3. The Contractor as payment in full, including superintendence and overhead, shall accept the compensation herein provided and profit, for extra work performed. For all such work, the Contractor shall furnish certified copies of the payrolls on forms provided for that purpose, invoices of all materials, and such other information as may be required by the Contract Representative. Submit the breakdown of items on a Bureau Time and Material Change Order Form for review and approval by the Contract Representative:
   a. Labor (Actual wage + 40%): The Construction Superintendent is responsible for logging the time for each individual. For all laborers and

foremen engaged on the specific operation and entered directly on the Contractor's payroll, the Contractor will receive the actual rate of wage for each and every hour said laborers and Foremen are actually engaged in such work to which will be added an amount equal to forty percent (40%) of the sum thereof, which percentage shall include the cost percentages of the following items as applied to the labor cost involved:

1) Contract Bond Premium.
2) Public Liability Insurance.
3) Worker's Compensation Insurance.
4) Federal Social Security.
5) Unemployment Compensation Taxes

b. Materials (Actual Cost + 10%): For all materials entering permanently into the work plus freight charges thereon, and for all labor not entered directly on his payroll, the Contractor will receive the actual cost, as shown by original receipted bills forwarded to the Contract Representative, to which cost will be added an amount equal to ten percent (10%) of the sum thereof. Bills presented by the Contractor for material taken back from his stock will be subject to the ten percent (10%) allowance if approved by the Contract Representative.

c. Equipment (Reasonable Rental Charge + 0%): For any trucks, machinery or special equipment, other than small tools, the Contractor will receive a reasonable rental charge to which sum no percentage will be added. This rental charge shall be agreed upon in writing before the work is begun and shall include an operator and all fuel, lubricants, and the upkeep of the equipment.

4. In addition to the above costs the General Contractor shall be allowed the following markups:
   a. Ten percent (10%). Said ten percent (10%) shall be all inclusive for overhead, supervision, and profit for Work performed by the General Contractor
   b. Five percent (5%) on that part of work performed by Subcontractors.
   c. The same percentages above shall apply to Subcontractors.
5. Extension of Contract Time: State any requests for extension of Contract Time with justification for such a request.

I. Any Changes that result in a credit to any portion of the contract and/or a change in the Contract Time must be processed as an Change Order except as provided for in Item 1.2E.

J. Execution of Change Orders: CCSNH Contract Representative will issue Change Orders per the following procedures.
1. The Contract Representative reviews cost for Change in Work. If needed the Contract Representative will request additional items, back-up information, and request any possible changes or clarifications.
2. Contract Representative will prepare a Change Order.
3. Contract Representative will issue the Change Order to the Contractor for review and signature.
4. Contractor submits signed Change Order to the Contract Representative.

5. The Contract Representative completes the Change Order with the signature of the College Representative
6. A fully signed and executed Change Order is issued to Contract Representative, Clerk of the Works, and Contractor.

K. Execution of Change Orders: The Contractor is responsible for preparing and updating a spreadsheet log itemizing all Proposed Changes. A separate spreadsheet shall be completed for each Allowance Item. The spreadsheet shall include columns for Proposed Change Number, Description, Amount of Change, (or initial order of magnitude), Status, and Approved Amounts. In addition a current balance remaining shall be included. Change Orders will be processed per the following procedures:
1. The Contract Representative reviews cost for Change in Work with the College and Consultant(s). If needed the Contract Representative will request additional items, back-up information, and request any possible changes or clarifications.
2. Contract Representative and College Representative signs Change Order.
3. Contractor can proceed with Change Order Work with direction from the Contract Representative.
4. Fully signed and executed Change Order is issued to the Contract Representative, Clerk of the Works, and Contractor.

L. Correlation Of Contractor Submittals:
1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.7 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Contract Representative, it is not practical to remove and replace the Work, the Contract Representative will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of the Contract Representative.

D. Defective Work will be repaired to instructions of and acceptance by the Contract Representative, and unit sum/price will be adjusted to new sum/price at discretion of the Contract Representative.

E. Authority of the Contract Representative to assess defects and identify payment adjustments, is final.

F. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.

3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected products.

1.8 UNIT PRICES

A. NONE

1.9 ALTERNATES (intentionally omitted)

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Permits and fees.

C. Field engineering.

D. Preconstruction meeting.

E. Site mobilization meeting.

F. Progress meetings.

G. Pre-installation meetings.

H. Cutting and patching.

I. Notification of Subcontractors and Workmen's Compensation Insurance (SB 78)

J. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of the Specifications to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. The Contractor shall comply with the "Underground Utility Damage Prevention System" by notification to DIG-SAFE SYSTEM of intent to excavate near or around any underground utility installations in public ways. The Contractor shall call 1-800/225-4977 at least seventy-two (72) hours in advance of starting any excavation. Saturday, Sundays, and legal holidays are not included in the computation of the required seventy-two (72) hour notice.

C. Prior to any Work, the Contractor shall hire an independent company to locate utilities potentially affected by the Work and as shown and/or identified in the Contract Documents. All utilities shall be identified by the Contractor on the Record Drawings.

D. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion [and for portions of Work designated for State's [partial] occupancy].

H. After State occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of State's activities.

1.3 PERMITS AND FEES

A. The CCSNH shall obtain and pay for all permits, and impact fees as may be required by law for construction of CCSNH's facility. The Contractor shall pay for all fees and charges, and use of the property other than the site of the work for storage of materials or other purposes.

B. The Contractor shall pay all applicable Federal, State, and Local sales and other taxes, except taxes and assessments on the real property comprising the site of the Project.

1.4 FIELD ENGINEERING (not used)

1.5 PRECONSTRUCTION MEETING

A. The Contract Representative will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance required (unless otherwise waived): Contract Representative, Clerk of the Works, Contractor, Contractor's Superintendent, and major Subcontractors.

C. Potential Agenda Topics:
1. Distribution of Contract Documents.
2. Submission of list of Subcontractors, insurance carriers, subcontracting relationship, list of products, schedule of values, and progress schedule.
3. Designation of personnel representing parties in Contract.
4. Use of premises by CCSNH and Contractor.
5. College's requirements and partial occupancy.
6. Construction facilities and controls provided by CCSNH.
7. Temporary utilities provided by CCSNH
8. Security and housekeeping procedures.
9. Schedules.
10. Application for payment procedures.
11. Procedures for maintaining record documents.

12. Requirements for start-up of equipment.
13. Inspection and acceptance of equipment put into service during construction period.

D. Contract Representative shall record minutes and distribute copies within two days after meeting to participants, with one copy to each person in attendance and one to those affected by decisions made.

1.6 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at weekly intervals.

B. Attendance required (unless otherwise waived): Contract Representative, Clerk of the Works, Contractor, Contractor's Superintendent, and major Subcontractors.

C. Potential Agenda Topics:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

D. Contract Representative shall record minutes and distribute copies within two days after meeting to participants, with one copy to each person in attendance and one to those affected by decisions made.

1.7 PRE-INSTALLATION MEETING(S)

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

B. Require attendance of parties directly affecting, or affected by, Work of specific section.

C. Notify the Contract Representative seven days in advance of meeting date.

D. Contractor shall prepare agenda and preside at meeting:
1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight exposed elements.
5. Work of CCSNH or separate contractor.

C. Execute cutting, fitting, and patching [including excavation and fill,] to complete Work, and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, roof, or floor construction; completely seal voids.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with material in accordance with design and code requirements, to full thickness of penetrated element.

J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

K. Identify hazardous substances or conditions exposed during the Work to the Contract Representative for decision or remedy.

3.2 SPECIAL PROCEDURES

A. Materials: As specified in product sections; match existing with new products [and salvaged products] for patching and extending work.

B. Employ skilled and experienced installer to perform alteration work.

C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

E. Remove debris and abandoned items from area and from concealed spaces.

F. Prepare surface and remove surface finishes to permit installation of new work and finishes.

G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original condition.

I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to original condition for each material, with neat transition to adjacent finishes.

J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Contract Representative for review.

L. Where change of plane of 1/inch or more occurs, submit recommendation for providing smooth transition to Contract Representative for review.

M. Trim existing doors to clear new floor finish. Refinish trim to original condition.

N. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

O. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Subcontractor list.

D. Proposed products list.

E. Product data.

F. Shop drawings.

G. Samples.

H. Design data.

I. Test reports.

J. Certificates.

K. Manufacturer's instructions.

L. Manufacturer's field reports.

M. Erection drawings.

N. Construction photographs.

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal with CCSNH accepted form.

B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

C. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents. Incomplete items or items submitted without the Contractor's signed stamp of approval thereon will be returned rejected.

E. Schedule submittals to expedite Project. Coordinate submission of related items. Deliver to:

Contract Representative
Matthew Moore
memoore@ccsnh.edu
Director of Capital Projects & Planning
Community College System of New Hampshire
26 College Drive
Concord, NH 03301

F. For each submittal for review, allow 14 days excluding delivery time to and from Contract Representative.
1. All shop drawings to be returned to Contractor from the Contract Representative. Direct return of shop drawings from Architect or Engineer to Contractor is not permitted.

G. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

H. Allow space on submittals for Contractor and Architect or Engineer review stamps.

I. When revised for resubmission, identify changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

K. Submittals not requested will not be recognized or processed.

L. Work shall not begin until [All] submittal items have been approved and returned to General Contractor by the Contract Representative.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules at PreConstruction Meeting.

B. Submit revised Progress Schedules with each Application for Payment.

C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

E. Submit horizontal bar chart with separate line for each major portion of Work or operation\ and section of Work, identifying first work day of each week.

F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of Work at each submission.

H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including CCSNH furnished products and dates reviewed submittals will be required from Contract Representative. Indicate decision dates for selection of finishes. Selection of finishes cannot occur until ALL finish items are submitted and products are approved.

I. Indicate delivery dates for furnished products.

J. Revisions To Schedules:
1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

1.4 SUBCONTRACTOR LIST

A. Submit list, at the PreConstruction Meeting, of subcontractors setting forth in detail the work for which they will be responsible. In addition, the General Contractor shall identify what work will be performed with the Bidder's own forces.

B. Provide Subcontractor and Insurance information as required under SB 78.
1. Subcontractor list is to include subcontracting relationship and the carrier of Workmen Compensation Insurance for all subcontractors, all tiers.
2. Proof of Insurance is to be provided within 36 hours of request.
3. Changes and additional to Subcontractor and Insurance is to be provided to the CCSNH within 36 hours of occurrence.
4. The CCSNH will post this information in a publicly accessible website for the duration of the contract.

1.5 PRODUCT DATA

A. Product Data: Submit for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit electronic copies to the Contract Representative. The copy for the CCSNH is separate from the copy the Contractor to provide as part of close out procedures.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01700.

1.6 SHOP DRAWINGS

A. Shop Drawings: Submit for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Submit an electronic copy to the Contract Representative. The copy for the CCSNH is separate from the copy the Contractor to provide as part of close out procedures.

D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01700.

1.7 SAMPLES

A. Samples: Submit for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Samples for Selection as Specified in Product Sections:
   1. Submit to Contract Representative for aesthetic, color, or finish selection.
   2. Submit samples of finishes from full range of manufacturers' standard colors, in custom colors selected, textures, and patterns for Contract Representative and System approval.

C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full Project information.

E. Submit number of samples specified in individual specification sections; Contract Representative will retain one sample and Architect or Engineer will retain one sample.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

G. Samples will not be used for testing purposes unless specifically stated in specification section.

H. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01700.

1.8 DESIGN DATA

A. Submit for Contract Representative's knowledge.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

A. Submit for Contract Representative's knowledge.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor, to Contract Representative in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to the Contract Representative.

1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, [start-up,] adjusting, and finishing, to the Contract Representative in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Contract Representative's and System's benefit.

B. Submit report in duplicate within 7 days of observation to the Contract Representative for information.

C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.13 ERECTION DRAWINGS

A. Submit to the Architect and Contract Representative for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

B. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect, Engineer, or Contract Representative.

1.14 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of construction throughout progress of Work produced by an experienced] photographer, acceptable to the Contract Representative.

B. Twice monthly submit photographs.

C. Photographs: Submit digital images on 3-1/2" diskettes or on compact discs.

D. Take multiple site photographs from differing directions and interior photographs indicating relative progress of the Work, three (3) days maximum prior to submitting.

E. Identify each image. Identify name of Project, contract number phase orientation of view, date and time of view.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

F. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. All materials and equipment shall be new, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

D. The use of asbestos containing materials shall be prohibited.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection only with prior approval from the Contract Representative.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with or without provision for substitutions: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed. Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Where Bidding Documents stipulate particular Products, substitution requests will ONLY be considered before receipt of Bids. Submit requests per the requirements specified in this section.
   1. All requests shall be submitted to the Contract Representative not later than five (5) business days before the hour and day set for bid opening. Incomplete requests or requests received after this deadline will not be considered.
   2. All requests that are approved and are acceptable to CCSNH will be issued as part of an Addendum to each Bidder who has received a set of bidding documents, so that all Bidders may avail themselves of the change in submitting their Proposals.

B. Substitutions [may] be considered after bid opening when a product becomes unavailable through no fault of the Contractor. The Contractor shall apply to the Contract Representative, in writing, within ten (10) days of his realizing his inability to furnish the article specified, describing completely the substitution he desires to make. The Contractor shall include a dated written statement from the manufacturer outlining an explanation for the unavailability of the product. Substitutions for reasons of lead times, i.e., the time between when the Contractor orders necessary materials from the vendor

and anticipated delivery, will only be reviewed if the lead time is more than the length of the contract time. The Department may extend the contract time to accommodate the product specified. No additional costs from the Contractor will be considered due to the fact that the Contractor shall verify lead times and coordinate with contract time during the bidding phase.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that Bidder:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for Substitution as for specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the State.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Department and Architect and/or Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.

E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
   3. The Department will notify Bidders in writing of decision to accept by issuing an addendum.

PART 2 PRODUCTS

A. Not used

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Protecting installed construction.

D. Project record documents.

E. Manual for materials and finishes.

F. Product warranties and product bonds.

G. Guarantee of work.

1.2 CLOSEOUT PROCEDURES

A. Submit a signed Substantial Completion Application attesting that the Contract Documents have been reviewed, Work has been inspected, and that all Work is complete in accordance with Contract Documents and ready for Contract Representative review. The Substantial Completion Application for use by the Contractor is attached to the end of this specification section. The Contract Representative may modify this Agreement to accommodate any changes in Work.
   1. Provide submittals to the Contract Representative as required by the Contract Documents and as required by authorities having jurisdiction.

B. Only after completion of all Punch List items and submission of all items the Contractor shall submit a Final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

C. College will occupy portions of building as specified in Section 01100.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean debris from roofs, gutters, downspouts, and drainage systems.

C. Clean site; sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.5 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by State.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish [first] [main] floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.

5. Details not on original Contract drawings.

G. Submit documents to the Contract Representative at time of Substantial Completion.

1.6 MANUAL FOR MATERIALS AND FINISHES

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. The Contract Representative will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by State, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes (15) fifteen days prior to Substantial Completion. Draft copy be reviewed and returned after Substantial Completion, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.

D. Submit one set of revised final volumes in final form prior to final inspection, and one electronic version.

E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

H. Additional Requirements: As specified in individual product specification sections.

I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.7 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after Substantial Completion. All warranties start dates shall be the Substantial Completion Date, if project is phased all warranties to start at the date of Substantial Completion of each phase.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time of Submittals:
1. For equipment or component parts of equipment put into service during construction with State's permission, submit documents within (10) ten days after acceptance.
2. Make other submittals within (10) ten days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within (10) ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.8 GUARANTEE OF WORK

A. Except as otherwise specified, all work shall be guaranteed by the Contractor against defects resulting form the use of inferior materials, equipment or workmanship for one (1) year from the Date of Substantial Completion of the work.

B. If, within any guarantee period, repairs or changes are required in connection with guaranteed work, which in the opinion of the Contract Representative, is rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract shall, promptly upon receipt of notice from the Chancellor, and at his own expense:
1. Place in satisfactory condition in every particular, all such guaranteed work, correct all defects therein.
2. Make good all damage to the building or site, or equipment or contents thereof, which in the opinion of the Contract Representative, is the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract.
3. Make good any work or material, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.

C. In any case, wherein fulfilling the requirements of the Contract or of may guarantee, embraced in or required thereby, the Contractor disturbs any work guaranteed under another contract, he shall restore such disturbed work to a condition satisfactory to the Contract Representative and guarantee such resorted work to the same extent as it was guaranteed under such other contracts.

D. If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Chancellor may have the defects corrected and the Contractor and his/her Surety shall be liable for all expense incurred.

E. All special guarantees applicable to definite parts of the work that may be stipulated in the Specifications or other papers forming a part of the Contract shall be subject to the term of this paragraph during the first year of the life of such special guarantee.

F. Failure to adhere to guarantee terms may result in suspension or barring from the prequalification list, or, alternatively, the requirement of a Letter of Credit or other guaranty equal to a percentage of the Contract amount.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Project # WMC24-02

EXHIBIT "A"

FOR

Berlin MEP Upgrades

AT

White Mountains Community College

2020 Riverside Drive, Berlin NH 03570

A COMPONENT OF THE

Community College System of New Hampshire

26 College Drive, Concord, NH

PROJECT MANUAL

Attached to this exhibit:

- 14a_WMC24-02_Scope
- 14b_WMC24-02_Appendix C - WMCC Berlin MEP Final Drawings
- 14b_WMC24-02_Appendix D - WMCC Control Spec
- 14b_WMC24-02_Appendix E - WMCC SWITCHBOARDS
- 14b_WMC24-02_Appendix F - WMCC PANELBOARDS
- 14b_WMC24-02_HVAC Upgrade - 20038ME STAMPED MECH & ELEC
- 14b_WMC24-02_Welding Lab - 20039ME STAMPED MECH & ELEC

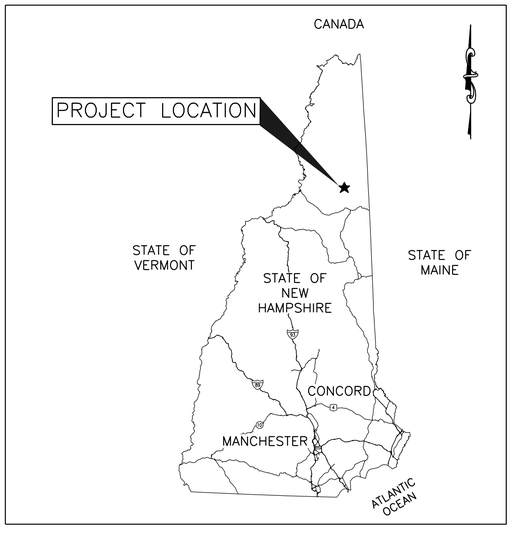
Scope:

Replacing the existing roof top air handlers and the kitchen makeup air unit. This includes Absolute Air make-up air unit serving the kitchen connected to the existing fire alarm and fire suppression systems, GE Electric R-22 packaged rooftop unit serving the business offices at the main entrance, Trane LP gas fired packaged rooftop unit serving the library office area, Trane R-22 packaged rooftop unit serving rooms, York R-22 gas-fired packaged rooftop unit serving the library study rooms, Nordyne R-22 split-system AC serving the business office, Kitchen roof mounted Greenheck upblast exhaust fan and integration of energy recovery systems will be considered. This will include plumbing, demolition of existing equipment and installation of new equipment. It will also include the replacement and installation of new mechanical and electrical equipment including two additional panels and a 2000A switchboard. Additionally, there will be upgrades to the Welding lab including installation of additional electrical equipment, installation of an air compressor and its required piping. Finally, there will be additional HVAC upgrades including the installation of new gas lines and its support, RTU upgrade, and ductwork.

WHITE MOUNTAIN COMMUNITY COLLEGE

BERLIN MECHANICAL AND ELECTRICAL UPGRADES
BERLIN, NEW HAMPSHIRE

ISSUED FOR CONSTRUCTION
APRIL 11, 2024



VICINITY MAP
SCALE: NTS

LIST OF DRAWINGS		
SHEET NO.	DRAWING TITLE	SHEET
G-001	COVER SHEET	1
M-001	MECHANICAL LEGEND, ABBREVIATIONS & GENERAL NOTES	2
M-100	MECHANICAL RTU PLAN	3
M-701	AIR HANDLING UNIT SCHEMATICS SHEET 1 OF 3	4
M-702	AIR HANDLING UNIT SCHEMATICS SHEET 2 OF 3	5
M-703	AIR HANDLING UNIT SCHEMATICS SHEET 3 OF 3	6
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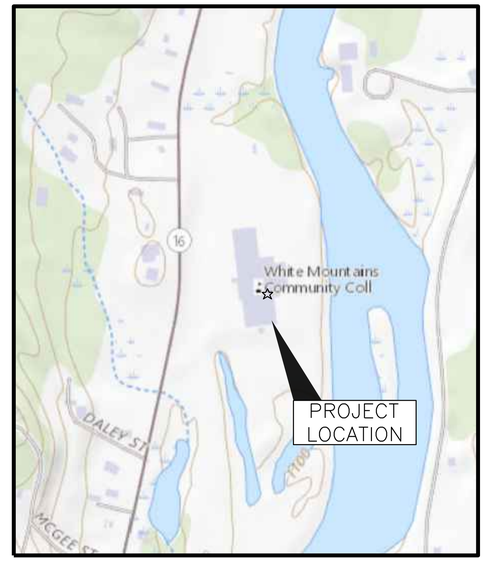

LOCUS MAP
SCALE: NTS

47A York St
Portland, ME
04101
207.553.7753

REV	DESCRIPTION	DWN	APP	DATE
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WHITE MTNS. COMMUNITY COLLEGE
BERLIN, NEW HAMPSHIRE

MECHANICAL/ELECTRICAL UPGRADES

COVER SHEET

SIZE: ANSI D
DATE: 04/11/2024
DES BY: ZPC
DWN BY: ZPC
CKD BY: RLM

PROJECT NO. 372.009.001
SHEET 1 OF 13
DRAWING NO. G-001

ABBREVIATIONS

A	AMP
AC	AIR CONDITIONER
ACS	ACCESS
AFF	ABOVE FINISHED FLOOR
AHU	AIR-HANDLING UNIT
APD	AIR PRESSURE DROP
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BTUH	BRITISH THERMAL UNITS PER HOUR
CA	COMPRESSED AIR
CF	CEILING FAN
CFM	CUBIC FEET PER MINUTE
CLG	COOLING
CO	CLEANOUT
COND	CONDENSATE
CP	CONDENSATE PUMP
CW	COLD WATER
CU	CONDENSING UNIT
DB	DRY BULB
DBA	DECIBELS
DEG, °	DEGREE
DIA, ø	DIAMETER
DN	DOWN
DP,DPS	DIFFERENTIAL-PRESSURE SENSOR
(E)	EXISTING TO REMAIN
EA	EACH, EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
F	FAN, FAHRENHEIT
FLA	FULL LOAD AMPS
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT	FEET
GA	GAUGE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HG	HOT GAS
HGB	HOT GAS BYPASS
HP	HEAT PUMP, HORSEPOWER
HR	HOUR
HTG	HEATING
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HZ	HERTZ
IN	INCHES
LAT	LEAVING AIR TEMPERATURE
LB	POUND
LCP	LOCAL CONTROL PANEL
LWT	LEAVING WATER TEMPERATURE
MAU	MAKEUP AIR UNIT
MAX	MAXIMUM
MBH	1000 BTU PER HOUR
MCP	MAIN CONTROL PANEL
MIN	MINIMUM
MOP	MAXIMUM OVERCURRENT PROTECTION
NC	NOISE CRITERIA
NEC	NATIONAL ELECTRICAL CODE
NO	NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
PC	PUMPED CONDENSATE
PD	PRESSURE DROP
PDS	PRESSURE DIFFERENTIAL SWITCH
PH	PHASE
PRV	PRESSURE REDUCING VALVE
PS	PRESSURE SWITCH
QTY	QUANTITY
RA	RETURN AIR
RG	REFRIGERANT GAS
RL	REFRIGERANT LIQUID
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SP	STATIC PRESSURE
T	TEMPERATURE SENSOR, THERMOSTAT
THK	THICK
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
W/	WITH
WB	WET-BULB
WC	WATER COLUMN
WG	WATER GAUGE
WPD	WATER PRESSURE DROP

DUCTWORK SYMBOLS

- RETURN/EXHAUST DUCT UP
- RETURN/EXHAUST DUCT DOWN
- SUPPLY DUCT UP
- SUPPLY DUCT DOWN
- RISE(R) OR DROP(D)
- RADIUS ELBOW
- SQUARE ELBOW W/ TURNING VANES
- OFFSET
- DUCT TRANSITION FROM RECTANGULAR TO ROUND
- BULLHEAD TEE (VD)
- SPLIT TAKE-OFF W/ BRANCH DAMPERS SUPPLY (VD)
- TAKE-OFF (VD, SUPPLY)
- EXHAUST/RETURN (VD)
- CEILING SUPPLY DIFFUSER W/ DIRECTION SHOWN BY ARROWS
- BULLHEAD SPLIT (VD)
- CEILING DIFFUSER OR GRILLE W/ FLEXIBLE DUCT (VD)
- FLEXIBLE DUCT

MECHANICAL LINE TYPE LEGEND

- EXISTING ITEMS TO REMAIN
- ITEMS TO BE REMOVED
- ITEMS TO BE PROVIDED
- HIDDEN ITEMS
- CONTROL WIRING

MECHANICAL SYMBOLS

- SECTION NUMBER / DRAWING WHERE SECTION IS DRAWN
- SYMBOL PER ABBREVIATION LIST / EQUIPMENT SEQUENCE NUMBER
- S-1 / 100 — DIFFUSER, REGISTER OR GRILLE SEQUENCE NUMBER / CFM
- FR-X / MBH / XX / X.X GPM — SYMBOL PER ABBREVIATION LIST / PER FOOT MBH / LINEAL FEET OF ACTIVE ELEMENT / BALANCING FLOW RATE
- +15 +15 — SMACNA DUCT PRESSURE CLASS DESIGNATION MARKER
- UNIT HEATER
- FAN
- CONNECT TO EXISTING
- DIRECTION OF AIR FLOW (OUT)
- DIRECTION OF AIR FLOW (IN)
- FD — FIRE DAMPER
- H — HAND DAMPER ACTUATOR
- ID — IRIS DAMPER
- MANUAL DAMPER, HAND WHEEL
- M — MOTORIZED DAMPER
- M — MOTORIZED DAMPER OPPOSED BLADE
- VOLUME DAMPER
- DP — DIFFERENTIAL PRESSURE SENSOR
- DUCT SMOKE DETECTOR
- T — TEMPERATURE SENSOR
- T — THERMOSTAT
- VARIABLE-AREA FLOW METER
- S — WALL SWITCH

PIPING SYMBOLS

- AUTOMATIC AIR VENT
- BACKFLOW PREVENTER
- BALL VALVE
- BALL DRAIN VALVE W/ HOSE THREAD OUTLET AND CAP
- CHECK VALVE
- S — CHECK VALVE, SILENT
- COMBINATION FLOW MEASURING/ BALANCING VALVE (CIRCUIT SETTER)
- GATE VALVE
- GLOBE VALVE
- MANUAL AIR VENT
- PRESSURE GAUGE W/ BALL VALVE
- PRESSURE REDUCING VALVE
- P/T — PRESSURE/TEMPERATURE PORT
- PUMP
- SAFETY RELIEF VALVE
- STRAINER WITH SCREEN CAP
- STRAINER W/BALL DRAIN VALVE, HOSE THREAD OUTLET AND CAP
- THERMOMETER IN WELL
- THREE-WAY AUTOMATIC CONTROL VALVE
- TWO-WAY AUTOMATIC CONTROL VALVE
- DIRECTION OF FLOW OF PIPE
- UP — PITCH UP IN DIRECTION OF FLOW
- DN — PITCH DOWN IN DIRECTION OF FLOW
- DRAIN
- END CAP
- FLANGE CONNECTION
- FLEXIBLE CONNECTION
- PIPE TEE FROM TOP
- PIPE TEE FROM BOTTOM
- PIPE RISE
- PIPE DROP
- REDUCER (CONCENTRIC)
- REDUCER (ECCENTRIC-FOB OR FOT)
- UNION OR FLANGE, DICTATED BY PIPE SIZE
- VIBRATION ISOLATOR

APPLICABLE CODES AND STANDARDS

- INTERNATIONAL MECHANICAL CODE (2015) WITH NH AMENDMENTS
- SHEET METAL AND AIR CONDITIONING NATIONAL ASSOCIATION, INC. (SMACNA)

GENERAL NOTES

1. GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO DRAWINGS MARKED M-# AND MD-#.
2. DRAWINGS ARE DIAGRAMMATIC; DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
3. COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS.
4. INSTALL THERMOSTATS AND OTHER OCCUPANT CONTROLS WITH TOPS OF OPERABLE ELEMENTS 48 INCHES AFF FOR ADA ACCESSIBILITY.
5. COORDINATE WORK WITH THE OTHER TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS AT NO ADDITIONAL COST TO THE GOVERNMENT.
6. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.
7. PROVIDE ACCESS PANELS, WHERE REQUIRED, TO SERVICE FIRE DAMPERS, VOLUME DAMPERS, VALVES AND CONCEALED MECHANICAL EQUIPMENT.
8. INSTALL EQUIPMENT, PIPING, AND DUCTWORK AS REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION AND TO FACILITATE EQUIPMENT ACCESS AS REQUIRED BY EQUIPMENT MANUFACTURER.
9. CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NEC.
10. DUCT SIZES INDICATED ARE INTERNAL CLEAR AIR FLOW DIMENSIONS.
11. DIFFUSER SIZES SHOWN ARE NECK SIZES; REGISTER AND GRILLE SIZES ARE NOMINAL.
12. PROVIDE FLEXIBLE DUCT CONNECTIONS ON DUCTS CONNECTING TO FANS AND AIR HANDLING UNITS. GROUND DUCTS TO BE GROUNDED ACROSS FLEXIBLE CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS.
13. PROVIDE PIPING AND DUCTWORK. PERFORM TESTS BEFORE INSULATING.
14. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
15. PITCH CONDENSATE PIPING 1/8" PER FOOT IN DIRECTION OF FLOW.
16. PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS.

SCOPE SUMMARY

1. REPLACE AIR HANDLERS ON THE ROOF: RTU-1, RTU-2, RTU-3, & RTU-4.
2. REPLACE FANS ON THE ROOF: EF-1, EF-2.
3. REPLACE MAKEUP AIR UNIT MAU-1 AT GROUND LEVEL.
4. REPLACE SPLIT SYSTEM CU-1 AT GROUND LEVEL AND IU-1 IN THE BUILDING.
5. 35 NEW CONTROL VALVES, INCLUDING TEMPERATURE TRANSMITTERS.
6. NEW WATER ENTRANCE.
7. BUILDING AUTOMATION SYSTEM.

PETER BROWN No.13953 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
03-11-22

COLBY COMPANY, LLC CCE engineering & design
47A York St
Portland, ME
04101
207.553.7753

REV	DESCRIPTION	DWN	APP	DATE
0	ISSUED FOR CONSTRUCTION	ZPC	PJS	4/11/24

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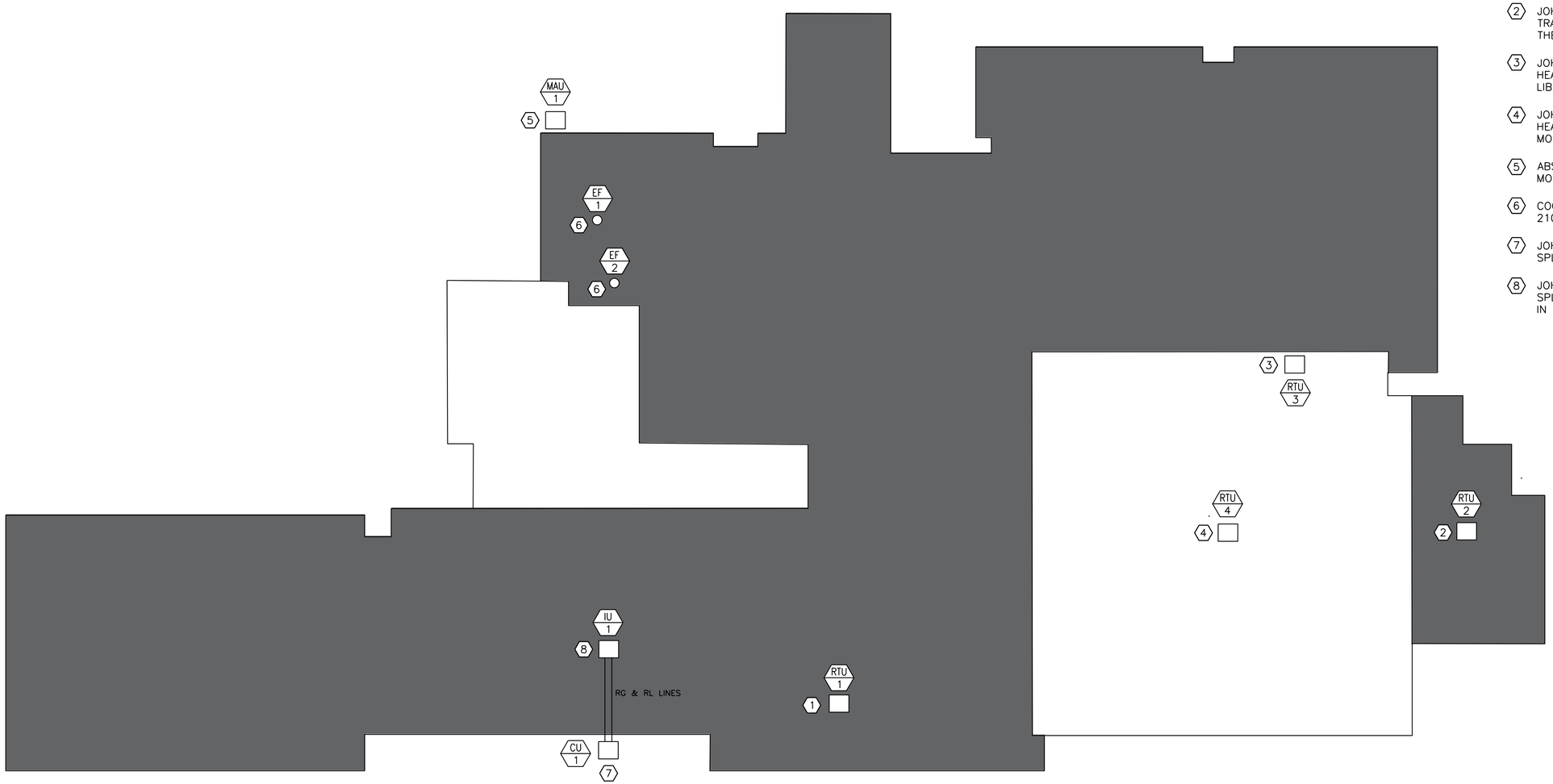
WHITE MTNS. COMMUNITY COLLEGE
BERLIN, NEW HAMPSHIRE

MECHANICAL/ELECTRICAL UPGRADES

MECHANICAL LEGEND, ABBREVIATIONS & GENERAL NOTES

SIZE:	ANSI D
DATE:	04/11/2024
DES BY:	ZPC
DWN BY:	ZPC
CKD BY:	RLM

PROJECT NO. 372.009.001
SHEET 2 OF 13
DRAWING NO. M-001



NOTES:

1. SEE SHEET M-001 FOR LEGEND, ABBREVIATIONS, AND GENERAL NOTES.

KEYED NOTES:

1. JOHNSON CONTROLS SINGLE PACKAGE R-410A AIR CONDITIONER FOR GENERAL ELECTRIC AIR CONDITIONER REPLACEMENT. MODEL NUMBER: ZQE06A2C1AA1C321A4.
2. JOHNSON CONTROLS SINGLE PACKAGE R-410A AIR CONDITIONER FOR TRANE AC ONLY REPLACEMENT SERVING ROOMS 312, 314, AND 316 IN THE LIBRARY. MODEL NUMBER: ZQE05A2C1AA1C321A3.
3. JOHNSON CONTROLS SINGLE PACKAGE R-410A AIR CONDITIONER W/ HEAT FOR TRANE LP GAS FIRED RTU REPLACEMENT SERVING THE LIBRARY OFFICE. MODEL NUMBER: ZQG04D2C1AA1C321A3.
4. JOHNSON CONTROLS SINGLE PACKAGE R-410A AIR CONDITIONER W/ HEAT FOR YORK RTU REPLACEMENT SERVING STUDY ROOMS IN LIBRARY. MODEL NUMBER: ZQG06F2C1AA1C321A4.
5. ABSOLUTAIRE MAU REPLACEMENT FOR CURRENT ABSOLUTAIRE MAU. MODEL NUMBER: V5-HVM.
6. COOK MODEL EXHAUST FAN DIRECT REPLACEMENT. MODEL NUMBER: 210VCR.
7. JOHNSON CONTROLS SPLIT-SYSTEM CONDENSING UNIT FOR NORDYNE SPLIT-SYSTEM REPLACEMENT. UNIT MODEL NUMBER: TCD42B32S.
8. JOHNSON CONTROLS SPLIT-SYSTEM INDOOR UNIT FOR NORDYNE SPLIT-SYSTEM REPLACEMENT. UNIT MODEL NUMBER: AE42CX21. LOCATED IN BUSINESS OFFICE CLOSET.

PLAN NORTH

MECHANICAL RTU PLAN

SCALE: NTS

PETER BROWN No.13953 STATE OF NEW HAMPSHIRE PROFESSIONAL ENGINEER
05-11-22

COLBY COMPANY, LLC CCE engineering & design
47A York St
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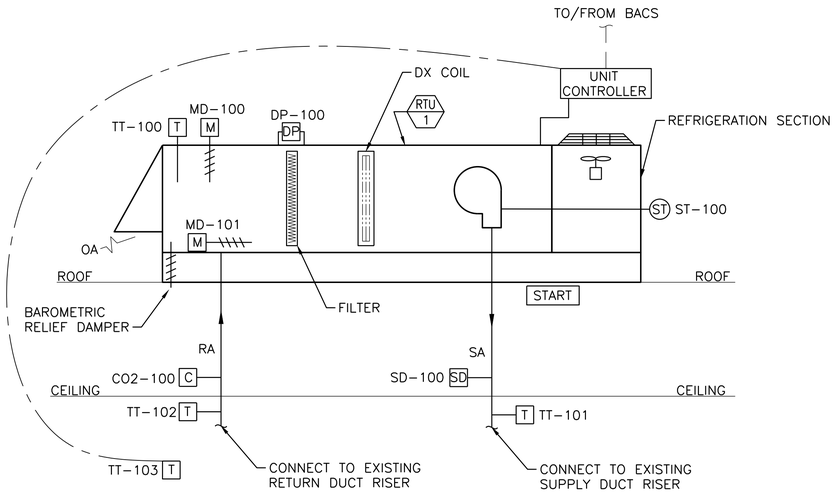
BERLIN, NEW HAMPSHIRE
MECHANICAL/ELECTRICAL UPGRADES
MECHANICAL RTU PLAN

SIZE: ANSI D
DATE: 04/11/2024
DES BY: ZPC
DWN BY: ZPC
CKD BY: RLM

PROJECT NO. 372.009.001
SHEET 3 OF 13
DRAWING NO. M-100

RTU-1 POINT LIST									
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
TT-100	OA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
ST-100	FAN MOTOR START/STOP	X	–	–	–	X	–	X	–
TT-101	SA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-102	RA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-103	SPACE TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
MD-100	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–
DP-100	FILTER DIFFERENTIAL PRESSURE	X	–	–	X	–	–	X	–
SD-100	SA SMOKE DETECTOR	X	–	–	X	–	X	X	–
CO2-100	CO2 SENSOR	X	X	–	–	–	–	X	–
MD-101	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–

NOTES:
1. PROVIDE ALL FIELD INSTRUMENTS SHOWN ON DIAGRAM AND PER THE CONTROLS SPECIFICATION.



RTU-1 – SEQUENCE OF OPERATIONS

PACKAGED ROOFTOP AIR CONDITIONER IS A CONSTANT VOLUME, VARIABLE TEMPERATURE UNIT DESIGNED TO PROVIDE COOLING, PRESSURIZATION AND VENTILATION TO SPACE. SPACE TEMPERATURE SETTINGS, SETBACK SCHEDULE AND OCCUPIED SCHEDULES ARE CONTROLLED BY BAS. AIR CONDITIONER IS PROVIDED W/ FACTORY CONTROLS W/ BAS COMMUNICATION CARD. BUILT-IN FACTORY CONTROL OF AIR CONDITIONER SHALL CONTROL SPEED OF INTERNAL COMPONENTS TO PROVIDE MOST EFFICIENT COOLING AS REQUIRED TO SATISFY SPACE SETPOINTS.

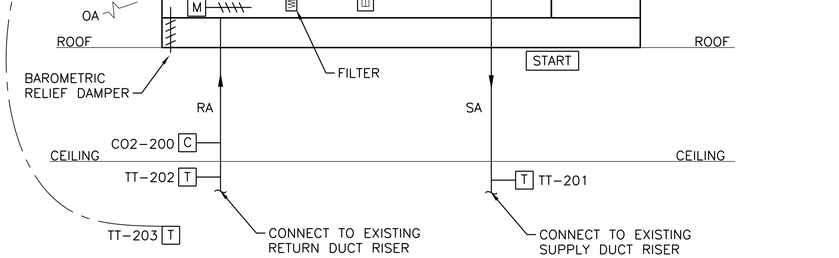
PACKAGED RTU SHALL BE CONTROLLED BY DEMAND CONTROL VENTILATION WITH CO2 SENSORS. DURING OCCUPIED MODES THE SUPPLY FAN RUNS CONTINUOUSLY, AND THE OUTDOOR AIR DAMPER SHALL BE OPEN TO SUPPLY THE MINIMUM OUTDOOR AIR REQUIRED. WHEN THE CO2 IN THE RETURN DUCT RISER REACHES 700 PPM, THE OA DAMPER SHALL MODULATE TO MAINTAIN 700 PPM OR LESS. THE AIR CONDITIONER SHALL DISCHARGE A MINIMUM OF 58.5 DEG F SUPPLY AIR.

ECONOMIZER MODE: THE RTU IS EQUIPPED WITH ENTHALPY BASED ECONOMIZER CONTROLS TO PROVIDE FREE COOLING WHEN POSSIBLE. BAROMETRIC RELIEF DAMPER RELIEVES AIR DURING ECONOMIZER OPERATION. USE STANDARD ALGORITHMS TO PROVIDE FREE COOLING WHEN CONDITIONS ALLOW.

DUCT SMOKE: UPON SMOKE DETECTION IN SUPPLY AIR THE UNIT SHALL SHUTDOWN AND NOTIFY THE FACP AND INDICATE ALARMS STATUS TO BACS.

RTU-2 POINT LIST									
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
TT-200	OA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
ST-200	FAN MOTOR START/STOP	X	–	–	–	X	–	X	–
TT-201	SA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-202	RA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-203	SPACE TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
MD-200	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–
DP-200	FILTER DIFFERENTIAL PRESSURE	X	–	–	X	–	–	X	–
CO2-200	CO2 SENSOR	X	X	–	–	–	–	X	–
MD-201	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–

NOTES:
1. PROVIDE ALL FIELD INSTRUMENTS SHOWN ON DIAGRAM AND PER THE CONTROLS SPECIFICATION.



RTU-2 – SEQUENCE OF OPERATIONS

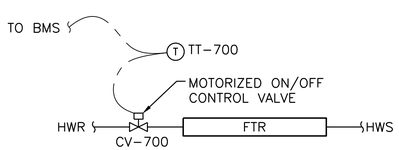
PACKAGED ROOFTOP AIR CONDITIONER IS A CONSTANT VOLUME, VARIABLE TEMPERATURE UNIT DESIGNED TO PROVIDE COOLING, PRESSURIZATION AND VENTILATION TO SPACE. SPACE TEMPERATURE SETTINGS, SETBACK SCHEDULE AND OCCUPIED SCHEDULES ARE CONTROLLED BY BAS. AIR CONDITIONER IS PROVIDED W/ FACTORY CONTROLS W/ BAS COMMUNICATION CARD. BUILT-IN FACTORY CONTROL OF AIR CONDITIONER SHALL CONTROL SPEED OF INTERNAL COMPONENTS TO PROVIDE MOST EFFICIENT COOLING AS REQUIRED TO SATISFY SPACE SETPOINTS.

PACKAGED RTU SHALL BE CONTROLLED BY DEMAND CONTROL VENTILATION WITH CO2 SENSORS. DURING OCCUPIED MODES THE SUPPLY FAN RUNS CONTINUOUSLY, AND THE OUTDOOR AIR DAMPER SHALL BE OPEN TO SUPPLY THE MINIMUM OUTDOOR AIR REQUIRED. WHEN THE CO2 IN THE RETURN DUCT RISER REACHES 700 PPM, THE OA DAMPER SHALL MODULATE TO MAINTAIN 700 PPM OR LESS. THE AIR CONDITIONER SHALL DISCHARGE A MINIMUM OF 59 DEG F SUPPLY AIR.

ECONOMIZER MODE: THE RTU IS EQUIPPED WITH ENTHALPY BASED ECONOMIZER CONTROLS TO PROVIDE FREE COOLING WHEN POSSIBLE. BAROMETRIC RELIEF DAMPER RELIEVES AIR DURING ECONOMIZER OPERATION. USE STANDARD ALGORITHMS TO PROVIDE FREE COOLING WHEN CONDITIONS ALLOW.

FIN TUBE RADIATOR POINTS LIST									
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
TT-700	ROOM TEMPERATURE	X	X				X	X	2
–	ROOM TEMPERATURE HEATING SETPOINT	X	X					X	1
CV-700	HOT WATER CONTROL VALVE	X		X				X	
–	NIGHT HEATING SET-BACK SETPOINT	X	X					X	1

NOTES:
1. BMS TO CONTROL HIGH TEMPERATURE AND LOW TEMPERATURE LIMITS.
2. GENERATE ALARM IF ROOM TEMPERATURE IS NOT WITHIN +/- 5 DEG F OF SETPOINT.
3. LOCATIONS OF CONTROL VALVES ARE VARIOUS IN THE BUILDING TO BE IDENTIFIED BY THE OWNER.
4. PROVIDE THERMOSTAT FOR INTEGRATION INTO CONTROLS.



35 CONTROL VALVES – SEQUENCE OF OPERATIONS

HYDRONIC HOT WATER CONTROL VALVES ARE ON OR OFF SOLENOID TYPE. THE CONTROL VALVE WILL OPEN ON A CALL FOR HEAT FROM THE BMS.

THE BMS WILL CYCLE THE CONTROL VALVES TO MAINTAIN SETPOINT BASED ON THE SPACE TEMPERATURE. THE SETPOINT WILL BE ADJUSTABLE FOR SCHEDULING OF OCCUPIED AND UNOCCUPIED TIME AS WELL AS NIGHT SETBACK AND MORNING WARM UP.

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CCE
engineering & design
47A York St
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REV	DESCRIPTION	DWN	APP	DATE
0	ISSUED FOR CONSTRUCTION	ZPC	PJS	4/11/24

WHITE MTNS. COMMUNITY COLLEGE
BERLIN, NEW HAMPSHIRE

MECHANICAL/ELECTRICAL UPGRADES

AIR HANDLING UNIT SCHEMATICS SHEET 1 OF 3

SIZE:	ANSI D
DATE:	04/11/2024
DES BY:	ZPC
DWN BY:	ZPC
CKD BY:	RLM

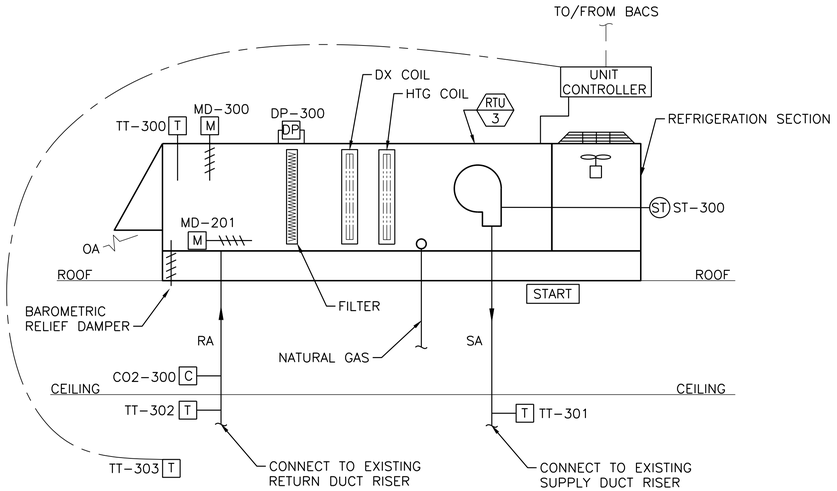
PROJECT NO. 372.009.001

SHEET 4 OF 13

DRAWING NO. M-701

RTU-3 POINT LIST									
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
TT-300	OA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
ST-300	FAN MOTOR START/STOP	X	–	–	–	X	–	X	–
TT-301	SA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-302	RA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-303	SPACE TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
MD-300	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–
DP-300	FILTER DIFFERENTIAL PRESSURE	X	–	–	X	–	–	X	–
CO2-300	CO2 SENSOR	X	X	–	–	–	–	X	–
MD-301	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–

NOTES:
1. PROVIDE ALL FIELD INSTRUMENTS SHOWN ON DIAGRAM AND PER THE CONTROLS SPECIFICATION.



RTU-3 – SEQUENCE OF OPERATIONS

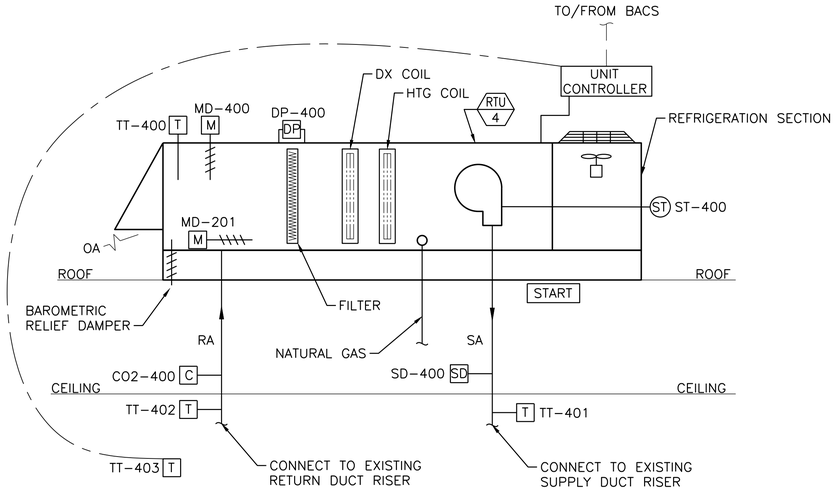
PACKAGED ROOFTOP UNIT IS A CONSTANT VOLUME, VARIABLE TEMPERATURE UNIT DESIGNED TO PROVIDE HEATING, COOLING, PRESSURIZATION AND VENTILATION TO SPACE. SPACE TEMPERATURE SETTINGS, SETBACK SCHEDULE AND OCCUPIED SCHEDULES ARE CONTROLLED BY BAS. RTU IS PROVIDED W/ FACTORY CONTROLS W/ BAS COMMUNICATION CARD. BUILT-IN FACTORY CONTROL OF AIR CONDITIONER SHALL CONTROL SPEED OF INTERNAL COMPONENTS TO PROVIDE MOST EFFICIENT HEATING AND COOLING AS REQUIRED TO SATISFY SPACE SETPOINTS.

PACKAGED RTU SHALL BE CONTROLLED BY DEMAND CONTROL VENTILATION WITH CO2 SENSORS. DURING OCCUPIED MODES THE SUPPLY FAN RUNS CONTINUOUSLY, AND THE OUTDOOR AIR DAMPER SHALL BE OPEN TO SUPPLY THE MINIMUM OUTDOOR AIR REQUIRED. WHEN THE CO2 IN THE RETURN DUCT RISER REACHES 700 PPM, THE OA DAMPER SHALL MODULATE TO MAINTAIN 700 PPM OR LESS. THE RTU SHALL DISCHARGE A MINIMUM OF 59.6 DEG F SUPPLY AIR FOR COOLING AND A MINIMUM OF 103.2 DEG F SUPPLY AIR FOR HEATING.

ECONOMIZER MODE: THE RTU IS EQUIPPED WITH ENTHALPY ECONOMIZER CONTROLS TO PROVIDE FREE COOLING WHEN POSSIBLE. BAROMETRIC RELIEF DAMPER RELIEVES AIR DURING ECONOMIZER OPERATION. USE STANDARD ALGORITHMS TO PROVIDE FREE COOLING WHEN CONDITIONS ALLOW.

RTU-4 POINT LIST									
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
TT-400	OA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
ST-400	FAN MOTOR START/STOP	X	–	–	–	X	–	X	–
TT-401	SA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-402	RA TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
TT-403	SPACE TEMPERATURE SENSOR	X	X	–	–	–	–	X	–
MD-400	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–
DP-400	FILTER DIFFERENTIAL PRESSURE	X	–	–	X	–	–	X	–
SD-400	SA SMOKE DETECTOR	X	–	–	X	–	X	X	–
CO2-400	CO2 SENSOR	X	X	–	–	–	–	X	–
MD-401	OA MOTORIZED DAMPER	X	–	X	–	–	–	X	–

NOTES:
1. PROVIDE ALL FIELD INSTRUMENTS SHOWN ON DIAGRAM AND PER THE CONTROLS SPECIFICATION.



RTU-4 – SEQUENCE OF OPERATIONS

PACKAGED ROOFTOP UNIT IS A CONSTANT VOLUME, VARIABLE TEMPERATURE UNIT DESIGNED TO PROVIDE HEATING, COOLING, PRESSURIZATION AND VENTILATION TO SPACE. SPACE TEMPERATURE SETTINGS, SETBACK SCHEDULE AND OCCUPIED SCHEDULES ARE CONTROLLED BY BAS. RTU IS PROVIDED W/ FACTORY CONTROLS W/ BAS COMMUNICATION CARD. BUILT-IN FACTORY CONTROL OF AIR CONDITIONER SHALL CONTROL SPEED OF INTERNAL COMPONENTS TO PROVIDE MOST EFFICIENT HEATING AND COOLING AS REQUIRED TO SATISFY SPACE SETPOINTS.

PACKAGED RTU SHALL BE CONTROLLED BY DEMAND CONTROL VENTILATION WITH CO2 SENSORS. DURING OCCUPIED MODES THE SUPPLY FAN RUNS CONTINUOUSLY, AND THE OUTDOOR AIR DAMPER SHALL BE OPEN TO SUPPLY THE MINIMUM OUTDOOR AIR REQUIRED. WHEN THE CO2 IN THE RETURN DUCT RISER REACHES 700 PPM, THE OA DAMPER SHALL MODULATE TO MAINTAIN 700 PPM OR LESS. THE RTU SHALL DISCHARGE A MINIMUM OF 58.5 DEG F SUPPLY AIR FOR COOLING AND A MINIMUM OF 113.7 DEG F SUPPLY AIR FOR HEATING.

ECONOMIZER MODE: THE RTU IS EQUIPPED WITH ENTHALPY ECONOMIZER CONTROLS TO PROVIDE FREE COOLING WHEN POSSIBLE. BAROMETRIC RELIEF DAMPER RELIEVES AIR DURING ECONOMIZER OPERATION. USE STANDARD ALGORITHMS TO PROVIDE FREE COOLING WHEN CONDITIONS ALLOW.

DUCT SMOKE: UPON SMOKE DETECTION IN SUPPLY AIR THE UNIT SHALL SHUTDOWN AND NOTIFY THE FACP AND INDICATE ALARMS STATUS TO BACS.

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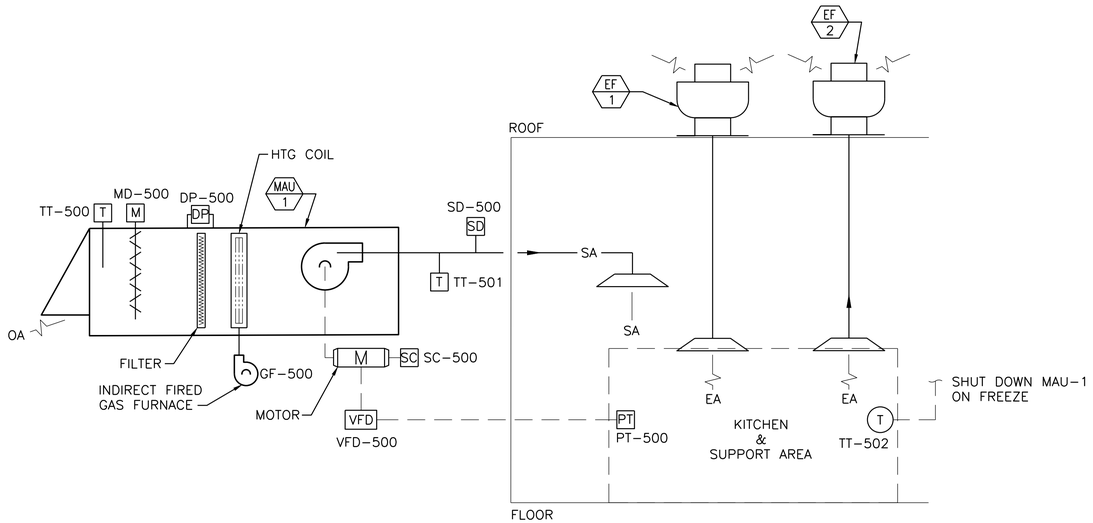
WHITE MTNS. COMMUNITY COLLEGE
BERLIN, NEW HAMPSHIRE
MECHANICAL/ELECTRICAL UPGRADES
AIR HANDLING UNIT SCHEMATICS SHEET 2 OF 3

SIZE: ANSI D
DATE: 04/11/2024
DES BY: ZPC
DWN BY: ZPC
CKD BY: RLM

PROJECT NO. 372.009.001
SHEET 5 OF 13
DRAWING NO. M-702

MAU–1 POINTS LIST								
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	NOTES
TT–500	OA TEMPERATURE SENSOR	X	X	–	–	–	–	1
MD–500	INTAKE ISOLATION DAMPER	X	–	–	X	X	–	–
TT–501	SA TEMPERATURE SENSOR	X	X	–	–	–	–	–
SC–500	SA FAN START/STOP/STATUS	X	–	–	X	X	–	–
VFD–500	SA FAN VFD SPEED	X	–	X	–	–	–	–
GF–500	GAS FURNACE	X	X	X	–	–	–	–
PT–500	PRESSURE TRANSMITTER	X	X	–	–	–	–	3
EF–1,2	EXHAUST FAN STATUS (TYP 2)	X	–	–	X		–	–
TT–502	FREEZE STAT (THERMOSTAT)	X	–	–	–	–	X	2
DP–500	FILTER DIFFERENTIAL PRESSURE	X	–	–	X	–	–	–
–	MINIMUM SPARES	–	2	2	2	2	2	–
SD–500	SA SMOKE DETECTOR	X			X		X	4

NOTES:
1. SENSOR FOR OVERALL BLDG CONTROL.
2. HARDWIRE TO SHUT DOWN
3. VFD MODULATED TO MAINTAIN –.05" WC SPACE PRESSURE.
4. INTERFACE WITH EXISTING FACP.



MAU–1: KITCHEN MAKEUP AIR – SEQUENCE OF OPERATIONS

OCCUPANCY: MAU–1 SHALL BE ENABLED WHEN ANY OF THE COOKING EXHAUST HOOD OR DISHWASHING HOOD FANS ARE ENERGIZED. WHEN ALL EXHAUST FANS ARE SHUT OFF MAU–1 SHALL BE DISABLED, OUTSIDE AIR DAMPER SHALL CLOSE (FAIL CLOSED), FURNACE AND FAN SHALL SHUT DOWN.

SUPPLY FAN PRESSURIZATION: MAU–1 IS RESPONSIBLE FOR MAINTAINING SPACE PRESSURIZATION IN RESPONSE TO THE TOTAL DEMAND OF OPERATING EXHAUST FANS AND TO SUPPLY HEATED MAKEUP AIR TO THE SPACE. ON A CALL TO RUN THE OUTSIDE AIR DAMPER SHALL OPEN. WHEN THE OUTSIDE AIR DAMPER REACHES FULLY OPEN POSITION THE SUPPLY FAN SHALL START. THE VFD SHALL MODULATE FAN SPEED TO MAINTAIN SPACE PRESSURE AT SLIGHTLY NEGATIVE VALUE, APPROXIMATELY –0.05 INCHES WATER COLUMN (ADJUSTABLE). AS ADDITIONAL EXHAUST FANS ARE ENERGIZED THE FAN WILL INCREASE SPEED TO ACCOMMODATE THE PRESSURE CHANGE AS SENSED BY THE STATIC PRESSURE SENSOR IN THE KITCHEN.

HEATING: WHEN AMBIENT AIR IS BELOW 55 DEG F (ADJUSTABLE) THE GAS FIRED FURNACE SHALL STAGE ON TO TEMPER THE SUPPLY AIR TO APPROXIMATELY 65 DEG F.

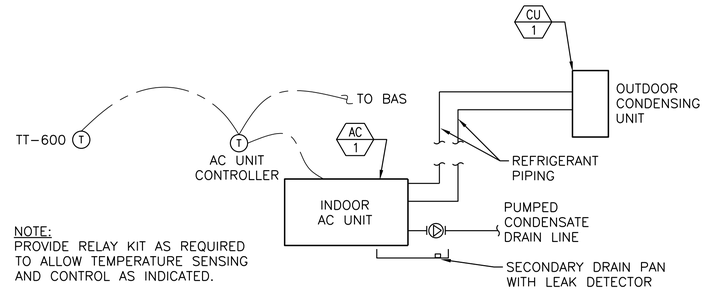
FREEZE STAT (WALL THERMOSTAT): THE SPACE THERMOSTAT SHALL BE UTILIZED TO SHUT DOWN THE MAU. PROVIDE ANY TRANSFORMERS OR RELAYS REQUIRED TO HARDWIRE THERMOSTAT TO SHUTDOWN UNIT. OUTSIDE AIR DAMPER SHALL GO TO CLOSED POSITION. GAS FURNACE IS DISABLED. FANS ARE DISABLED. GENERATE ALARM CONDITION.

KITCHEN HOOD/DISHWASHER EXHAUST: SWITCHED ON LOCAL WALL SWITCH. THE BACS SHALL INDICATE OPERATION VIA CURRENT SWITCH ON EACH FAN.

DUCT SMOKE: UPON SMOKE DETECTION IN SA DUCT, SHUTDOWN UNIT & NOTIFY FACP & INDICATE STATUS TO BACS.

MINI–SPLIT SYSTEM (CU–1, AC–1)									
TAG	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
TT–600	ROOM TEMPERATURE	X	X				X	X	2
–	ROOM TEMPERATURE SETPOINT	X	X					X	3
–	NIGHT SETBACK TEMPERATURE SETPOINT (ADJ.)	X		X				X	
–	DRAIN PAN LEAK DETECTOR	X			X		X		
–	CONDENSATE PUMP LEVEL	X			X		X	X	
–	INDOOR UNIT STATUS (ON/OFF/FAIL)	X			X		X	X	4
–	CONDENSING UNIT STATUS (ON/OFF/FAIL)	X			X		X	X	4

NOTES:
1. SPLIT SYSTEM SHALL COMMUNICATE DIRECTLY WITH BAS.
2. GENERATE ALARM IF ROOM TEMPERATURE IS NOT WITHIN +/–5 DEG F OF SET POINT.
3. BAS SHALL CONTROL HIGH TEMPERATURE AND LOW TEMPERATURE LIMITS.
4. GENERATE AC/CU MAINTENANCE ALARM AT BAS.



NOTE:
PROVIDE RELAY KIT AS REQUIRED TO ALLOW TEMPERATURE SENSING AND CONTROL AS INDICATED.

SPLIT AIR CONDITIONING UNIT, AC–1 – SEQUENCE OF OPERATIONS

AIR CONDITIONING UNIT AC–1 SHALL UTILIZE ITS UNITARY THERMOSTAT CONTROLLER PROVIDED BY THE MANUFACTURER TO PROVIDE SUPPLEMENTAL ROOM COOLING.

THE UNITARY THERMOSTAT CONTROLLER WILL BE CONTROLLED AND MONITORED BY THE BAS. LOW AND HIGH TEMPERATURE ALARMS SHALL BE MONITORED.

AC UNIT WILL MAINTAIN A CONSTANT SETPOINT OF 65 DEG F (ADJUSTABLE) IN COOLING MODE.

ON A RISE OR DROP IN SPACE TEMPERATURE ABOVE THE OCCUPIED COOLING SETPOINT THE UNIT COMPRESSOR SHALL CYCLE AS REQUIRED TO SATISFY THE SPACE TEMPERATURE SETPOINT. THE SPACE COOLING SETPOINTS SHALL BE DEFINED BY THE BAS.

ONCE THE SPACE TEMPERATURE IS SATISFIED, THE COMPRESSOR SHALL SWITCH OFF AND THE UNIT FAN WILL RUN FOR AN ADDITIONAL 30 SECONDS. THE UNIT SHALL REMAIN DISABLED UNTIL REQUIRED FOR SUPPLEMENTAL COOLING.

SHUT DOWN UNIT UPON ALARM INDICATING DRAIN PAN LEAK OR CONDENSATE PUMP HIGH LEVEL.

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WHITE MTNS. COMMUNITY COLLEGE
BERLIN, NEW HAMPSHIRE

MECHANICAL/ELECTRICAL UPGRADES

AIR HANDLING UNIT SCHEMATICS SHEET 3 OF 3

SIZE: ANSI D
DATE: 04/11/2024
DES BY: ZPC
DWN BY: ZPC
CKD BY: RLM

PROJECT NO. 372.009.001

SHEET 6 OF 13

DRAWING NO. M-703

NOTES:

1. DRAWINGS ARE DIAGRAMMATIC; DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.

APPLICABLE CODES AND STANDARDS

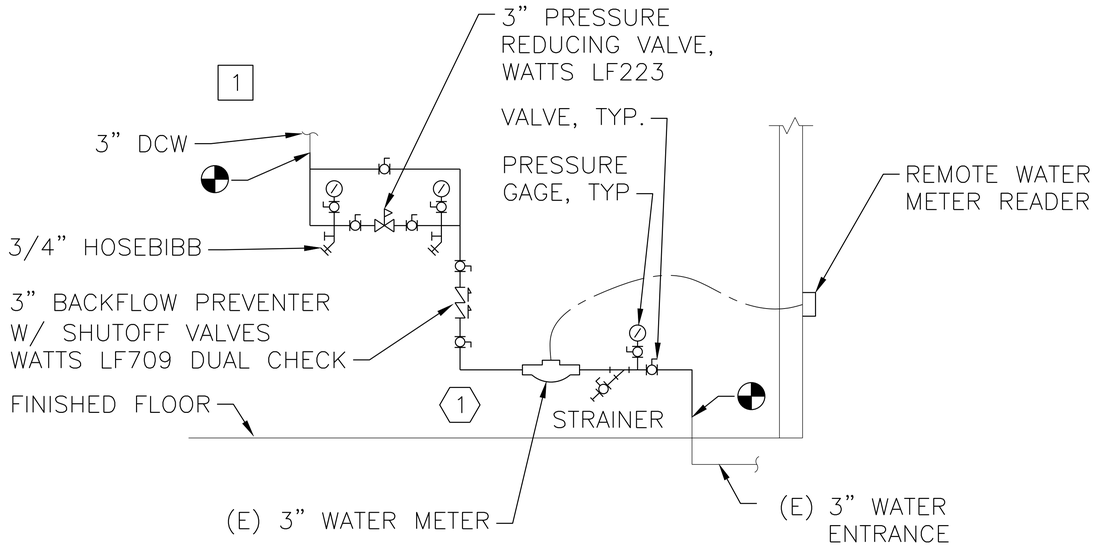
- INTERNATIONAL PLUMBING CODE (2015)

KEYED NOTES:

(1) PROVIDE METAL SUPPORT SYSTEM FOR PIPES AND EQUIPMENT, MOUNTED TO FLOOR.

DEMO NOTES:

[1] REMOVE PRESSURE REDUCING VALVE, (2) DUAL CHECK VALVE ASSEMBLIES, AND INTERCONNECTING PIPING.



DOMESTIC WATER SUPPLY ENTRANCE

SCALE: NTS

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MECHANICAL/ELECTRICAL UPGRADES

DOMESTIC WATER SUPPLY ENTRANCE

SIZE: ANSI D
DATE: 04/11/2024
DES BY: PWB
DWN BY: ZPC
CKD BY: RLM

PROJECT NO. 372.009.001

SHEET 7 OF 13

DRAWING NO. P-100

POWER:

60 H (4) — NON-FUSED SAFETY SWITCH
NEMA ENCLOSURE (NEMA 1 UNLESS OTHERWISE NOTED)
AMPERE RATING

(4) F 60AS 40AF — FUSED SAFETY SWITCH, TOP NUMBER INDICATES SWITCH AMPERE RATING, LOWER NUMBER INDICATES FUSE RATING
NEMA ENCLOSURE (NEMA 1 UNLESS OTHERWISE NOTED)

1 (4) — MAGNETIC MOTOR STARTER, FVNR UNLESS INDICATED OTHERWISE
NEMA ENCLOSURE (NEMA 1 UNLESS OTHERWISE NOTED)
NEMA SIZE (TYP.)

5 XP — ELECTRIC MOTOR, NUMBER INDICATES HORSEPOWER RATING
XP – EXPLOSION PROOF

E — DUPLEX RECEPTACLE, NEMA 5-20R
E – INSTALLED ON EMERGENCY CIRCUIT
IG – ISOLATED GROUND
S – SWITCHED RECEPTACLE

WP — GFCI DUPLEX RECEPTACLE, NEMA 5-20R
WEATHER PROOF

PANELBOARD, NORMAL POWER

J — JUNCTION BOX

M OL — MANUAL MOTOR STARTER, TOGGLE OPERATED, SINGLE PHASE. 1,2 OR 3 POLE AS REQUIRED
OVERLOAD PROTECTION

T — TRANSFORMER

VFD — VARIABLE FREQUENCY DRIVE

LINE TYPES:

EXISTING

NEW

DEMOLITION

MATCHLINE

PART PLAN OUTLINE

ABBREVIATIONS:

AC	ALTERNATING CURRENT
AMP	AMPERE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AIC	AMPERE INTERRUPTING CAPACITY
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION CONTROL SYSTEM
BFG	BELOW FINISHED GRADE
BLDG	BUILDING
BOS	BOTTOM OF STEEL
C	CONDUIT
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CLG	CEILING
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DACT	DIGITAL ALARM COMMUNICATOR TRANSMITTER
DB	DIRECT BURIED
DC	DIRECT CURRENT
DISC	DISCONNECT
DN	DOWN
EMT	ELECTRICAL METALLIC TUBING
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EQP	EQUIPMENT
EXIST	EXISTING
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FLR	FLOOR
FWE	FURNISHED WITH EQUIPMENT
FU	FUSE
G	GROUND
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
HP	HORSEPOWER
HTR	HEATER
IDS	INTRUSION DETECTION SYSTEM
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
K	KILO
KCMIL	THOUSAND CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KVAR	KILOVOLT-AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT-HOUR
LA	LIGHTNING ARRESTER
LTG	LIGHTING
MC	METAL CLAD
MCB	MAIN CIRCUIT BREAKER
MFR	MANUFACTURER
MI	MINERAL INSULATED
MLO	MAIN LUG ONLY
MNS	MASS NOTIFICATION SYSTEM
MTD	MOUNTED
MV	MEDIUM VOLTAGE
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEG	NEGATIVE
NEUT	NEUTRAL
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
P	POLE
PF	POWER FACTOR
PH	PHASE
PVC	POLYVINYL CHLORIDE
RFID	RADIO FREQUENCY IDENTIFICATION
RGS	RIGID GALVANIZED STEEL CONDUIT
RECEPT	RECEPTACLE
RM	ROOM
RSC	RIGID STEEL CONDUIT
RTD	RESISTANCE TEMPERATURE DETECTOR
SN	SOLID NEUTRAL
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE DOUBLE THROW
STP	SHIELDED TWISTED PAIR
STT	SHIELDED TWISTED TRIPLET
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TOS	TOP OF STEEL
TYP	TYPICAL
V	VOLT
VA	VOLT-AMPERE
VAR	VOLT-AMPERE REACTIVE
WM	WATT METER
WP	WEATHER PROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

GENERAL NOTES:

1. GENERAL NOTES, SYMBOL LISTS AND DETAILS ARE TO BE CONSIDERED AS APPLICABLE TO ALL ELECTRICAL DRAWINGS FOR THIS PROJECT. SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY AND DO NOT INDICATE THEIR INCORPORATION IN THE DESIGN.

2. DRAWINGS ARE SCHEMATIC AND DIAGRAMMATIC. USE JUDGMENT AND CARE TO INSTALL ELECTRICAL WORK TO FUNCTION PROPERLY AND FIT WITHIN BUILDING CONSTRUCTION AND FINISHES. ELECTRICAL CONDUCTORS, CONDUIT, COMPONENTS, NOT SHOWN OR SPECIFIED, WHICH ARE REQUIRED FOR ANY DEVICE OR SYSTEM TO PRODUCE A COMPLETE AND OPERATIVE SYSTEM ARE REQUIRED TO BE FURNISHED AND INSTALLED.

3. PERFORM WORK IN ACCORDANCE WITH NFPA-70, NATIONAL ELECTRICAL CODE (NEC) 2017.

4. VERIFY THAT FIELD MEASUREMENTS, SURFACES, SUBSTRATES AND CONDITIONS ARE AS REQUIRED, AND READY TO RECEIVE WORK. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. BY BEGINNING WORK, CONTRACTOR ACCEPTS CONDITIONS AND ASSUMES RESPONSIBILITY FOR CORRECTING UNSUITABLE CONDITIONS ENCOUNTERED AT NO ADDITIONAL COST.

5. PANEL SCHEDULE INFORMATION FOR EXISTING PANELS IS BASED ON AVAILABLE INFORMATION DURING DESIGN. VERIFY THAT PANEL SCHEDULES ARE ACCURATE AND NOTIFY CONTRACTING OFFICER OF ANY DISCREPANCY PRIOR TO COMMENCING WORK.

6. REMOVE ELECTRICAL EQUIPMENT WHERE INDICATED. REMOVE CONDUIT, CIRCUIT CONDUCTORS, SWITCHES, LIGHTING FIXTURES AND MISCELLANEOUS APPLIANCES BACK TO ENERGIZING SOURCE OR JUNCTION BOX WHERE MULTIPLE EQUIPMENT IS POWERED.

7. CONDUCTOR MATERIAL, INCLUDING WIRING, PANELBOARD BUSES, TRANSFORMER WINDINGS, AND GROUNDING MUST BE COPPER. ALUMINUM CONDUCTORS ARE NOT ALLOWED.

8. UNLESS OTHERWISE NOTED, FOR 20A-1P BRANCH CIRCUIT WIRING USE 2#12 AWG CONDUCTORS AND #12 GND. HOME RUNS FED FROM 20A-1P CIRCUITS IN EXCESS OF 100 FEET USE #10 AWG.

9. PROVIDE COMMERCIAL SPECIFICATION GRADE CONVENIENCE RECEPTACLES, GROUNDING TYPE NEMA 5-20R, SIDE WIRED. LEVITON, PASS AND SEYMOUR OR APPROVED EQUAL.

10. PROVIDE GALVANIZED STEEL WALL PLATES FOR MECHANICAL SPACES WIRING DEVICES, NYLON SMOOTH WALL PLATES FOR FINISHED PARTITIONED SPACES WIRING DEVICES, AND THERMOPLASTIC WALL PLATES FOR EXTERIOR WIRING DEVICES.

11. UNLESS OTHERWISE NOTED, PROVIDE TYPE EMT CONDUIT FOR INTERIOR RACEWAY, TYPE RGS CONDUIT FOR EXTERIOR RACEWAY, LIQUID TIGHT FLEXIBLE METAL CONDUIT FOR FINAL CONNECTIONS TO MOTORS, AND FLEXIBLE METAL CONDUIT FOR CONNECTIONS TO LIGHT FIXTURES (MAXIMUM 6FT LENGTH).

12. PROVIDED EQUIPMENT DISCONNECTS AND MANUAL MOTOR STARTERS UNLESS NOTED AS FURNISHED WITH EQUIPMENT (FWE). INCLUDE FUSES RATED FOR PROTECTION OF LOAD SUPPLIED. MOUNT ALL DISCONNECTS AND MOTOR STARTERS IN AN ACCESSIBLE LOCATION WITHIN SIGHT OF THE LOAD SERVED. ALL DISCONNECTS AND MOTOR STARTERS MUST BE LOCKABLE IN THE OPEN POSITION.

13. UNLESS OTHERWISE NOTED MOUNT CONVENIENCE RECEPTACLES 18" AFF. MEASUREMENTS ARE MADE TO TOP OF DEVICE.

14. SEAL PENETRATIONS THROUGH FLOORS, RATED WALLS AND PARTITIONS WITH UL APPROVED FIRE SEALANT MATERIAL TO MAINTAIN THE RATING OF SEPARATION.

GENERAL NOTES CONTINUED:

15. EQUIPMENT CONNECTIONS ARE SHOWN FOR BASIS-OF-DESIGN PRODUCTS. COORDINATE EQUIPMENT CONNECTIONS – INCLUDING DISCONNECTING MEANS, OVERCURRENT PROTECTION, AND WIRE SIZING – WITH SELECTED MANUFACTURER'S RECOMMENDED INSTRUCTIONS.

16. COORDINATE FINAL DEVICE LOCATIONS IN PARTITIONED SPACES WITH OWNER'S PROPOSED FURNITURE LAYOUT.

17. PROVIDE MOUNTING HARDWARE NECESSARY FOR A COMPLETE INSTALLATION. MOUNT EQUIPMENT AND ROUTE CONDUIT SO AS NOT TO INTERFERE WITH OPERATIONS SUCH AS OVERHEAD DOORS, DOOR SWINGS, ACCESS POINTS, AND OTHER INSTALLATIONS.

18. MANUFACTURER'S NAMES AND MODEL NUMBERS ARE USED THROUGHOUT THE PROJECT FOR DESCRIPTIVE PURPOSES ONLY AND ARE INTENDED TO INDICATE THE STANDARD OF MATERIAL OR ARTICLES REQUIRED. DESIGN IS PREDICATED AROUND LISTED MANUFACTURERS AS NOTED ON SCHEDULES AND NOTES AND IS NOT INTENDED TO LIMIT THE CONTRACTOR TO ONE MANUFACTURER.

19. PROVIDE A 3-INCH HIGH REINFORCED CONCRETE PAD UNDER ALL FLOOR MOUNTED ELECTRICAL EQUIPMENT.

20. SUPPLY DISTRIBUTION EQUIPMENT FROM THE SAME MANUFACTURER. APPROVED MANUFACTURERS INCLUDE SQUARE D, EATON/CUTLER-HAMMER, SIEMENS, OR APPROVED EQUAL.

21. GROUND THE ELECTRICAL DISTRIBUTION SYSTEM IN ACCORDANCE WITH NEC ARTICLE 250 AND ELECTRICAL SPECIFICATIONS.

22. UNLESS OTHERWISE NOTED WIRING MUST BE AS FOLLOWS:
    A. LOW VOLTAGE INTERIOR DISTRIBUTION AND BRANCH WIRING MUST BE 600V, COPPER WITH THHN/THWN INSULATION
    B. LOW VOLTAGE EXTERIOR DISTRIBUTION AND BRANCH WIRING MUST BE 600V, COPPER WITH XHHW INSULATION.

23. EQUIPMENT ENCLOSURES, SWITCHES, RECEPTACLES, AND DEVICES MUST BE LABELED WITH THE SOURCE CIRCUIT AND EQUIPMENT CONTROLLED WHERE APPLICABLE. ALL PANELBOARDS AND SWITCHBOARDS MUST HAVE APPROPRIATE ARC-FLASH LABELS INSTALLED IN ACCORDANCE WITH NFPA 70E REQUIREMENTS.

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BERLIN, NEW HAMPSHIRE

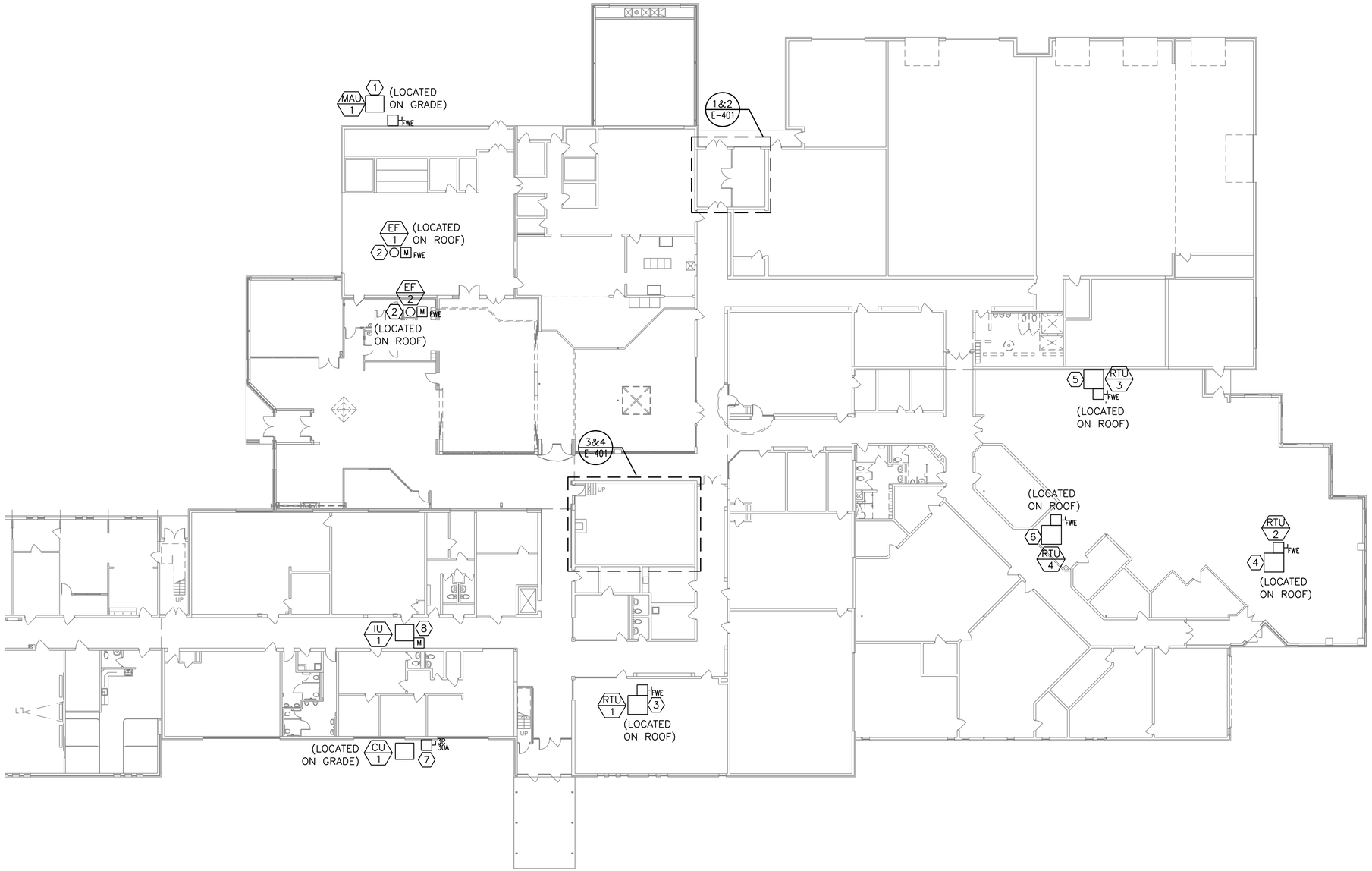
MECHANICAL/ELECTRICAL UPGRADES

ELECTRICAL LEGEND, ABBREVIATIONS & GENERAL NOTES

SIZE: ANSI D
DATE: 04/11/2024
DES BY: BHG
DWN BY: ACY
CKD BY: JMB

PROJECT NO. 372.009.001
SHEET 8 OF 13

DRAWING NO. E-001



ELECTRICAL PLAN
SCALE:1/16" = 1'-0"

NOTES:

1. SEE SHEET E-001 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

KEYED NOTES:

(1) DISCONNECT POWER TO MAKEUP AIR UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#8 AWG & #8 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 70 AMP, 3 POLE CIRCUIT BREAKER.

(2) DISCONNECT POWER TO EXHAUST FAN AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#12 AWG & #12 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 15 AMP, 3 POLE CIRCUIT BREAKER.

(3) DISCONNECT POWER TO ROOF TOP UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#8 AWG & #8 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 45 AMP, 3 POLE CIRCUIT BREAKER.

(4) DISCONNECT POWER TO ROOF TOP UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#10 AWG & #10 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 40 AMP, 3 POLE CIRCUIT BREAKER.

(5) DISCONNECT POWER TO ROOF TOP UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#10 AWG & #10 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 30 AMP, 3 POLE CIRCUIT BREAKER.

(6) DISCONNECT POWER TO ROOF TOP UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#8 AWG & #8 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 45 AMP, 3 POLE CIRCUIT BREAKER.

(7) DISCONNECT POWER TO CONDENSING UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 3-#12 AWG & #12 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 25 AMP, 3 POLE CIRCUIT BREAKER.

(8) DISCONNECT POWER TO INDOOR AC UNIT AND REMOVE CONDUCTORS BACK TO SOURCE. CONDUIT SHALL REMAIN AND BE REUSED. PROVIDE 2-#12 AWG & #12 GND IN EXISTING CONDUIT FROM EXISTING PANELBOARD. VERIFY EXISTING CIRCUIT BREAKER IN THE FIELD, IF REQUIRED PROVIDE 15 AMP, 2 POLE CIRCUIT BREAKER.

PLAN NORTH

Scale: 1/16" = 1'-0"

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REV	DESCRIPTION	DWN	APP	DATE
0	ISSUED FOR CONSTRUCTION	ACY	MJK	4/11/24

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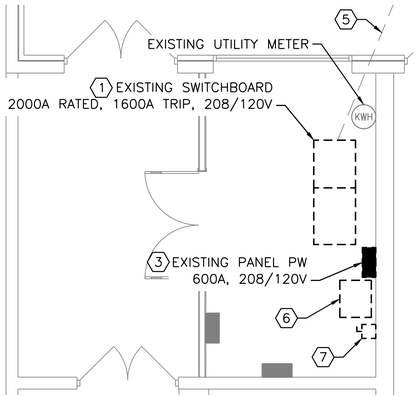
BERLIN, NEW HAMPSHIRE
MECHANICAL/ELECTRICAL UPGRADES
ELECTRICAL PLAN

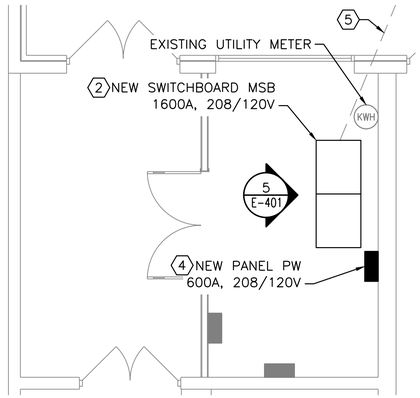
SIZE:	ANSI D
DATE:	2022.1.04
DES BY:	BHG
DWN BY:	ACY
CKD BY:	JMB

PROJECT NO. 372.009.001
SHEET 9 OF 13
DRAWING NO. E-100



1 E-401 MAINTENANCE/ELECTRICAL ROOM DEMO FLOOR PLAN

SCALE: 1/4" = 1'-0" E-100



2 E-401 MAINTENANCE/ELECTRICAL ROOM FLOOR PLAN

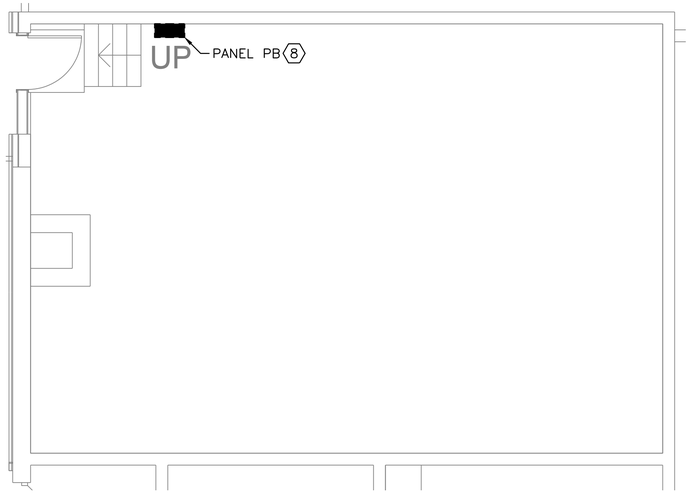
SCALE: 1/4" = 1'-0" E-100

NOTES:

1. SEE SHEET E-001 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

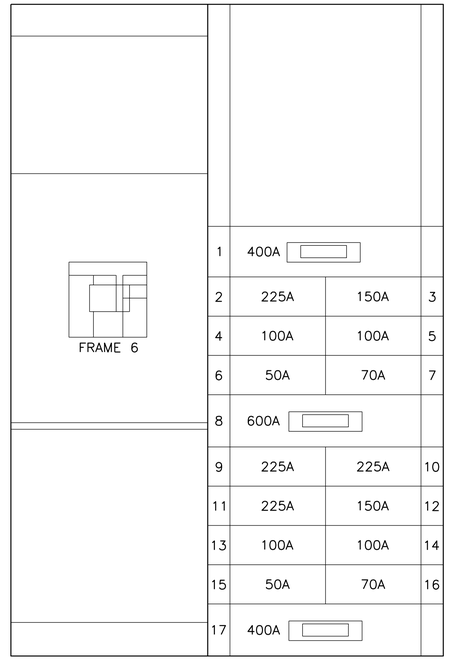
KEYED NOTES:

1. REMOVE EXISTING ITE 2000A SWITCHBOARD WITH 1600A CURRENT LIMITING FUSES. MAINTAIN EXISTING SERVICE ENTRANCE CONDUCTORS AND ALL DISTRIBUTION FEEDER CONDUCTORS FOR RECONNECTION TO NEW SWITCHBOARD. CONTRACTOR SHALL VERIFY FUSE RATING PRIOR TO ORDERING NEW 1600A SWITCHBOARD.
2. PROVIDE NEW SWITCHBOARD, RATED 208Y/120V, 1600A IN A NEMA 1 ENCLOSURE. RECONNECT EXISTING FEEDERS TO NEW CIRCUIT TERMINATIONS IN SWITCHBOARD. COORDINATE POWER OUTAGE WITH OWNER, OUTAGE TO TAKE PLACE DURING NIGHTS, WEEKENDS, AND/OR TIMES WHEN BUILDING IS NOT IN USE.
3. REMOVE EXISTING ITE 600A PANELBOARD "PW".
4. PROVIDE NEW PANELBOARD "PW", SQUARE D, RATED 208Y/120V, 600A IN A NEMA 1 ENCLOSURE. PROVIDE WITH 600A SHUNT TRIP MAIN CIRCUIT BREAKER. RECONNECT ALL EXISTING BRANCH CIRCUIT CONDUCTORS, AND SHUNT TRIP CONTROL CIRCUIT. PROVIDE NEW FEEDER CONDUCTORS FROM MAIN SWITCHBOARD, RUN 2 SETS (4-350KCMIL & & #1 GND, 3"C). EXTEND ALL CONDUCTORS AS REQUIRED.
5. MAINTAIN UNDERGROUND CONDUCTORS TO MAIN ELECTRICAL SERVICE SWITCHBOARD.
6. REMOVE ABANDONED 30KVA TRANSFORMER AND ASSOCIATED CONDUCTORS AND CONDUIT IN THEIR ENTIRETY.
7. REMOVE 60A DISCONNECT AND ASSOCIATED CONDUIT AND CONDUCTORS IN THEIR ENTIRETY.
8. REMOVE EXISTING PANEL "PB". MAINTAIN EXISTING CIRCUIT CONDUCTORS FOR RECONNECTION TO NEW PANEL.
9. PROVIDE NEW 225A, 208Y/120V 3 PHASE, 4 WIRE PANEL AND LABEL "PB". RECONNECT EXISTING BRANCH CIRCUITS AND CONDUCTORS IN SAME CIRCUIT POSITIONS AS INDICATED IN PANEL SCHEDULE.



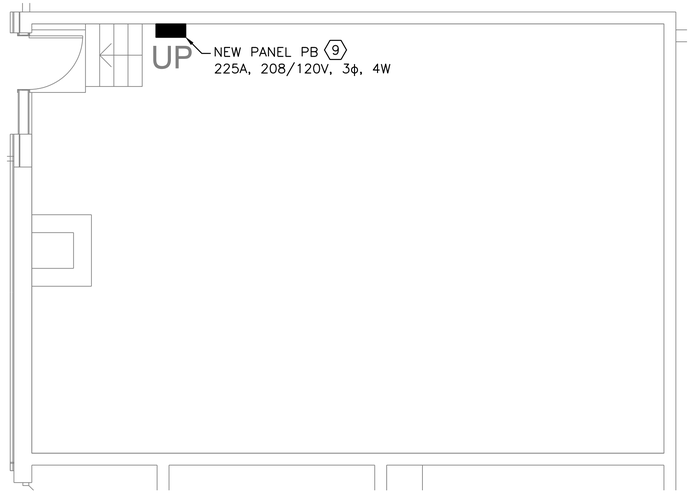
3 E-401 BOILER ROOM DEMO FLOOR PLAN

SCALE: 1/4" = 1'-0" E-100



5 E-401 SWITCHBOARD MSB ELEVATION

SCALE: NTS



4 E-401 BOILER ROOM FLOOR PLAN

SCALE: 1/4" = 1'-0" E-100

PLAN NORTH

0 2' 4' 8'
Scale: 1/4" = 1'-0"

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MECHANICAL/ELECTRICAL UPGRADES

ELECTRICAL FLOOR PLANS

SIZE:	ANSI D
DATE:	04/11/2024
DES BY:	BHG
DWN BY:	ACY
CKD BY:	JMB

PROJECT NO. 372.009.001

SHEET 10 OF 13

DRAWING NO. E-401

PANELBOARD NO:	SWITCHBOARD MSB (NEW)	SC RATING:	65000		
PANELBOARD TYPE:	–	MOUNTING:	FREE STANDING	1600 AMP MAIN BREAKER	
PANEL LOCATION:	ELECTRICAL ROOM	VOLTAGE:	208Y/120V, 3PH, 4W	1600 AMP BUS (COPPER)	
SUPPLIED FROM:	UTILITY				

CKT NO.	TRIP AMPS	NO. POLES	WIRE SIZE	CONDUIT SIZE	LOAD SERVED	LOAD VA	ϕ	LOAD VA	LOAD SERVED	WIRESIZE	CONDUIT SIZE	NO. POLES	TRIP AMPS	CKT NO.
1							A							2
3	400	3			PANEL DP1(*)		B		AUTO SHOP P2A (*)			3	225	4
5							C							6
7							A							8
9	50	3			PK A (*)		B		SPARE			3	50	10
11							C							12
13							A							14
15	70	3			PE (*)		B		L-12 (*)			3	70	16
17							C							18
19							A							20
21	100	3			L-2 (*)		B		PWR TO PAPER & PULP LAB (*)			3	100	22
23							C							24
25							A							26
27	100	3			L-11(*)		B		L2 (*)			3	100	28
29							C							30
31							A							32
33	225	3			L1(*)		B		PB (*)			3	225	34
35							C							36
37							A							38
39	150	3			P-K (*)		B		L-13 (*)			3	150	40
41							C							42
43							A							44
45	?	3			PM (*) (**)		B		UNKNOWN (*)			3	400	46
47							C							48
49							A							50
51	600	3	2 SETS (4-350KCMIL & #1 GND	3"	PANEL PW		B		SPACE					52
53							C							54

TOTAL PHASE A LOAD =	0.0 kVA	NOTES:	(*) EXISTING CIRCUIT TO BE RECONNECTED
TOTAL PHASE B LOAD =	0.0 kVA		(**) VERIFY BREAKER SIZE IN FIELD
TOTAL PHASE C LOAD =	0.0 kVA		
TOTAL CONNECTED LOAD =	0.0 kVA		

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MECHANICAL/ELECTRICAL UPGRADES

SCHEDULE - SWITCHBOARD MSB

SIZE: ANSI D
DATE: 04/11/2024
DES BY: BHG
DWN BY: ACY
CKD BY: JMB

PROJECT NO. 372.009.001

SHEET 11 OF 13

DRAWING NO. E-601

PANELBOARD NO:	PB (NEW)	SC RATING:	18,000		
PANELBOARD TYPE:	–	MOUNTING:	SURFACE	225 AMP MAIN LUGS	
PANEL LOCATION:	ELECTRICAL ROOM	VOLTAGE:	208Y/120V, 3PH, 4W	225 AMP BUS (COPPER)	
SUPPLIED FROM:	MSB				

CKT NO.	TRIP AMPS	NO. POLES	WIRE SIZE	CONDUIT SIZE	LOAD SERVED	LOAD VA	ϕ	LOAD VA	LOAD SERVED	WIRE SIZE	CONDUIT SIZE	NO. POLES	TRIP AMPS	CKT NO.
1	20	1			SPRINKLER SYSTEM (*)		A		SPRINKLER SYSTEM (*)			1	20	2
3	20	1			SPARE ELECTRONICS ROOM (*)		B		SM H.W. CIR. (*)			1	20	4
5	20	1			POWERS CLOCK, DRYER, BOILER CONTROL (*)		C		SUMP PUMP (*)			1	20	6
7							A							8
9	20	3			WAYNE COM. W. WALL (*)		B		DRAFT FAN #2 (*)			3	20	10
11							C							12
13							A							14
15	20	3			POWERS COMP E. WALL (*)		B		DRAFT FAN #1 (*)			3	20	16
17							C							18
19							A							20
21	20	3			V.F. CORR. 100 B (*)		B		CIRC PUMP #2 (*)			3	20	22
23							C							24
25							A							26
27	20	3			SPRINKLER CMOP (*)		B		CIRC PUMP #1 (*)			3	20	28
29							C							30
31							A							32
33	20	3			OUTSIDE WALL (*)		B		H.W. CIRC. (*)			3	20	34
35							C							36
37	15	1			UNKNOWN (*)		A							38
39	30	2			SPARE		B		OIL BURNER #2 (*)			3	30	40
41							C							42
43							A							44
45	20	3			CIRC PUMP (*)		B		OIL BURNER #1 (*)			3	30	46
47							C							48
49							A		UNKNOWN (*)			1	15	50
51	50	3			PHYSICS LAB DISB PANEL (*)		B		24 VOLT EM SYSTEM (*)			1	20	52
53							C		SPARE			2	20	54
55							A							56
57	70	3			MET. ELEC. WELDER (*)		B		PARKING LOT LIGHTS FRONT (*)			2	20	58
59							C							60
61							A							62
63	125	3			ELEVATOR (*)		B		ELECTRONICS LAB 2 (*)			3	?	64
65							C							66

TOTAL PHASE A LOAD =	0.0 kVA
TOTAL PHASE B LOAD =	0.0 kVA
TOTAL PHASE C LOAD =	0.0 kVA
TOTAL CONNECTED LOAD =	0.0 kVA

NOTES: (*) EXISTING CIRCUIT TO BE RECONNECTED

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MECHANICAL/ELECTRICAL UPGRADES

SCHEDULE - PANELBOARD PB

SIZE: ANSI D
DATE: 04/11/2024
DES BY: BHG
DWN BY: ACY
CKD BY: JMB

PROJECT NO. 372.009.001

SHEET 12 OF 13

DRAWING NO. E-602

PANELBOARD NO:	PW (NEW)	SC RATING:	42000
PANELBOARD TYPE:	–	MOUNTING:	SURFACE
PANEL LOCATION:	ELECTRICAL ROOM	VOLTAGE:	208Y/120V, 3PH, 4W
SUPPLIED FROM:	MSB		

600 AMP MAIN BREAKER
600 AMP BUS (COPPER)

CKT NO.	TRIP AMPS	NO. POLES	WIRE SIZE	CONDUIT SIZE	LOAD SERVED	LOAD VA	φ	LOAD VA	LOAD SERVED	WIRE SIZE	CONDUIT SIZE	NO. POLES	TRIP AMPS	CKT NO.
1							A							2
3	50	3			RTU-2 (*)		B		HV-1 (*)			3	20	4
5							C							6
7							A							8
9	70	3			RTU-4 (*)		B		HV-2 (*)			3	20	10
11							C							12
13							A							14
15	20	3			EF-2 (*)		B		WELD SHOP REC (*)			3	20	16
17							C							18
19							A							20
21	20	3			EF-3 (*)		B		MAU-1 (*)			3	40	22
23							C							24
25							A							26
27	100	3			WELD SHOP P2 (*)		B		440V TRANSFORMER (*)			3	200	28
29							C							30
31					SPACE		A		SPARE					32
33					SPACE		B							34
35					SPACE		C		SPARE (**)			3	?	36
37					SPACE		A							38
39					SPACE		B		SPARE					40
41					SPACE		C		SPARE					42
43							A							44
45	100	3			SPARE		B		TRANSFORMER 208 (*)			3	100	46
47							C							48
49							A							50
51	100	3			SPARE		B		SPARE			3	100	52
53							C							54
55							A							56
57	100	3			PANEL P4 (*)		B		PANEL P1A (*)			3	225	58
59							C							60

TOTAL PHASE A LOAD =	0.0 kVA	NOTES:	PROVIDE 600A MAIN BREAKER WITH SHUNT TRIP
TOTAL PHASE B LOAD =	0.0 kVA		(*) EXISTING CIRCUIT TO BE RECONNECTED
TOTAL PHASE C LOAD =	0.0 kVA		(**) VERIFY BREAKER SIZE IN FIELD
TOTAL CONNECTED LOAD =	0.0 kVA		

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MECHANICAL/ELECTRICAL UPGRADES

SCHEDULE - PANELBOARD PW

SIZE: ANSI D
DATE: 04/11/2024
DES BY: BHG
DWN BY: ACY
CKD BY: JMB

PROJECT NO. 372.009.001

SHEET 13 OF 13

DRAWING NO. E-603

SECTION 230900 – INSTRUMENTATION AND CONTROL FOR MECHANICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Direct Digital Control (DDC) equipment.

B. Software.

C. Installation.

D. Mechanical Commissioning.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Piping:
1. Control Valves – piping connections.
2. Temperature Sensor Wells and Sockets.
3. Pressure Sensors and Switches.
4. Flow Switches.
5. Flow Meters.

B. Ductwork:
1. Access Doors.
2. Airflow Measuring Stations.
3. Dampers - ductwork connections.

1.3 PRODUCTS FURNISHED UNDER OTHER SECTIONS

A. Controllers furnished with some Plumbing equipment (Division 22).

B. Controllers furnished with some HVAC equipment (Division 23).

C. Monitoring devices furnished with some Electrical equipment (Division 26).

1.4 RELATED SECTIONS

A. Division 01 Section “General Commissioning Requirements.”

B. Division 01 Section “Testing, Adjusting, and Balancing for HVAC.”

C. Division 08 Section “Access Doors and Frames.”

D. Division 23 Section “Common Work Results for HVAC.”

E. Division 23 Section “Common Motor Requirements for HVAC Equipment.”

1.5 REFERENCES

A. U.S. Department of Justice – 2010 ADA Standards for Accessible Design.

B. ASME MC85.1 - Terminology for Automatic Control.

C. NEMA EMC1 - Energy Management Systems Definitions.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NFPA 70 - National Electrical Code.

F. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.6 SYSTEM DESCRIPTION

A. A fully integrated Automatic Temperature Control (ATC) Building Management and Control System incorporating Direct Digital Control (DDC), energy management, equipment monitoring, and control consisting of the following:
   1. Microcomputer-based equipment controllers interfacing directly with sensors, actuators and environmental delivery systems.
   2. Electric controls and mechanical devices for items indicated on Drawings and described hereinafter including dampers, valves, and motor drives.
   3. Microcomputer-based terminal controllers interfacing with sensors, actuators, and terminal equipment control devices.

B. Submittals, data entry, electrical installation, programming, start up, test and validation, instruction of Owner's representative on maintenance and operation, as built documentation, and system warranty.

C. System Summary:
   1. The intent of this project is to provide an ATC system with electric actuators.
   2. For existing pneumatically controlled equipment which is to remain and which requires temporary removal, modifications or relocation, provide pneumatic tubing and associated controls as required to return equipment to its original operating conditions.
   3. Items which according to the Sequence of Operations are designated to be controlled by a thermostat, such as Cabinet unit heaters, unit heaters, terminal heating units, and the like, shall be viewable at the DDC system, but are not required to have the ability to modify setpoints via remote access to the DDC system. At the Contractor’s option, they may have full DDC control.
   4. Makeup air units, rooftop HVAC units, and terminal heating units which are designated to be controlled by a temperature sensor shall be interfaced with the DDC system, such that monitoring and setpoint adjustment shall be accomplished through the graphical user interface at the operator workstation.

D. Note: The terms “BMS”, “ATC”, and “DDC” are used somewhat interchangeably throughout this Section.

1.7 DEFINITIONS

A. Note: The terms ATC, BAS, and DDC may be used interchangeably in this Section and on the

Drawings, to indicate the overall control system.

B. Definitions:
1. ATC: Automatic temperature control.
2. BACnet: A control network technology platform for designing and implementing interoperable control devices and networks.
3. BAS: Building Automation System.
4. DDC: Direct digital control.
5. I/O: Input/output.
6. MS/TP: Master slave/token passing.
7. PC: Personal computer.
8. PID: Proportional plus integral plus derivative.
9. RTD: Resistance temperature detector.

1.8 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:
1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
   a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).
   b. Water Flow: Plus or minus 5 percent of full scale.
   c. Water Pressure: Plus or minus 2 percent of full scale.
   d. Space Temperature: Plus or minus 1 deg F (0.5 deg C).
   e. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).
   f. Outside Air Temperature: Plus or minus 2 deg F (1.0 deg C).
   g. Dew Point Temperature: Plus or minus 3 deg F (1.5 deg C).
   h. Temperature Differential: Plus or minus 0.25 deg F (0.15 deg C).
   i. Relative Humidity: Plus or minus 5 percent.
   j. Electrical: Plus or minus 5 percent of reading.

1.9 SUBMITTALS

A. Submit in accordance with Division 01 Section “Submittal Procedures.”

B. Qualification Data: For Installer and manufacturer.

C. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for

materials, and installation and startup instructions for each type of product indicated.

1. Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
2. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

D. 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.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including size and flow characteristics.
8. DDC System Hardware:
    a. Wiring diagrams for control units with termination numbers.
    b. Schematic diagrams and floor plans for field sensors and control hardware.
    c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control units.
9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems:
    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.

E. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with the open protocol standard compatible with the Owner's existing Delta system, ASHRAE Standard 135 (BACnet).

F. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or CD, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens. Sample graphic screens are included in Appendix A of this specification section. Graphics must match the sample graphics screens to the greatest extent possible.

G. Field quality-control test reports.

H. Operation and Maintenance Data.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 01 Section "Operation and Maintenance Data."

B. For mechanical instrumentation and control system to include in emergency, operation, and maintenance manuals.

C. In addition to items specified in Division 01, include the following:
   1. Maintenance instructions and lists of spare parts for each type of control device.
   2. Exploded assembly views.
   3. Interconnection wiring diagrams with identified and numbered system components and devices.
   4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
   5. Calibration records and list of set points.

D. Manuals: Provide the following:
   1. An Operator's Manual with graphic explanations of keyboard use for operator functions specified under Operator Training.
   2. Computerized printouts of equipment controller’s data file construction including point processing assignments, physical terminal relationships, scales and offsets, command and alarm limits, and others as applicable.
   3. A manual including revised as-built documents of materials required under the paragraph "SUBMITTALS" in this Specification Section.
   4. Provide the quantity of manuals specified in Division 01, and at least 2 Operator’s Manuals and 2 As-Built Manuals to the Owner. Refer to other Sections of the Specifications for project requirements for quantities of documentation.

1.11 CODES AND APPROVALS

A. The complete temperature control installation shall be in strict accordance to the national and local electrical codes and the electrical Division of these Specifications. Devices designed for or used in line voltage applications shall be UL listed. Microprocessor based remote and central devices shall be UL916 Listed.

B. Electronic equipment shall conform to the requirements of FCC regulation Part 15, Section 15 governing radio frequency electromagnetic interference and be so labeled.

1.12 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE Standard 135 (BACnet) for DDC system components.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 01 Section “Project Requirements.”

B. Factory-Mounted Components: Where control devices specified in this Section are indicated

to be factory mounted on equipment, provide shipping of control devices to equipment manufacturer, in a timely manner coordinated with the equipment manufacturer.

C. Components to be Installed under Other Sections: For components to be installed under other Sections of the Specifications, provide delivery of components to appropriate Subcontractors, provide installation instructions, and supervise their installation.

1.14 COORDINATION

A. Coordinate location of thermostats and other exposed control sensors with Contract Drawings before installation.

B. Coordinate equipment with Division 26 and existing fire alarm system to achieve compatibility with equipment that interfaces with that system.

C. Coordinate line-voltage power supplies with Division 26.

1.15 WARRANTY

A. Components, system software, parts, and assemblies furnished under this Section shall be guaranteed against defects in materials and workmanship for 1 year from acceptance date.

B. Labor to troubleshoot, repair, reprogram, or replace system components shall be provided at no charge to the Owner during the warranty period.

C. Corrective software modifications made during warranty service periods shall be updated on user documentation and on user and manufacturer archived software disks.

PART 2 - PRODUCTS

2.1 ACCEPTABLE SUPPLIERS

A. Acceptable Manufacturers and Installers:
1. Automated Logic Corp., WebCTRL Series, installed by Trident Controls Inc., 187 Gray Road, Unit A, Cumberland, ME 04021.
2. Honeywell Controls, installed by Honeywell Inc., 501 County Road, Westbrook, ME 04092.
3. Honeywell Controls, installed by Honeywell Inc., 70 Wells Ave., Newton Highlands, MA 02459.
4. Honeywell Controls, installed by Honeywell Inc., 500 Narragansett Pk. Dr., Pawtucket, RI 02861.
5. Honeywell Controls, installed by Honeywell Inc., 30 Cold Spring Rd., Rocky Hill, CT 06033.
6. Johnson Controls, installed by Johnson Controls Inc., 500 Harvey Road, Manchester, NH 03103.
7. Johnson Controls, installed by Trident Controls Inc., 187 Gray Road, Unit A, Cumberland, ME 04021.
8. Siemens, Staefa Control Systems, Talon Series, installed by Siemens Building Technologies, Inc., 66 Mussey Road, Scarborough, ME 04074.
9. Siemens, Staefa Control Systems, Talon Series, installed by Siemens Building

Technologies, Inc., 11 Court St., Exeter, NH 03833.

10. TAC, I/A Series, installed by Maine Controls, 400 Presumpscot Street, Portland, ME 04103.
11. TAC, I/A Series, installed by Control Technologies, New Hampshire Office, 70 Zachary Road, Manchester, NH 03109.
12. TAC, I/A Series, installed by Control Technologies, Massachusetts Office, 500 West Cummings Park, Suite 1050, Woburn, MA 01801.
13. TAC, I/A Series, installed by Control Technologies, New York Office, 3500 Sunrise Highway, Suite T209, Great River, NY 11739.
14. TAC, I/A Series, installed by Control Technologies, Vermont Office, 121 Park Avenue, Suite 10, Williston, VT 05495.
15. Trane, Tracer SC+ with TracerSynchrony, installed by Trane, Maine Office, 860 Spring Street Westbrook, ME 04092.
16. Trane, Tracer SC+ with TracerSynchrony, installed by Trane, New Hampshire Office, 15 Constitution Drive, Bedford, NH 03110
17. No Substitutions.

B. The Temperature Control Contractor (or Subcontractor) shall hereinafter be referred to as the ATC Contractor.

2.2 SYSTEM REQUIREMENT

A. Provide complete direct digital and electronic control system consisting of temperature sensors, thermostats, control valves, dampers, operators, indicating devices, interface equipment, and other apparatus required to operate mechanical system and to perform functions specified. Provide controls for the following:

1. Air conditioning systems.
2. Boilers, furnaces, and fuel-fired equipment.
3. Combustion air systems.
4. Control dampers and valves.
5. Cooling and heating terminal units.
6. Exhaust, return, and supply fans.
7. Filter pressure drops.
8. Fume hoods.
9. Heat pump systems.
10. Heat recovery systems.
11. Kitchen ventilation systems.
12. Pressurization of rooms and building.
13. Radiant floor heating.
14. Refrigerant leak, CO2, and other contaminant monitoring.
15. Chilled water systems.
16. Plumbing heating and pumping systems.
17. Electrical demand management.
18. Electrical system monitoring.
19. Fire alarm system interfaces.
20. Lighting control system interfaces.
21. Graphical workstation.
22. Provide hardware and software required for remote monitoring of the ATC system through modem or ethernet interface.

2.3 DATA INPUTS AND OUTPUTS

A. Input/output sensors and devices shall be closely matched to the requirements of the remote panel for accurate, responsive, noise-free signal input/output. Control input response shall be high-sensitivity and matched to the loop gain requirements for precise and responsive control.

B. Duct temperature sensors shall be rigid stem or averaging type as required. Provide water sensors with a separable copper, monel or stainless-steel well.

C. Control relays and analog output transducers shall be compatible with equipment controllers output signals. Relays shall be suitable for the loads encountered. Analog output transducers shall be designed for precision closed loop control with pneumatic repeatability error no greater than 1/2 percent.

D. Data inputs and outputs shall be compatible with variable frequency drives; see Division 23 Section "Common Motor Requirements for HVAC Equipment."

2.4 TEMPERATURE CONTROL CENTRAL HARDWARE

A. Operator Workstations: Operator workstation shall meet the following minimum criteria:
1. Operator workstation shall be Acer, Dell, Hewlett Packard, or IBM/Lenovo. No substitutions.
2. Form Factor: Tower.
3. Operating System: MS Windows 10 Professional operating system. Windows older versions are not allowed. (Operating systems that provide only foreground/background operation, or are based on concurrent DOS, are unacceptable and will be rejected.)
4. Processor: 8th Generation Intel Core i5, 6-core, 3 GHz base frequency, 6 MB cache.
5. RAM: The system shall come standard with at least 256K RAM disk cache and 4 gigabytes of system RAM. Provide 4 DIMM slots with capacity for up to 16 GB.
6. High Resolution Color Monitor: Provide with a 19-inch (482 mm) LCD flat panel 0.29 dot pitch Super VGA (1280 X 1024 resolution @ 60, 75 Hz) color monitor and driver.
7. Video Card: 256 megabyte of video RAM, dual-monitor capability, Blu-ray disc compatibility.
8. Hard Drives: 2 drives, at least 2 TB capacity each for optical drives, 256 GB capacity each for solid state drives.
9. CD-DVD +/- RW Drive: Read/write 48xCD/16xDVD drive, with CD creator software.
10. Multi-Card Reader: Integral to the workstation, with slots for SD, MiniSD, MicroSD, and Memory Stick Pro memory cards.
11. Mouse and Keyboard: High quality bus or serial mouse with at least 3 buttons and scroll wheel. 104-key keyboard. Either mouse or keyboard shall be able to be utilized interchangeably for operator interface.
12. Modem: Phone/fax modem, where required for remote access to the ATC system.
13. Ethernet Interface: 10/100 speed. Compatible with the Owner's network, as well as control system network. Refer to Division 27 for Owner's network requirements.
14. Wireless network card, internal to the workstation, with external antenna. Compatible with the Owner's wireless network. Refer to Division 27 for Owner's network requirements.
15. USB Ports: 8 total, at least 2 front, remainder back. At least 1 front and 1 back shall be USB 3.1; remainder shall be USB 2.0.
16. Fire-Wire Ports: IEEE 1394 interface standard. At least 1 each of IEEE 1394a and IEEE 1394b, front or rear.

17. Printer: Color, ink-jet type as follows:
    a. Print Head: 4800 x 1200 dpi optimized color resolution.
    b. Paper Handling: Minimum of 100 sheets.
    c. Print Speed: Minimum of 17 ppm in black and 12 ppm in color.
18. Accessories: Provide interconnecting cables and other accessories as required.
19. Security Software: Install anti-virus, anti-spyware, and firewall software provided by the Owner. Contact the Owner for requirements.

B. Equipment controllers shall be 16 bit microprocessor based with EPROM operating system (O.S.). ATC programs and data files shall be non-volatile EEPROM or flash memory to allow simple additions and changes. Each equipment controller shall have an on-board real-time clock with battery backup of a minimum of 30 days.
1. Equipment controllers shall be provided where indicated or specified with capacity to accommodate input/output (I/O) points required for the application plus spare points specified. These panels shall be configured with analog and digital inputs and outputs, and pulse counting totalizers and such that the primary input, the output and control logic shall be resident in a single microprocessor to provide network independent stand-alone closed loop ATC.
2. Panel electronics shall be installed in suitable enclosures. Equipment room panels shall have hinged doors and shall also contain the load relays, transducers, and associated equipment.

C. Terminal Equipment Controllers shall be EEPROM based and modularity expandable to accommodate additional points if required for future functional changes or enhancements, and with I/O selected for the application plus specified spares. Terminal controllers shall be capable of processing sensor signals of the applications specified, and shall have capability to drive digital (on-off), pulse width modulation, and true analog (0-10V) outputs. Terminal Controller enclosures shall be compact, finished steel to fit within or on terminal equipment. Each terminal controller shall have complete standalone capability.

2.5 OPERATOR STATION SOFTWARE

A. Operator Station (OS) software shall include as a minimum the Operating System, Data Base Manager, Communications Control, Operator Interface , Trend and History Files, Report Generator, and Support Utilities.
1. Real time operating system shall be true multi-tasking providing concurrent execution of multiple real time programs and custom program development.
2. Data Base manager is to manage data on an integrated and non-redundant basis. It shall allow additions and deletions to the data base without any detriment to the existing data.

B. Operator Interface Software:
1. Operator access to the system is to be under personal ID and password control for up to 100 unique operators.
2. Up to 100 frequently addressed system points shall be definable as "quick access" points. Each points user address, descriptor, and value/status shall be displayed.
3. Points (physical and pseudo) shall be displayed with dynamic data provided by the system with appropriate text descriptors, status or value, and engineering unit. Points shall be dynamic and shall continuously update anytime their field status/value changes.
4. An on-line context-sensitive help utility shall be provided to facilitate operator training and understanding.
5. Electronic messaging facility shall be provided on the operator station for any operator to

enter a message to another operator.

C. Site Specific Customizing Software:
   1. Provide software which will allow the user to modify and tailor the temperature control to the specific and unique requirements of the equipment installed, the programs implemented, and to staffing and operational practices.
   2. Point alarms shall be user-classifiable as critical or non-critical. Critical alarms shall be displayed in a dialog box of the color monitor. Display shall include time and date of occurrence, indication of alarm condition, analog value or status, user address, and alarm message.
   3. A discrete per point detailed alarm-action taking message of up to 480 characters shall be available for each point.
   4. Alarms shall be directed to the user selected alarm printer.
   5. Non-critical alarms shall only output to the printer and OS disk in order of occurrence.
   6. Run time limit messages shall be presented and processed as alarm messages except the action message shall be of a maintenance directive nature.

D. Dynamic trends shall provide for each OS of up to eight user selected points to show real time activity of the associated points. This information shall be printed and/or displayed in numeric, bar chart, curve plot, pie chart, and other formats, as selected by the operator.

E. Standard Reports Shall Be Provided Which Shall Be Output onto the Selected Report Printer. The Following Standard Pre-formatted Reports Shall Be Provided:
   1. The user shall be provided with a command trace feature selectable on a per point basis allowing the archiving of commands issued to each point.
   2. A custom report capability shall be provided to allow the user to format reports of any mix of text, points with status/value and descriptors, and points with status/value only.
   3. Alarm history. The last 4000 alarm events shall be disk archived. Viewing or printing shall be by entering a date range (from-to).
   4. Operator activity. Operator activity shall be archived. Viewing or printing shall be by entering a desired date range.
   5. Trend reports shall allow the operator to randomly select point archival. Equipment controllers trend points (hardware and software) shall be assignable to PC archive files for display at user selectable intervals of 10 seconds to 24 hours.

F. Equipment controllers shall be up-line or down-line loadable to or from the OS disk for backup archival.

G. Provide software to execute and observe diagnostics of any remote device connected to the peer bus and the ability to deactivate and restart the device.

H. In addition, a word processing utility, graphics package, and spreadsheet shall be available for generic use. The base system software shall include a CRT "windowing" feature to allow the operator to monitor the real time system and use third party software simultaneously.

2.6 GRAPHIC PROGRAMMING

A. Graphic Programming. Provide hardware and software required for complete equipment controllers ATC programming of plant programs including plant system schematic development, I/O hardware point definition, hardware and software text point descriptors, ATC algorithmic development, a controller software loading utility, and a live programming test

facility. At a minimum, the following shall be provided in the graphics package:

1. Boilers - control and status.
2. Heating water pump - control and status.
3. Heat recovery pump - control and status
4. Exhaust fans- control and status
5. Floor plans showing temperature sensors - control and status.
6. Air handling units, makeup air units, rooftop HVAC units and associated pumps, fans, dampers - control and status.

B. Provide a Boolean logic switching table matrix module for building ON-OFF commands from combinations of and or functions.

C. Provide a program testing utility which allows live and dynamic monitoring of the graphically displayed control programs provided.

D. In addition to training specified elsewhere in this Specification, provide 4 days of additional programming training, at a minimum of 4 hours training per day. These 4 days of additional training shall be provided during the 1 year warranty period. They are intended for use by the Owner as questions regarding system operation arise. Coordinate with the Owner.

E. Provide 2 sets of programmer's manuals.

2.7 CONTROLLER SOFTWARE

A. Energy Management application programs and associated data files shall be in non-volatile memory.

1. Optimum Start shall delay equipment start-up based on global outdoor temperature, space temperature, and system response to assure that comfort conditions are reached at scheduled occupancy. The optimum start program shall operate fully stand-alone in the local equipment controllers.
2. A load reset program shall be provided to assure that only the minimum amount of heating, cooling, and electrical energy is supplied to satisfy zone temperature requirements.

B. Control Software:

1. Each equipment controllers shall contain up to 20 unique user modifiable time programs.
2. Control Application Software shall be customized strictly to meet the detailed requirements of the "Sequence of Operation" specified hereinafter. Equipment controllers and terminal controllers shall be fully programmable. Initial software shall be fully modifiable, and not restricted by vendor's specific configuration guidelines. Equipment controllers control software shall be designed via a graphic programming facility, the detailed graphic design of which shall be provided as system documentation. Control strategies shall be advanced as noted with stabilizing setpoint ramps and procedures to assure slow loading of variable load equipment and economizer modes to prevent unsafe overshoot of controlled pressure and unsafe undershoot of mixed air temperatures during start-up and transition periods.

C. Management Software:

1. Each equipment controllers shall be provided with a trend archive of at least the last 200 events (digital transitions or analog value changes) of any user selected group of up to 20 points. A stored event shall include date and time, and value or status. Point events shall

be displayable at local panels as trend logs for evaluation of control system performance.

2. Each equipment controllers shall monitor analog input points and specified digital points for off-normal conditions. Each alarm shall have an "alarm delay" attribute which shall determine how long (in seconds) a point must be in an off-normal state prior to being considered in an alarm state.

D. Communications Software: Each equipment controllers shall have a full master peer-to-peer communications module to support global data sharing, hierarchical control, and global control strategies specified.

2.8 DATA COMMUNICATIONS

A. Equipment controllers shall be interconnected via a primary communications network. Terminal controllers shall also be connected together via secondary networks to provide data concentration and parallel processing. Networks shall support sensor sharing, global application programs, and bus-to-bus communications without the presence of a host PC.

B. The equipment controller's communications network shall support true peer protocol such that loss of any single device will not cause total bus failure.

2.9 GENERAL

A. ATC setpoints, reset schedules, time programs, historical trends shall be displayable at local ATC panels and on the system’s operator workstations.

B. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with 3-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA).
6. Tri-State Outputs: Provide two coordinated binary outputs for control of 3-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

C. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:

1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-microsecond response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

D. Power Line Filtering: Internal or external transient voltage and surge suppression for

workstations or controllers with the following:

1. Minimum dielectric strength of 1000 V.
2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.
4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.10 SPARE POINTS

A. Provide a minimum of 10 percent spare points or 16 spare points, whichever is greater, in each ATC control panel for future use. Spare points shall be equally distributed among analog input, analog output, digital input and digital output. It is not intended that spare points be provided in unitary control panels which serve VAV boxes, unit ventilators, fan coil units and heat pumps. It is intended that spare points be provided in master control panels and in panels which serve boiler/mechanical rooms and major equipment such as air handling units.

2.11 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Division 27, provided under this Section.

2.12 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or 2-position action.
   1. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
   1. Manufacturers:
      a. Belimo.
   2. Valves: Size for torque required for valve close-off at maximum pump differential pressure.
      a. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running torque of at least 150 lbf-in. (16.9 N-m) and breakaway torque of at least 300 lbf-in. (33.9 N-m).
      b. Spring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running and breakaway torque of at least 150 lbf-in. (16.9 N-m).
   3. Dampers: Size for running torque as recommended by the damper manufacturer for tight sealing under design operating static pressures and velocities. Submit damper manufacturer’s torque chart in same submittal as actuator selection table.
      a. For dampers which do not list torque values, provide torque calculated as follows:
         1) Damper with Edge Seals: 7 inch-lb/sq. ft. (8.6 N-m/sq. m) of damper.
         2) Damper without Edge Seals: 5 inch-lb/sq. ft. (6.22 N-m/sq. m) of damper.
      b. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft (2.3 sq. m): Size for running torque of at least 150 lbf-in. (16.9 N-m) and breakaway torque of at least 300 lbf-in. (33.9 N-m).

c. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft (2.3 sq. m): Size for running and breakaway torque of at least 150 lbf-in. (16.9 N-m).
d. Dampers with 2- to 3-Inch wg (500 to 750 Pa) of Pressure Drop or Face Velocities of 1000 to 2500 fpm (5 to 13 m/s): Increase running torque by a factor of 1.5.
e. Dampers with 3- to 4-Inch wg (750 to 1000 Pa) of Pressure Drop or Face Velocities of 2500 to 3000 fpm (13 to 15 m/s): Increase running torque by a factor of 2.0.

4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (2-Position Spring Return): 24-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: 40 to 104°F (5 to 40°C).
    a. In addition, valve actuators shall be suitable for the anticipated ambient temperature and fluid temperature. For example, actuators located within heating equipment terminal enclosures will experience higher temperatures.
11. Temperature Rating (Smoke Dampers): -22 to 250 degrees F (-30 to 121 degrees C).
12. Run Time: 30 seconds.
13. Actuator Housing: Molded or die-cast zinc or aluminum. Terminal unit actuators may be high-impact plastic with ambient temperature rating of 50 to 140 degrees F (10 to 60 degrees C) unless located in return-air plenums.
14. Damper actuators shall be provided with end switches.

2.13 CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
1. Globe-type valves are required except for those applications where terminal-unit control valves or butterfly valves are specified or detailed.
2. Ball-type valves may be substituted for other types, and shall be manufactured by Belimo, with Belimo actuators (no substitutions).
3. Valves shall be suitable for water with up to 50 percent inhibited ethylene or propylene glycol.
4. 3-way valves shall be mixing pattern, except where diverting pattern is specified, or where manufacturer requires use of diverting pattern.
5. Rubber-paddle or ball-plug type control valves such as, but not limited to, Honeywell Fan-Coil Valves or the TAC Erie product line (division of Schneider Electric) are not allowed.
6. Valves with thermal-wax motors are not allowed.
7. Valves requiring cartridge replacement for service are not allowed.
8. Valves requiring special water treatment such as 50-micron filtration are not allowed.

B. Sizing: Maximum pressure drop determined with valve full-open at design flow rate and the following:
1. 2 Position: Line size.
2. 2-Way Modulating: Between one-half and one times the variable-flow load pressure drop, but not to exceed 3 psig (21 kPa).
3. 3-Way Modulating: Between one-half and one times the variable-flow load pressure

drop, but not to exceed 1.5 psig (10.5 kPa).

4. Note: For modulating valves, the load pressure drop is that across the modulated portion of the system. For example, for a 3-way valve providing reset-water control at a boiler, the modulated flow is across the boiler and accessories, whereas the building loop to terminal equipment is considered constant-flow for the purposes of this valve's sizing. For a 3-way valve modulating the flow thru a coil, the coil and its pipe fittings comprise the variable-flow load. For a 3-way valve in a primary-secondary loop to a coil, where the flow thru the coil is a constant pumped flow, the variable load is in the primary-secondary bridge.

C. Hydronic system globe valves shall have the following characteristics:
   1. NPS 2 (DN 50) and Smaller: Class 125 bronze (or red brass) body, bronze or brass seat, bronze trim, rising stainless steel stem, renewable brass or composition disc or plug, screwed ends, with backseating capacity, repackable under pressure. Valve may have integral union ends. Valves with ends other than threaded or factory-integral unions are not allowed.
   2. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
   3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
      a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
      b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
   4. Flow Characteristics: 2-way valves shall have equal percentage characteristics; 3-way valves shall have linear characteristics through 1 of the ports, equal percentage through the other.
   5. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for 2-way valves, and 100 percent of pressure differential across valve or 100 percent of total system (pump) head for 3-way valves.
   6. Temperature Rating: 250°F (121°C).

D. Butterfly Valves: 200-psig (1380-kPa), 150-psig (1034-kPa) maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.
   1. Body Style: Wafer or lug.
   2. Disc Type: Nickel-plated ductile iron or aluminum bronze.
   3. Seat: EPDM resilient seat replaceable. Disc may be coated, but primary sealing surface shall be the resilient seat mounted in the body.
   4. Sizing: 1-psig (7-kPa) maximum pressure drop at design flow rate.
   5. Temperature Rating: 250°F (121°C).

E. Terminal Unit Control Valves: Bronze body, bronze trim, 2 or 3 ports as indicated, replaceable plugs and seats, and union and threaded ends. Valves with ends other than threaded or factory-integral unions are not allowed.
   1. Applications: Duct-mounted reheat coils, and fintube radiation. For other applications, see globe valve specifications above.
   2. Honeywell "small linear control valves" with "linear valve actuators" (or equal) may be used only for VAV box coils and hot water duct coils; they may not be used for other coil or equipment types.
   3. Rating: Class 125 for service at 125 psig (860 kPa) and 250 deg F (121 deg C) operating

conditions.

4. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating sufficient to close against pump shutoff head.
5. Flow Characteristics: 2-way valves shall have equal percentage characteristics; 3-way valves shall have linear characteristics.

2.14 DAMPERS

A. Manufacturers:
   1. Non-Insulated Dampers:
      a. Ruskin - Model CD60.
      b. American Warming & Ventilating.
      c. Arrow.
      d. Greenheck.
      e. Tamco (T.A. Morrison & Co., Inc.).
   2. Insulated-Blade Dampers:
      a. T.A. Morrison & Co., Inc.; Tamco Series 9000 SC “Severe Cold Option” dampers.
      b. Greenheck – Series ICD-45.
      c. Ventex, Inc. - Series 3965SI.

B. Non-Insulated Dampers:
   1. AMCA-rated, parallel (2-position) or opposed-blade (modulating) design.
   2. Frames shall be 16 gauge (1.6 mm) thick galvanized steel, reinforced to equivalent strength of 11 gauge (3 mm) galvanized steel; or 0.125 inch (3.2 mm) minimum thickness extruded-aluminum.
   3. Blades shall be airfoil type of not less than 14 gauge (2 mm) equivalent thickness galvanized steel or heavy gauge extruded aluminum, with maximum blade width of 8 inches (200 mm) and length of 48 inches (1220 mm).
   4. Secure blades to 1/2 inch (13 mm) diameter, hex-profile, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze or 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.
   5. Operating Temperature Range: From -40 to 200 degrees F (-40 to 9 degrees C).
   6. Edge Seals, Low-Leakage Applications: Replaceable, inflatable blade edging of Ruskiprene, neoprene, vinyl, or rubber, and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm/sq. ft (50 l/s per sq. m) of damper area, at differential pressure of 4-inch wg (1 kPa) when damper is held by torque of 50 in.-l bf (5.6 N-m); when tested according to AMCA 500D-98.

C. Insulated Dampers: Dampers which are located in or 4 ft. (1.2 m) or less from outside walls or roof lines, and are 8 sq. ft. (0.74 sq. m) or larger, shall be thermally insulated type.
   1. Frame: Extruded aluminum, externally insulated with polystyrene foam.
   2. Blades: Double wall extruded aluminum, with internal injected polyurethane foam, thermally broken. Extruded silicone frame and blade seals, secured in slots in the aluminum extrusions. R-value of complete blade shall be 2.29 hr-ft2-F/Btu (0.39 m2- K/W).
   3. Leakage shall not exceed 4.9 cfm/sq. ft (25 l/s per sq. m) against 4 in. wg (1 kPa) differential static pressure at -40 degrees F (-40 degrees C).
   4. Bearings: Celcon inner bearing fixed to a 7/16 inch (11.1 mm) aluminum hexagon blade pin, rotating within a polycarbonate outer bearing inserted in the frame, resulting in no metal-to-metal or metal-to-plastic contact.

5. Linkage Hardware: Installed in the frame side, constructed of aluminum and corrosion-resistant, zinc-plated steel, with cup-point trunnion screws for a slip-proof grip.
6. Operating Temperatures: -40 to 155 degrees F (-40 to 68 degrees C).
7. For dampers less than 12 inches (305 mm) in 1 dimension, provide "flanged-to-duct" mounting style for maximum free area.

D. Automatic dampers at exterior wall louvers shall be 4 inches (100 mm) shorter in vertical dimension (height) than the louver they serve, to allow sloping of bottom of duct to drain outward. Depending on the height of the louver's integral waterstop, it may be necessary to slope the top of the duct as well as the bottom. Coordinate sizing and positioning of dampers and louvers with Division 23 Section "Air Inlets and Outlets" to ensure that base of damper frame is positioned higher than the lowest edge of the duct where it laps over the top edge of the louver's waterstop or bottom blade. It shall be the responsibility of this Section to ensure proper installation to drain.

2.15 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters:
1. Accuracy: Plus or minus 0.5°F (0.3°C) at calibration point.
2. Wire: Twisted, shielded-pair cable.
3. Insertion Elements in Ducts: Single point, 8 inches (200 mm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
4. Averaging Elements in Ducts: 36 inches (915 mm) long, flexible; use where prone to temperature stratification or where ducts are larger than 10 sq. ft. (1 sq. m).
5. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches (64-mm).
6. Room Sensor Cover Construction: See below.
7. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
8. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

C. Pressure Transmitters/Transducers:
1. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
   a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
   b. Output: 4 to 20 mA.
   c. Duct Static-Pressure Range: 0- to 5-inch wg (0 to 1240-Pa).
2. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure and tested to 300-psig (2070-kPa); linear output 4 to 20 mA.
3. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.

D. Room Sensor Cover Construction: Manufacturer's standard locking covers.
1. Set-Point Adjustment: Concealed.
2. Set-Point Indication: Concealed.
3. Thermometer: Concealed.

4. Communications Port: Standard phone-type jack for connection of portable laptop computer and other devices. Provide at each room sensor, no exceptions.
5. Override Pushbutton: For timed override of occupied/unoccupied cycle. Provide in normally-occupied rooms such as classrooms, shops, offices, cafeterias, kitchen, lecture hall, band and chorus rooms, and gymnasiums. Do not provide in storage rooms, stairs, entries, vestibules, corridors, elevator machine rooms, electrical rooms, Comm rooms, and mechanical rooms.

E. Room sensor accessories include the following:
1. Insulating Bases: For sensors located on exterior walls.
2. Adjusting Key: As required for calibration and cover screws. Furnish to the Owner, at least 5 per sensor type.
3. Guards:
   a) Cast aluminum, with large openings for easy viewing of sensor, rounded surfaces to prevent injury, equivalent to Siemens Model 134-117 thermostat guard or Kele Model AT-1104.
   b) Lockable, vented low-profile clear plastic guard equivalent to Kele BAPI-Guard Series.
   c) Lockable, vented clear plastic guard with opaque solid wall plate, equivalent to Kele TG500 Series.
4. Wall Mounting Box: Recessed, steel, securely fastened to wall framing. Equal to Steel City metallic switch boxes by Thomas & Betts Corp. Box may only be omitted where sensor attaches directly to masonry construction.

2.16 THERMOSTATS AND TEMPERATURE SENSORS

A. Thermostats and Sensors in locations in regular view by the occupants shall have covers which are simple, aesthetically pleasing, neutral in color, with manufacturer's logo, if any, in black or neutral color, and shall fit flush to the surrounding wall surface.

B. Freezestats:
1. Freezestat safety low limits shall be duct-mounted manual-reset and automatic-reset (see control sequences) 20-foot limited fill capillary-tube type, responsive to the coolest section of its length.
2. Air handling systems which handle outside air (or a mix of outside air and return air) or are located outdoors shall have freezestats at hydronic and steam coils. Where freezestats are required, provide both a manual-reset type set near freezing temperature for shutdown, and an automatic-reset type set at a warmer temperature for preventive action.
3. Air handling systems with chilled-water coils mounted upstream of heating coils shall have freezestats on the upstream face of the chilled water coils, in addition to the freezestats on the downstream face of the heating coils.

C. Thermostats
1. Electric thermostats shall be line voltage or low voltage type, suitable for the application. They shall have concealed setpoint adjustment and setpoint indicator. Electric thermostats shall be provided with manual adjustment dials and shall be protected by lockable tamper proof covers.
2. Unit heater aquastats shall be strap-on type.

D. Temperature Sensors:
   1. Temperature sensors shall provide a 2-wire connection to the controller that is polarity and wire type insensitive. Sensors shall have communications jacks for connection to the communication trunk to which the controller is connected. The temperature sensor, the connected controller, and other devices on the communications bus shall be accessible by the Graphical Programming tool.
   2. Provide with manual adjustment rotary or sliding dials, with a scale labeled as either temperature in degrees F, or "warmer/cooler". The input from this dial shall be programmable through the operator workstation to allow a maximum and minimum range for user adjustment. The min/max range shall initially be set at 4°F above/below the programmed setpoint. When the dial is adjusted, it shall shift both heating and cooling setpoints by the programmed amount, in proportion to the distance moved. This dial shall only affect the occupied setpoints; the unoccupied setpoints shall remain as programmed.
   3. Provide with override buttons which, when depressed during unoccupied time periods, will override the zone's temperature controls and setpoints to occupied conditions for a user adjustable period of time (initially set for 2 hours).

E. Tamper-Resistant Covers and Guards:
   1. Provide protective lockable guards for thermostats and temperature sensors located in high traffic and unsecure areas. These areas shall include, but not be limited to:
      a. Cafeteria.
      b. Corridors.
      c. Lobbies.
      d. Locker Rooms.
      e. Public Toilet Rooms.
      f. Stairways.
      g. Storage Areas.
      h. Technology Lab.
      i. Vestibules.
      j. Weight Room.

   2. Provide tamper-resistant blank covers (without manual adjustments, temperature indicators, or override buttons) for thermostats and temperature sensors located in the following areas:
      a. Closets.
      b. Corridors.
      c. Locker Rooms.
      d. Production Area.
      e. Stairways.
      f. Storage Areas.
      g. Toilet Rooms.
      h. Vestibules.

   3. Provide tamper-resistant semi-blank covers (without manual adjustments or temperature indicators, but including override buttons) for thermostats and temperature sensors located in the following areas:
      a. Lobbies.
      b. Teachers' Lounge.

2.17 STATUS SENSORS

A. Where differential pressure “sensor” is indicated or specified, they shall be analog-output type as specified herein. Where differential pressure “switch” is indicated, it may be digital-output type.

B. Status Inputs for Fans: Unless otherwise specified: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg (0 to 1240 Pa).

C. Status Inputs for Pumps: Unless otherwise specified: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig (55 to 414 kPa), piped across pump. Pumps with motors 1 hp or smaller may use current transformers (CTs) for status inputs.

D. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

E. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.

F. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4-20 mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.

G. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

H. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

I. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

2.18 CURRENT TRANSFORMERS

A. Current transformers (CTs) are not an acceptable substitute for pump or fan monitoring where flow switches or pressure switches are specified.

B. Provide CTs as required for the sequences of operation specified.

2.19 DIFFERENTIAL WATER PRESSURE SENSORS

A. Manufacturers:
1. Setra - Model 230 Wet-to-Wet Pressure Transducer.
2. Ashcroft.
3. Honeywell.
4. Johnson Controls.

B. At Contractor’s option, Setra Model 231RS wet-to-wet multi-range differential pressure

transducer with remote-wired sensors may be used.

C. Differential-pressure monitoring shall be analog-output type unless otherwise specified.

D. High output, low differential pressure transducer designed for wet to wet differential pressure measurements of liquids or gases. A fast-response capacitance sensor and signal conditioned electronic circuitry provide a highly accurate, linear analog output proportional to pressure. Both unidirectional and bidirectional pressure ranges are available for applications with line pressure up to 250 psig.

E. An isolation system transmits the motion of the differential pressure sensing diaphragm from the high line pressure environment (e.g. corrosive liquids) to the dry (air) enclosure where it moves one of a pair of capacitance plates proportionally to the diaphragm movement. Response to pressure changes is approximately 20 times faster than conventional fluid-filled transducers. The electronic circuit linearizes output vs. pressure and compensates for thermal effects of the sensor.

F. NEMA 4/IP65 rated enclosure. Pipe-thread fittings.

G. Accuracy RSS (of non-linearity, non-repeatability and hysteresis) (at constant temperature) +/- 0.25 percent of full scale (pressure range).

H. Pressure Range: Selected by the Contractor for the anticipated or field-measured (actual) pressure differential. Lower ranges have greater accuracy.

I. Ambient Operating Temperature for Electronics: 0 to 175°F (-18 to 79°C).

2.20 DIFFERENTIAL WATER PRESSURE SWITCHES

A. Differential-pressure switches with on/off contact closure output may be used where specified.

B. NEMA 2 minimum enclosure. Pipe-thread fittings. Brass or bronze wetted parts.

C. Ambient Operating Temperature for Electronics: 30 to 158°F (-1 to 70°C).

2.21 CARBON DIOXIDE SENSOR

A. Indoor Carbon Dioxide Sensor and Transmitter: Greystone CDD Series. Single detectors using solid-state non-dispersive infrared sensors; suitable over a temperature range of 32 to 122°F (0 to 50°C), calibrated for +/- 3 percent of reading at 72°F (22°C), with continuous or averaged reading, stability less than 2 percent full scale over life of sensor (15 years typical), self-calibrating. 4-20 mA or 0-10 Vdc output; 5 amp relay output; status LED; LCD display of PPM level with 1 ppm resolution. Enclosure for wall mounting or duct mount, depending on application. For wall-mounting in occupied spaces, provide Greystone's "Corporate Space" enclosure or other manufacturer's equivalent. Provide Modbus communications where applicable.

2.22 ROOM OCCUPANCY DETECTION EQUIPMENT

A. Carbon Dioxide Sensor and Transmitter: See "Carbon Dioxide Sensor" in this Section.

B. Occupancy Sensor: Provided by Division 26.

2.23 REFRIGERANT LEAK DETECTORS

A. Manufacturers:
   1. Bacharach, Inc. - HGM-MZ multizone.
   2. Parasense, Inc.

B. Product Type: Multiple-area monitoring system for low level continuous monitoring of refrigerant gases used in most commerial systems including: CFC, HCFC, HFC and Ammonia. System design supports compliance with gas monitoring requirements of ANSI/BSR ASHRAE 15-1994.

C. Gas Library:
   1. CFC: R-11, R-12, R-113, R-114, R-502, HFP.
   2. HFC: R-404a (HP62), R-407a, R-407c (AC9000), R-134a, R-410a (AZ20), R-507 (AZ50), R-508b (SUVA95), R236FA, R125, R245Fa, R422a, R422d, R427a.
   3. HCFC: R-22, R-123, R-124, R-500, R-503, R-401a (MP39), R-402a (HP80), R-402b (HP81), R-408a, R-409a, R-23, R21, R227.
   4. Halon: H1301,H2402, H1211.
   5. Other: FA188, FC72, N1230.

D. Front Panel: 3 indicator lights.
   1. Green: Monitor is powered on. LED glows during normal operation; flashes when unit is in warm-up mode.
   2. Red: Alarm. LED flashes when any point has exceeded the alarm setting.
   3. Yellow: Fault. LED flashes when there is a system fault.

E. Performance:
   1. Sensitivity: 1 ppm (exception is R11: +/- 10 ppm +/- 15 percent of reading 0-1000 ppm).
   2. Measuring Range: 0 to 10,000 ppm.
   3. Accuracy: +/- 1 ppm from +/- 10 percent of reading from 1-1000 ppm (exception is R-11: +/- 10 ppm +/- 15 percent of reading 0-1000 ppm).
   4. Temperature Drift: +/- 0.3 percent of reading per degree C.
   5. Coverage: 4 point (zone) standard, expandable to 16 points in 4 point increments.
   6. Detector Type: Infrared Non-Dispersive.
   7. Sampling Mode: Automatic or Manual (hold).
   8. Re-Zero: Auto or on Zone Change.
   9. Response Time: 5 to 120 seconds - depending on air-line length and number of zones.
   10. System Noise: Less than 40 dB(A) at 10 feet (3 m).
   11. Monitoring Distance: 1,200 ft. maximum for combined length of sample + exhaust tubing (each zone).
   12. Conditional System: Dual optional 4-20 mAdc isolated outputs. Channel 1: zone area. Channel 2: PPM.
   13. Alarms:
      a. 4 SPDT alarm contacts (rated 5 Amps at 250 volts). 3 assigned to PPM level alarms, 1 assigned to system faults.
      b. Audible alarm at panel, with silencing feature.
   14. Communications: RS-232C communication port standard. Provide full 2-way communication with building management system via RS485 MODBUS-RTU serial interface.
   15. Power Safety Mode: Fully automatic system reset. Programmed parameters retained

16. Operating Temp: 32 to 122°F (0 to 50°C).
17. Ambient Humidity: 5 to 90 percent RH (non-condensing).
18. AC Power: 100 to 240 VAC, 50/60 Hz, 20 W.
19. Altitude Limit: 6,562 ft. (2,000 m).
20. Fusing: F1, F2: 1.0 A, 250 VAC, Type “F”.
21. Sensor Life: 7-10 years.

F. Certification: UL 61010-1, Can/CSA 22.2 No. 61010-1 & CE Mark.

G. Warranty: 2 years from date of shipment.

H. Accessories:
1. Surge protector.
2. Tubing and supports for sample intake lines, purge line, and exhaust line.
3. End-of-line filters.
4. Charcoal filter for purge line.
5. Splitter kits for multiple filters on a single zone.
6. Water trap.
7. Spare fuses.
8. Annual maintenance kit, including line end filters in quantity to match installation, 1 charcoal filter, 1 hydrophobic filter, and 3 end-of-line water stop filters.

I. Zones:
1. As shown on plans.

J. For installation of relief valve end-of-line filter, provide end of relief copper piping turned downward to shed water and snow, and enlarge end of piping so that net area of piping with filter installed is not less than the area of the relief main.

2.24 AIRFLOW MEASURING STATIONS

A. Manufacturers:
1. EBTRON, Inc. Model GTx116 P and GTx116 F (basis of design).
2. Air Monitor Corporation.
3. Ruskin.

B. Verify quantities, sizes, and locations of measuring stations to meet the intent of the specified control sequences, and provide as required. Coordinate with other Sections of the Specifications and other trades, to provide installation in ductwork, air handling units, and other locations as required.

C. Warranty: Provide a manufacturer's parts warranty for 36 months from the date of unit shipment.

D. Submittals:
1. Submit product data sheets for airflow measuring devices indicating minimum placement requirements, sensor density, sensor distribution, and installed accuracy to the host control system.
2. Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this Specification throughout the measurement range.

3. Submit a schedule of airflow measuring devices indicating compliance with specified accuracy at minimum and maximum airflow rates.
4. Submit installation, operation and maintenance documentation.

E. Each measurement device shall consist of one or more sensor probe assemblies and a single microprocessor based transmitter. Each sensor probe assembly shall contain one or more independently wired sensor housings. Multiple sensor housings shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable. Vortex shedding flow meters are not acceptable.

F. Sensor Probe Assemblies:
1. Each sensor housing shall be manufactured of a U.L. listed engineered thermoplastic.
2. Each sensor housing shall utilize two hermetically sealed, bead in glass thermistor probes to determine airflow rate and ambient temperature. Devices that use "chip" type thermistors are unacceptable. Devices that do not have 2 thermistors in each sensor housing are not acceptable.
3. Each sensor housing shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/ 2 degrees of reading over the entire operating airflow range. Each sensor assembly shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
    a. Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this Specification throughout the measurement range.
4. The operating temperature range for the sensor probe assembly shall be 20 to 160 degrees F (-28 to 71 degrees C). The operating humidity range for the sensor probe assembly shall be 0 to 99 percent RH (non-condensing).
5. Each temperature sensor shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/ 0.15 degrees F (0.08 degrees C) over the entire operating temperature range. Each temperature sensor shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
6. Each sensor probe assembly shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to a remotely mounted transmitter. Terminal plug interconnecting pins shall be gold plated.
7. Each sensor assembly shall not require matching to the transmitter in the field.
8. A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter at a given measurement location.

G. Duct and Plenum Sensor Probe Assemblies:
1. Sensor housings shall be mounted in an extruded, gold anodized, 6063 aluminum tube probe assembly.
2. The number of sensor housings provided for each location shall be as follows:
    a.

Area (sq.ft.)	Area (sq.m)	Sensors
≤1	(≤0.09)	2
>1 to <4	(>0.09 to <0.37)	4
4 to <8	(0.37 to <0.74)	6
8 to <12	(0.74 to <1.11)	8
12 to <16	(1.11 to <1.49)	12
≥16	(≥1.49)	16

3. Probe assembly mounting brackets shall be constructed of Type 304 stainless steel. Probe assemblies shall be mounted using one of the following options:
    a. Insertion mounted through the side or top of the duct.

b. Internally mounted inside the duct or plenum.
c. Standoff mounted inside the plenum.
d. The operating airflow range shall be 0 to 5,000 FPM (0 to 56 m/s) unless otherwise indicated on the Drawings.

H. Fan Inlet Sensor Probe Assemblies:
1. Sensor housings shall be mounted on 304 stainless steel blocks.
2. Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel plated steel.
3. Mounting feet shall be constructed of 304 stainless steel.
4. The operating airflow range shall be 0 to 10,000 FPM (0 to 113 m/s) unless otherwise indicated on the Drawings.

I. Transmitters:
1. The transmitter shall have an LCD display capable of displaying airflow and temperature. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate.
2. The transmitter shall be capable of displaying the individual airflow and temperature readings of each sensor on the LCD display.
3. The transmitter shall operate on 24 VAC. The transmitter shall not require an isolated power source.
4. The operating temperature range for the transmitter shall be 20 to 120 degrees F (-28 to 48 degrees C). The transmitter shall be protected from weather and water.
5. The transmitter shall be capable of communicating with the host controls using one of the following interface options:
a. Linear analog output signal: Field selectable, fuse protected and isolated, 0 10VDC and 4 20mA (4 wire).
b. RS 485: Field selectable BACnet MS/TP, ModBus RTU and Johnson Controls N2 Bus.
c. 10 Base T Ethernet: Field selectable BACnet Ethernet, BACnet IP, ModBus TCP and TCP/IP.
d. LonWorks Free Topology.

J. The measuring device shall be UL listed as an entire assembly.

K. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the Drawings. Submit a written report to the Architect if any measurement locations do not meet the manufacturer's placement requirements.

L. Airflow measuring stations shall be interfaced with Division 23 Section “Instrumentation and Controls for HVAC” so that the building's ATC system shall monitor airflow. Coordinate output signal with Division 23 Section “Instrumentation and Controls for HVAC”. Any controllers required for the proper operation of the airflow monitoring station shall be LonWorks compliant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that power supply and data outlet is available to control units and operator workstation.

3.2 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Wiring and conduits shall be properly supported and run in a neat and workmanlike manner. Wiring and conduits exposed and in equipment rooms shall run parallel to or at right angles to the building structure. Wiring and conduits within enclosures shall be neatly bundled and anchored to prevent obstruction to devices and terminals. Wiring, conduits, wall boxes, and accessories shall conform to Division 26 – Electrical, and Division 27 of the Contract Documents.

B. The ATC Contractor shall be responsible for electrical installation, including any low voltage and line voltage wiring which is required for a fully functional control system and not indicated on the Electrical Drawings or required by the Electrical Specifications (Divisions 26 and 27).

C. Wiring shall be in accordance with local and national Codes and regulations.

D. Provide electrical materials and installation under this Section. Requirements and standards shall be as specified in other Sections and Divisions of the Specifications, as indicated in paragraphs below.
   1. Install raceways, boxes, and cabinets in conformance to Division 26.
   2. Install building wire and cable in conformance to Division 26.
   3. Provide interface wiring (line and low voltage) as required to complete ATC system installation.
   4. Install signal and communication cable according to Division 27.
      a. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
      b. Install exposed cable in raceway.
      c. Install concealed cable in raceway.
      d. Bundle and harness multi-conductor instrument cable in place of single cables where several cables follow a common path.
      e. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
      f. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
      g. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

E. Control wiring in boiler room, mechanical rooms, and equipment rooms shall be installed in conduit which shall comply with the requirements of the Electrical Specifications.

F. Electronic low-voltage wiring shall be #18 AWG minimum THHN and shielded if required.

G. Provide power for normally-openduct reheat coil, fintube, and glycol system,hot water valves from a central source(s). Interlock with hot water pump(s) to de-energize valves when pump is de-energized.

H. Power for any temperature control panels required in addition to those indicated on the Drawings shall be the responsibility of this Section. Power to temperature control panels shall be through "stand-by" power circuits which are powered through the building's emergency generator.
   1. It is the design intent to have the entire temperature control system, including damper and valve actuators, powered by stand-by power circuits to ensure that the DDC system is fully functional when the building is operating on generator power.

3.3 INSTALLATION

A. Wall mounted thermostats and temperature sensors shall be attached to an electrical wall box attached to a wall stud, masonry wall, or to blocking. Attaching to gypsum wallboard only shall not be allowed.

B. Mounting heights of room sensors, thermostats, and other devices, which have features which occupants may adjust or set by touching, shall be installed in locations and heights conforming to U.S. Department of Justice – 2010 ADA Standards for Accessible Design.
   1. Unobstructed Forward or Side Reach: Reaches, measured by distance above the finished floor or ground surface upon which the occupant shall be sitting or standing, shall be a high of 48 inches (1220 mm) maximum measured to the top of the device, and a low of 15 inches (380 mm) minimum measured to the bottom of the device.
   2. Obstructed High Reach: Where a high forward reach is over an obstruction, the clear floor space shall extend beneath the element for a distance not less than the required reach depth over the obstruction. The high forward reach shall be 48 inches (1220 mm) maximum where the reach depth is 20 inches (510 mm) maximum. Where the reach depth exceeds 20 inches (510 mm), the high forward reach shall be 44 inches (1120 mm) maximum and the reach depth shall be 25 inches (635 mm) maximum.
   3. Coordinate with Division 26 – Electrical to match heights for an aesthetically pleasing appearance.

C. Verify location of room temperature sensors and other exposed control sensors with Drawings and room details before installation.
   1. Thermostats and temperature sensors are indicated on the Drawings for general location. Terminal heat transfer units and fans which control space temperature shall be provided with thermostatic control, whether or not a thermostat or temperature sensor has been indicated on the Drawings.
   2. Locate in the general location indicated, and coordinate to group together with room light switches and other devices of similar height, to minimize disruption of open wall space.
   3. Locate to not be above electrical dimmers.
   4. Locate to avoid heat-generating equipment such as computers, copiers, cooking equipment, coffee makers, vending machines, and refrigerators. Where electrical outlets are indicated near sensors, verify whether equipment is intended.
   5. Locate to avoid heating piping which may be concealed in partitions.
   6. Locate away from windows and exterior doors.
   7. Locate to avoid other false sources of heat such as strong sunlight.

D. Provide guards on room sensors and thermostats in the following locations:
   1. Public areas other than classrooms and offices, including but not limited to: Corridors, hallways, entrances, lobbies, vestibules, stairwells, toilet rooms, locker rooms, storage rooms, cafeterias, and gymnasiums.
   2. Locations vulnerable to traffic.

3. Where indicated.

E. At each wall-mounted temperature sensor, provide wiring for setpoint dial and override pushbutton, and for communications jacks, whether or not the specified sensor has these functions. This will allow the Owner to change sensors to add these functions in the future. Provide access to the associated controller and related control panels through each communication jack.

F. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

G. Install freezestats serpentined across and clipped to the downstream face of coils. Entire length of capillary tube shall be within the unit airstream.

H. Perform adjustment/relocation of freezestats as required to eliminate nuisance freezestat alarms.

I. Aquastats installed on unit heaters and at any location above 60 inches (1525 mm) above finished floor shall be installed with adjustment knobs facing downward to facilitate adjustment.

J. Outdoor air temperature sensor(s) shall be installed on the North side of the building.

K. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

L. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

M. Connect lead-lag controls to lock out the failed or non-selected motor, to prevent simultaneous operation.

N. Connect lead-lag controls so that only 1 motor can run in starter “hand” position.

O. Connect fire alarm shutdown of motors on the load side of controls and hand-off-auto switches, to prevent motor from running in any switch position during fire alarm.

P. For components to be installed under other Sections of the Specifications, provide delivery of components to appropriate Subcontractors, provide installation instructions, and supervise their installation.

Q. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."
1. Sensors shall be immersion type in wells unless otherwise specified or indicated.
2. Enlarge piping at wells to prevent excess interference with flow.
3. Locate wells to ensure insertion in active flowing section of piping or tank.
4. Fill sensor wells with Honeywell thermal heat transfer paste to ensure good conduction.

R. Install refrigerant instrument wells, valves, and other accessories according to Division 23 Section "Refrigerant Piping and Specialties."

S. Install automatic dampers in conformance to Division 23 Section "Air Duct Accessories."

T. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures. Provide stand-off brackets of depth to meet or exceed specified thickness of duct insulation.

U. Install duct volume-control dampers according to Division 23 Sections specifying air ducts.

V. Provide labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."

W. Install electronic and fiber-optic cables according to Division 27.

X. Unless otherwise indicated, actuators shall be spring loaded and shall, upon a loss of power, actuate their device to an appropriate “fail safe” position.
   1. Hot water valves - fail safe to fully open.
   2. Outside and exhaust air dampers - fail safe to fully closed.
   3. Exhaust fan motorized dampers - fail safe to fully closed.
   4. Supply air dampers at rooftop units - fail safe to fully closed.
   5. Return air dampers - fail safe to fully open.
   6. Combination fire/smoke dampers - fail safe to fully closed.
   7. Boiler Room combustion air damper at upturned duct - fail safe to full open.
   8. Boiler Room combustion air damper at down turned duct - fail safe to fully closed.
   9. Boiler isolation valves (each boiler) - fail safe to fully open.

Y. For actuators that are required to “fail safe”, provide spring return actuators. “Floating point” actuators shall not be allowed for these applications. “Floating point” actuators shall be allowed for actuators that are not required to “fail safe”.

Z. Enter computer programs and data files into the related computers including control programs, initial approved parameters and settings, and English descriptors.

AA. Maintain CD copies of data file and application software for reload use in the event of a system crash or memory failure. 1 copy shall be delivered to the Owner during training session, and 1 copy shall be archived in the ATC Contractor's local software vault.

BB. Install software in control units and operator workstation(s). Implement features of programs to specified requirements and as appropriate to sequence of operation.

CC. Connect and configure equipment and software to achieve sequence of operation specified.

3.4 FIELD QUALITY CONTROL

A. Coordinate with the requirements of Division 01 Section “General Commissioning Requirements”.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

C. Perform the following field tests and inspections and prepare test reports:
   1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.

2. Test and adjust controls and safeties.

D. DDC Verification:
1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
5. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
6. Check temperature instruments and material and length of sensing elements.
7. Check control valves. Verify that they are in correct direction.
8. Check DDC system as follows:
   a. Verify that DDC controller power supply is from emergency power supply, if applicable.
   b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
   c. Verify that spare I/O capacity has been provided.
   d. Verify that DDC controllers are protected from power supply surges.

E. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.5 ADJUSTING

A. Calibrating and Adjusting:
1. Calibrate instruments.
2. Make 3-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:
   a. Check analog inputs at 0, 50, and 100 percent of span.
   b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
   c. Check digital inputs using jumper wire.
   d. Check digital outputs using ohmmeter to test for contact making or breaking.
   e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
5. Flow:
   a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
   b. Manually operate flow switches to verify that they make or break contact.
6. Pressure:
   a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
   b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
7. Temperature:
   a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
   b. Calibrate temperature switches to make or break contacts.
8. Stroke and adjust control valves and dampers without positioners, following the

manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.

9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to 3 visits to Project during other than normal occupancy hours for this purpose.

3.6 VALIDATION

A. The ATC Contractor shall completely check out, calibrate, and test connected hardware and software to ensure that the system performs in accordance with the approved submittals for specifications and sequences of operations.

B. Witnessed Validation Demonstration: Shall consist of:

1. Display and demonstrate each type of data entry to show site specific customizing capability.
2. Execute digital and analog commands.
3. Demonstrate ATC loop precision and stability via trend logs of inputs and outputs.
4. Demonstrate energy management performance via trend logs and command trace.
5. Demonstrate that each control point, tag, or address is associated with the proper device, such as a room sensor input or an actuator output. This demonstration shall include visual confirmation that the measured values and the output actions match what is indicated in the control system.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain Mechanical instrumentation and controls. Refer to Division 01 Section "Demonstration and Training."

3.8 TRAINING

A. Training shall be by the ATC Subcontractor and shall utilize specified manuals and as-built documentation. Video record each training session, and turn the completed video over to the Owner when training has been completed.

B. Operator training shall include 10 four-hour sessions encompassing:

1. Modifying text.
2. Sequence of Operation review.
3. Selection of displays and reports.
4. Use of the specified functions.
5. Setting and adjusting of occupancy schedules.
6. Troubleshooting of sensors.
7. Owner questions/concerns.

C. 2 training sessions shall be conducted at project substantial completion, and the others shall be conducted at the Owner's request and in accordance with the Owner's schedule within a period of 6 months after substantial completion of the project.

D. At 6 months after substantial completion, unused training hours shall be, at the Owner's discretion, used for future training of new personnel or reimbursed to the Owner at the Subcontractor's current hourly service rate.

3.9 MECHANICAL COMMISSIONING

A. Refer to Specification Division 01 Section "General Commissioning Requirements" - for requirements and responsibilities of the ATC Contractor.

B. Prior to the commencement of mechanical commissioning, provide validation of the temperature control system as follows:
   1. Completely check out, calibrate, and test connected hardware and software to insure that the system performs in accordance with the approved products and sequences of operations submitted.
   2. Witnessed validation demonstration shall consist of:
      a. Display and demonstrate each type of data entry to show site specific customizing capability.
      b. Execute digital and analog commands.
      c. Demonstrate DDC loop precision and stability via trend logs of inputs and outputs.
      d. Demonstrate energy management performance via trend logs and command trace.

C. To facilitate the commissioning process, provide the ability for the Commissioning Agent to, through the graphics screens, modify the outside air temperature analog input signal to the system. The intent is to allow the Commissioning Agent to adjust the outside air temperature so that the systems can be tested during their various modes of operation (for example, dehumidification, humidification, heating, cooling.)

D. Provide support for the Commissioning Agent as required to facilitate the commissioning process. This shall include a minimum of 2 four-hour training sessions on the use of the system's graphics and associated software. The intent is to train the Commissioning Agent so that he can perform simple commands such as adjusting room temperature setpoints for commissioning of reheat coils, fintube radiation, cabinet unit heaters, unit heaters and VAV boxes. This will allow the Commissioning Agent to perform a majority of his work without assistance. For more complicated systems such as building pressure control, control of outdoor air dampers based on CO_2 levels, control of variable frequency drives and air handling unit damper response, provide assistance as required by the Commissioning Agent during the commissioning process.

Appendix A Appendix A: Sample Graphics

A.1. Provide graphics to match images shown herein to the greatest extent possible. Location, building, and zone names do not apply to this project, but naming conventions must be matched. On-screen graphics must be clickable and route users to the item selected. Floor plan backgrounds used in graphics must match actual building layout and configuration. Naming of equipment in graphics must match naming used on Plans.

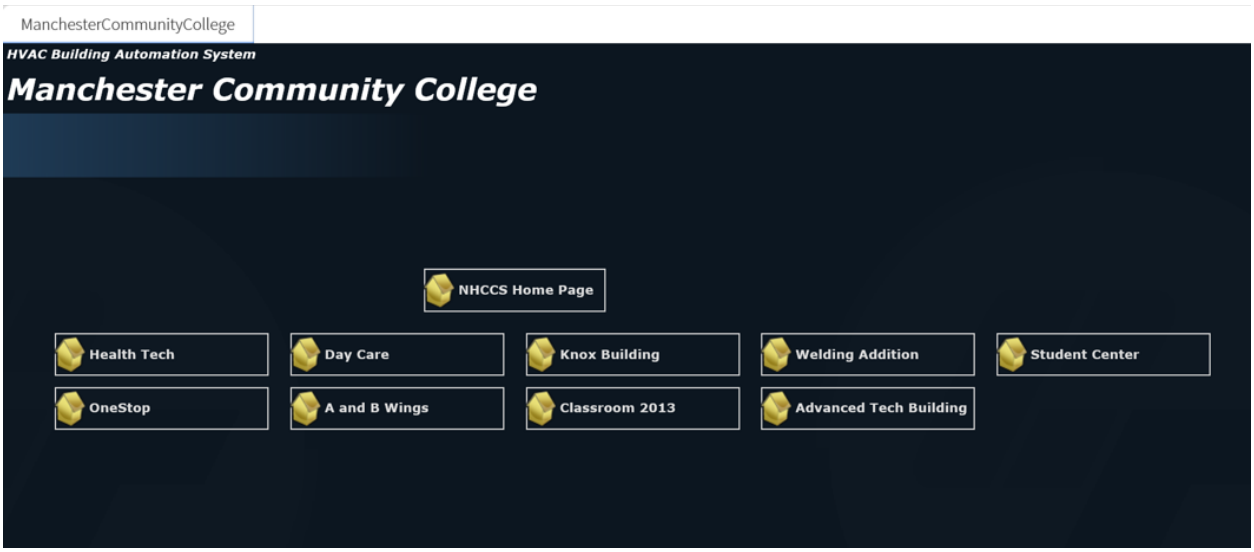


Figure A1. Campus home screen. Each rectangle represents a building on campus.

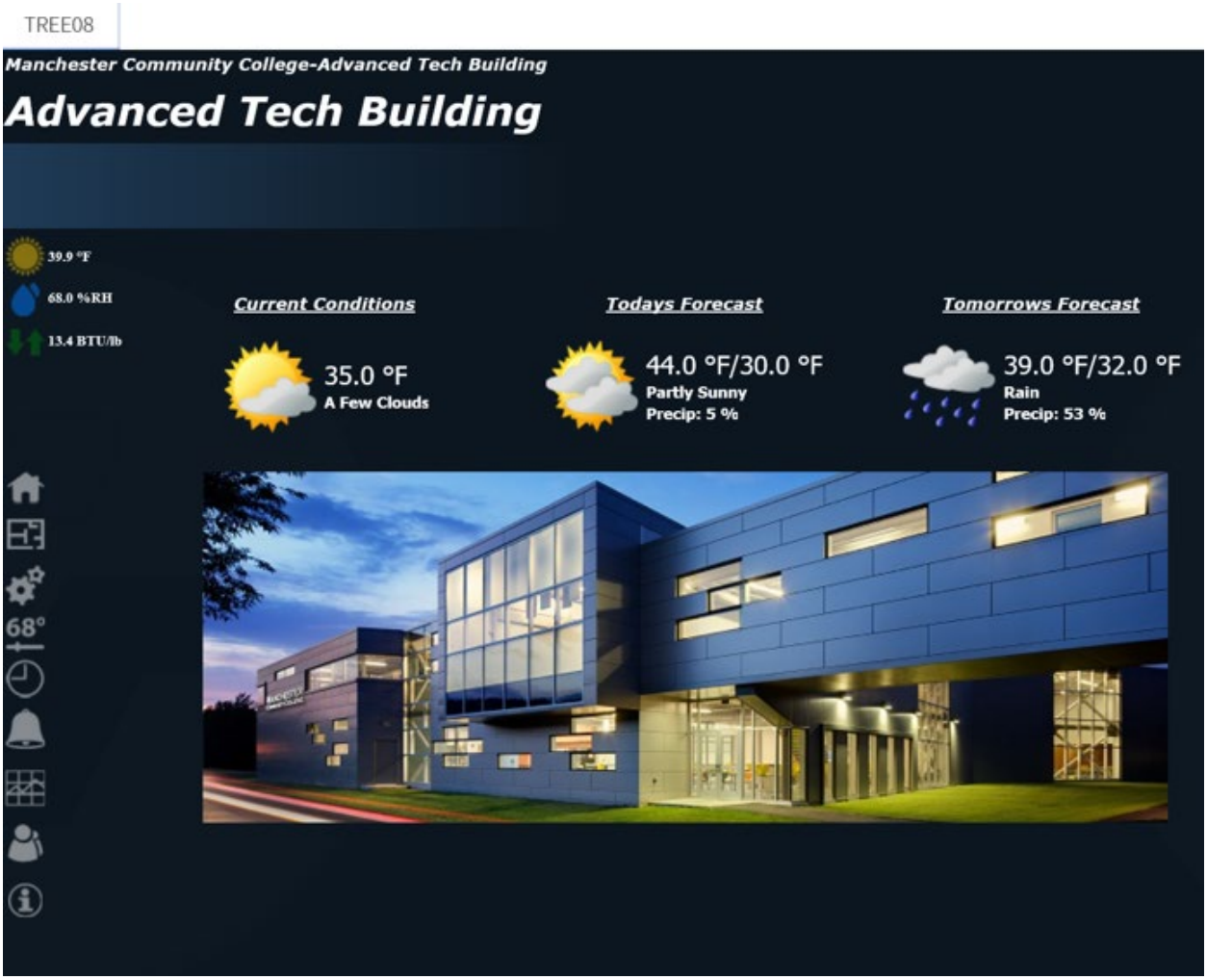


Figure A2. Building-specific screen. Accessed by clicking the building name shown in Figure A1.

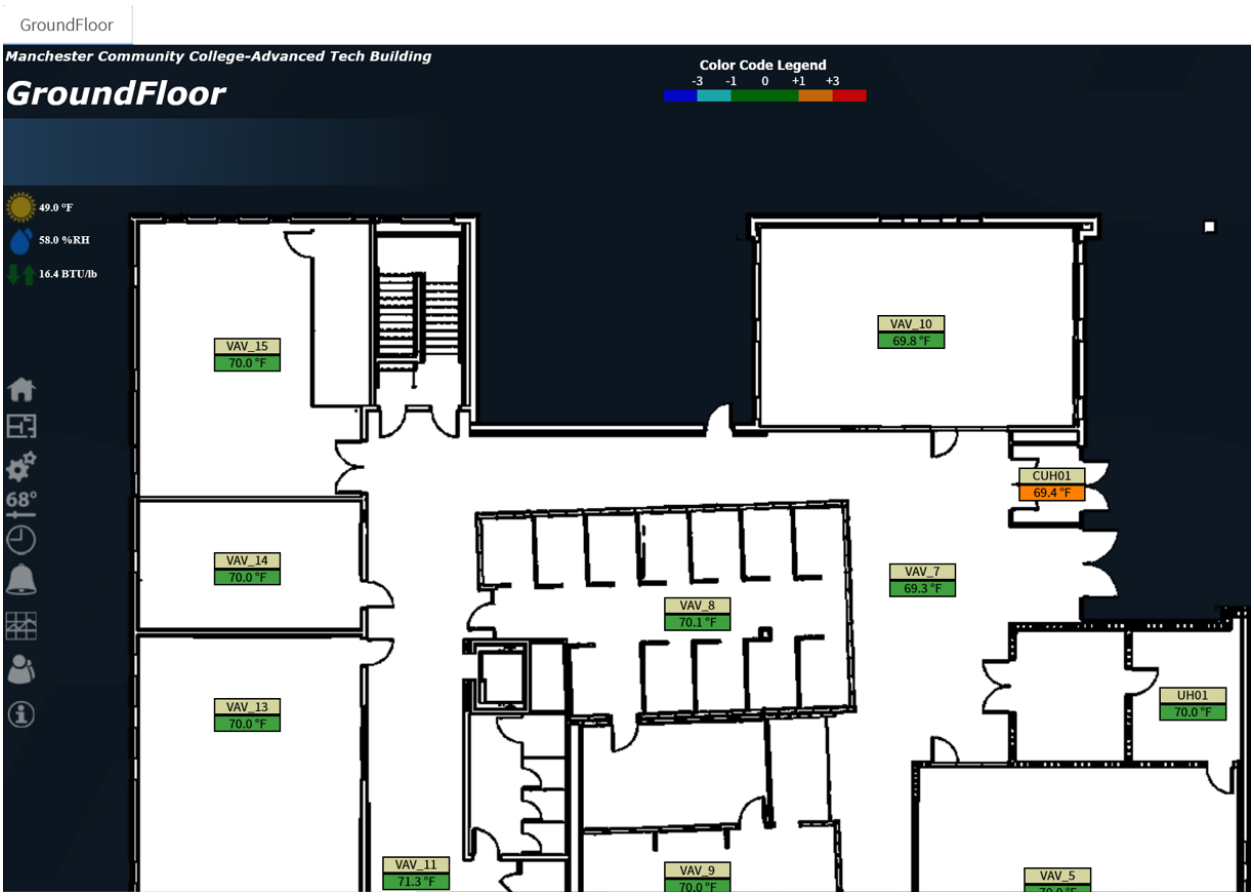


Figure A3. Floor plan. Includes equipment number of HVAC units serving spaces along with current space temperature. Space temperatures must be color-coded, with green indicating an acceptable temperature, as shown in the color code legend at the top of the graphics page.

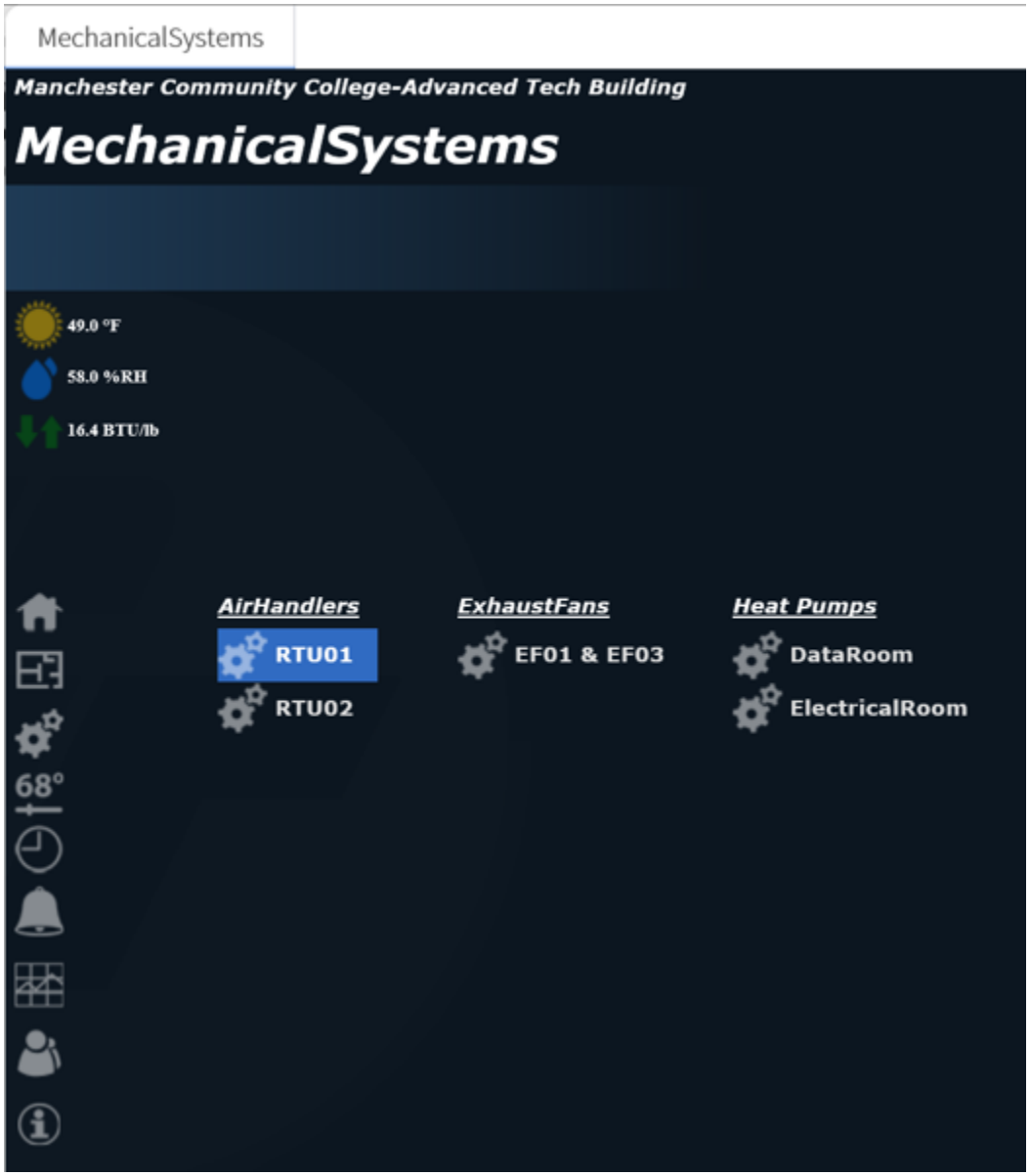


Figure A4. Mechanical systems screen for one building on campus. Must be organized by equipment type as shown in the sample graphic. Units must be clickable and must route user to the unit selected.

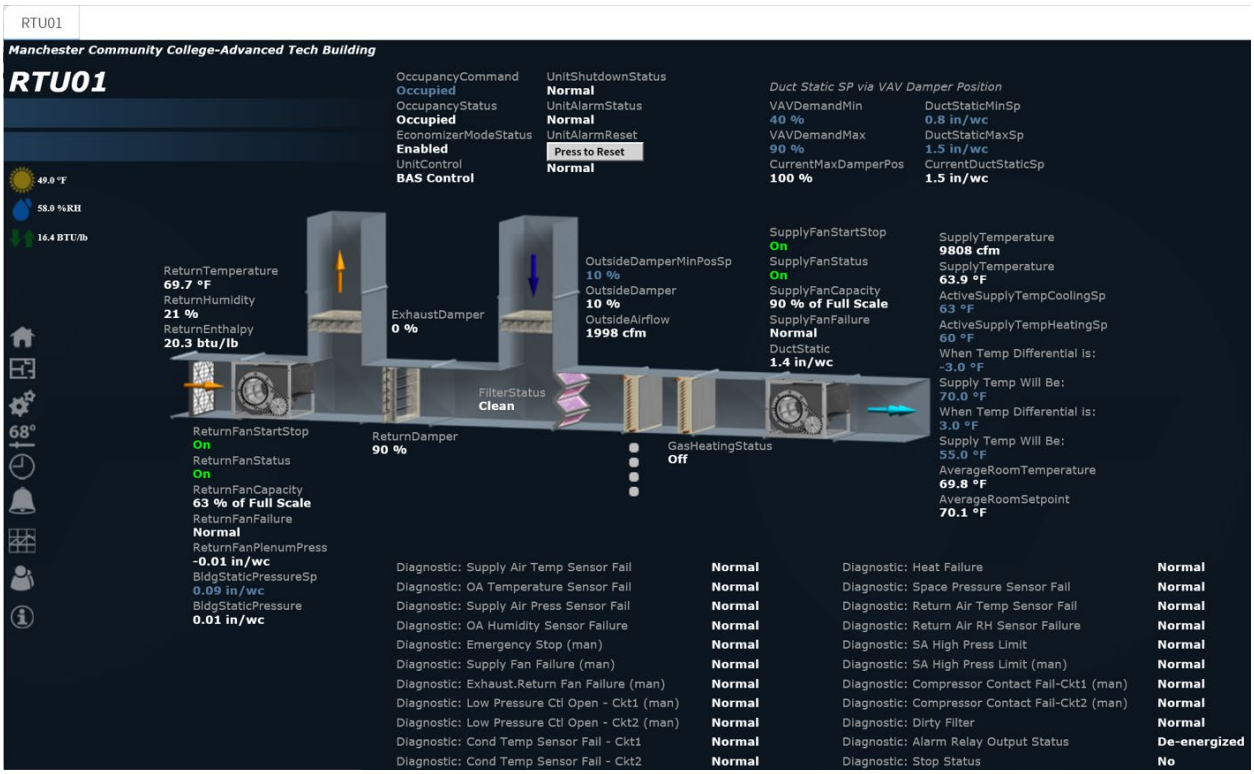


Figure A5. HVAC equipment/unit screen. Must display points indicated in controls sequences and points lists shown on the Drawings.

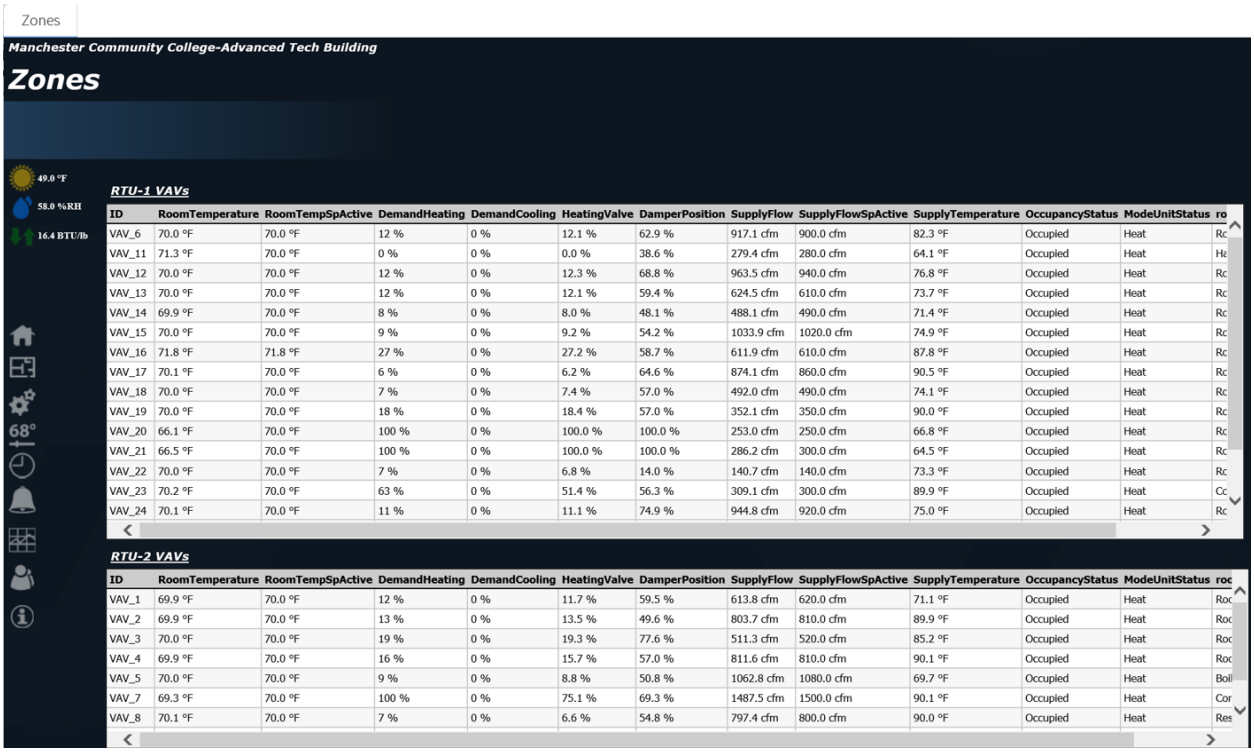


Figure A6. HVAC equipment zones screen. Must show all zone controls associated with one AHU.

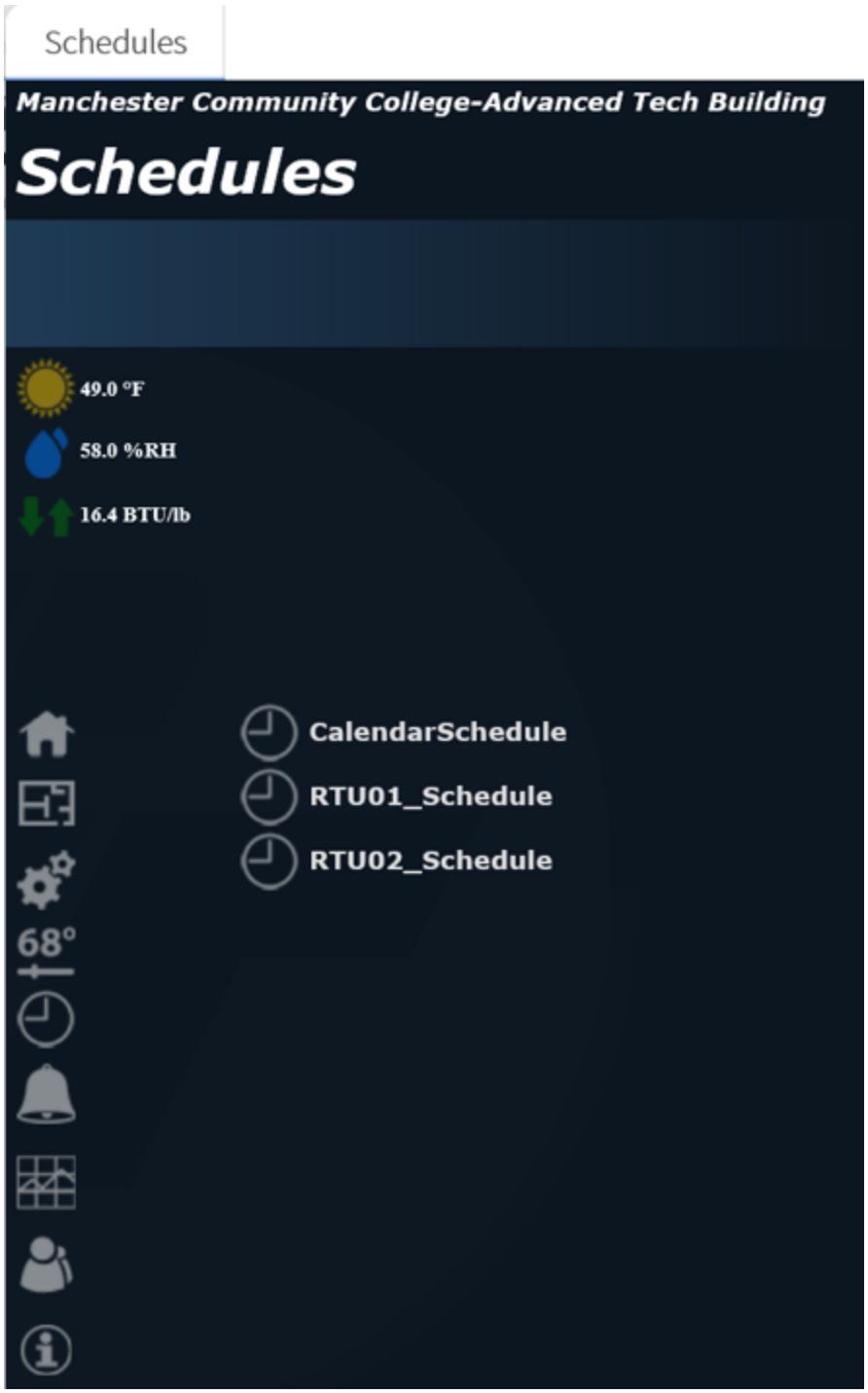


Figure A7. Schedules screen for one building on campus. Schedules must be editable via graphical user interface and must be organized by HVAC system.

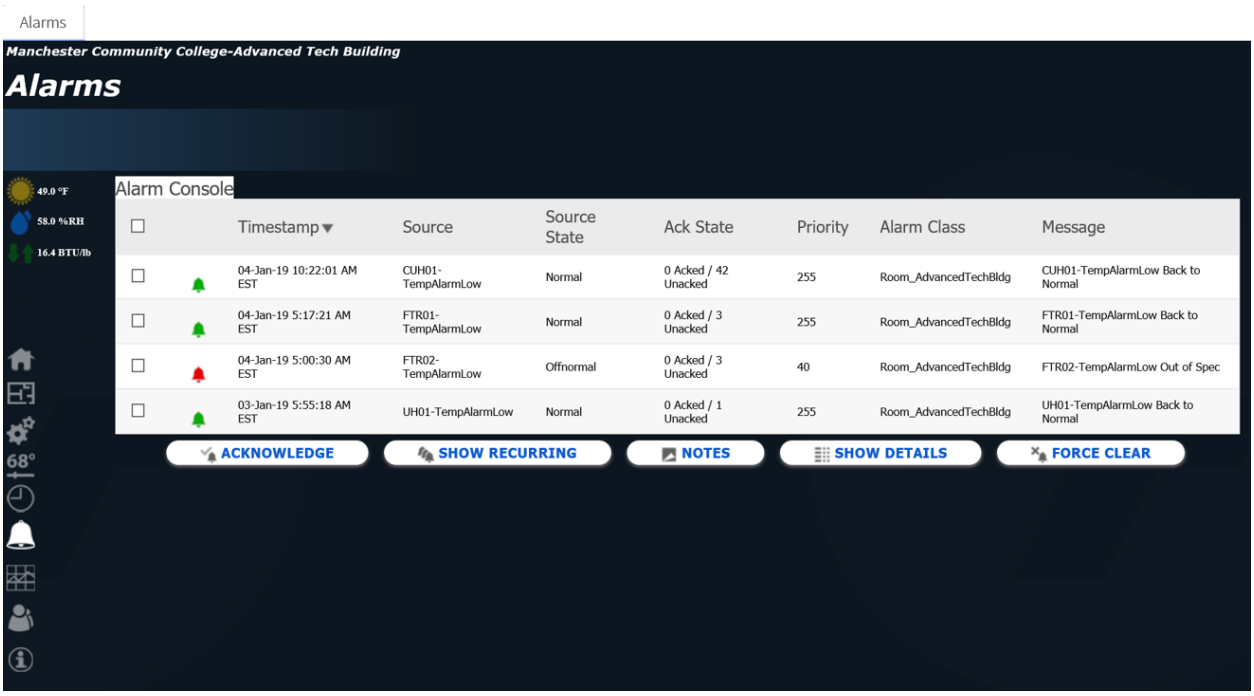


Figure A8. Alarms screen for one building on campus. Must indicate which are in an alarm condition via color-coding.

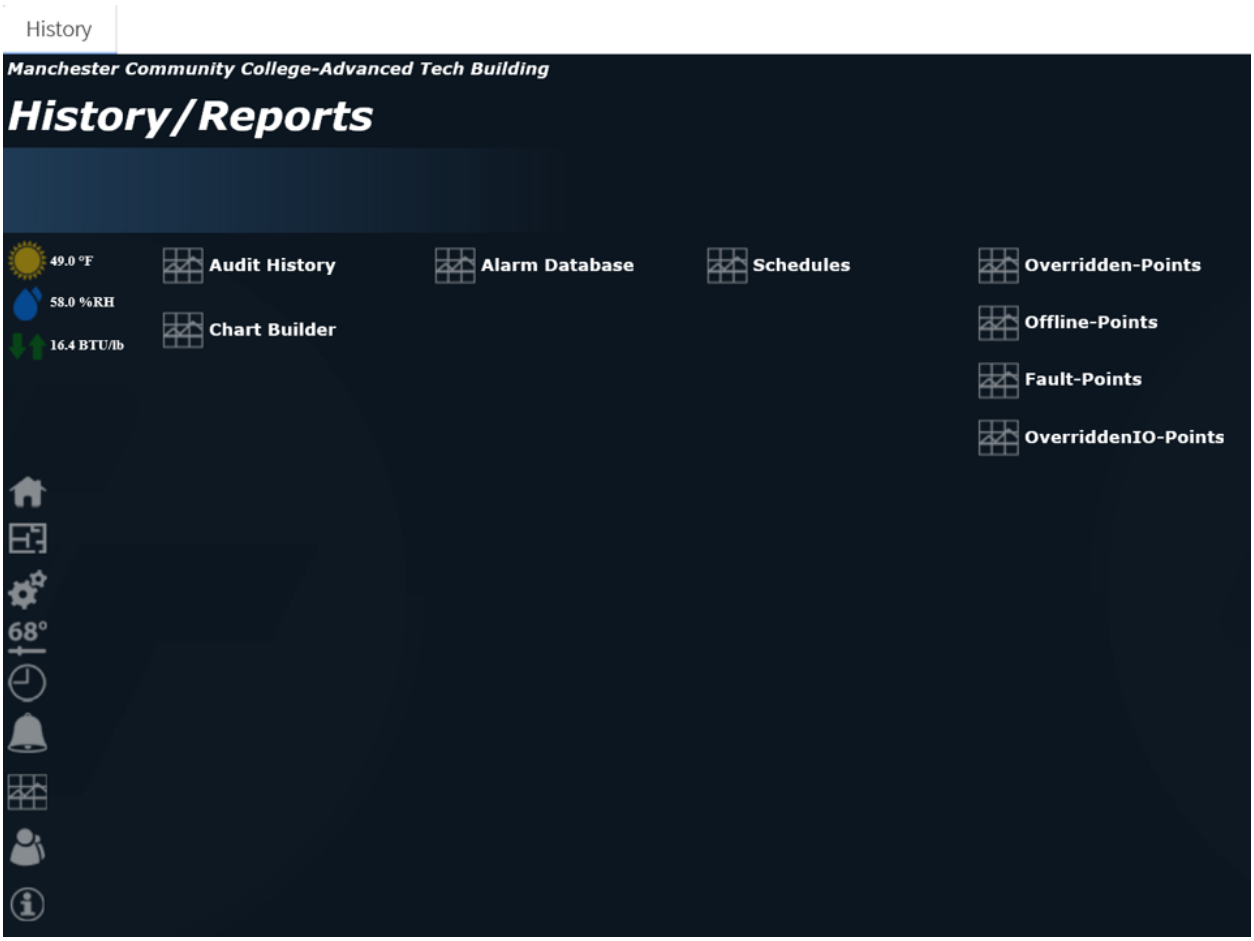


Figure A9. Trend logs for one building on campus. Must show historical trend data for all points indicated on the Drawings.

END OF SECTION 230900

SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Switchboards.
2. Surge protection devices.
3. Disconnecting and overcurrent protective devices.

1.2 COORDINATION

A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Switchboards.
2. Overcurrent protective devices.
3. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail bus configuration, current, and voltage ratings.
3. Detail short-circuit current rating of switchboards and overcurrent protective devices.
4. Detail utility company's metering provisions with indication of approval by utility company.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
6. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
7. Include schematic and wiring diagrams for power, signal, and control wiring.

C. Field Quality-Control Submittals:

1. Field Quality-Control Reports:

a. Test procedures used.
b. Test results that comply with requirements.
c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation instructions issued to Installer by manufacturer for the following:

1. Handling, storing, and providing temporary heat.
2. Mounting accessories and anchoring devices.
3. Short Circuit and Arc Flash results and recommendations
4. Testing and adjusting overcurrent protective devices.

B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

B. Remove loose packing and flammable materials from inside switchboards and install temporary electric heating (250 W per section) to prevent condensation.

C. Handle and prepare switchboards for installation in accordance with NECA 400.

1.7 WARRANTY

A. Special Installer Extended Warranty: Installer warrants that fabricated and installed switchboard perform in accordance with specified requirements and agrees to repair or replace components that fail to perform as specified within extended-warranty period.

1. Extended-Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

E. Comply with NEMA PB 2.

F. Comply with NFPA 70.

G. Comply with UL 891.

H. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

I. Nominal System Voltage: 208Y/120 V.

J. Main-Bus Continuous: 1600 A.

K. Indoor Enclosures: Steel, UL 50E, Type 1.

L. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over rust-inhibiting primer on treated metal surface.

M. Barriers: Between adjacent switchboard sections.

N. Insulation and isolation for main and vertical buses of feeder sections.

O. Service Entrance Rating: Switchboards intended for use as service entrance equipment may contain from one to six service disconnecting means with overcurrent protection, neutral bus with disconnecting link, grounding electrode conductor terminal, and main bonding jumper.

P. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company.

Q. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

R. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

S. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from front of switchboard.
2. Phase- and Neutral-Bus Material:

    a. Hard-drawn copper of 98 percent conductivity.

3. Copper feeder circuit-breaker line connections.
4. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with mechanical connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.
5. Ground Bus: 1/4 by 2 inch Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
6. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections.
7. Disconnect Links:

    a. Isolate neutral bus from incoming neutral conductors.
    b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.

8. Neutral Buses: 50 percent of ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.

T. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 200 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

2.3 SHORT CIRCUIT AND ARC FLASH STUDY

A. Provide short circuit, arc flash and breaker coordination studies using computer software such as ETAP, SKM, or EasyPower. Provide arc flash labels as required and recommendations for breaker settings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store switchboards in accordance with NECA 400.

1. Lift or move switchboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's published instructions.
2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
3. Protect from moisture, dust, dirt, and debris during storage and installation.
4. Install temporary heating during storage in accordance with manufacturer's published instructions.

B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.

C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect performance of equipment.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Switchboards and Accessories: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 400.

C. Special Techniques:

1. Equipment Mounting: Install switchboard in existing switchboard location. Verify existing conduit entrance locations and provide conduit entrance locations to match.

    a. Install conduits entering underneath switchboard, entering under vertical section where conductors will terminate.
    b. Place and secure anchorage devices. Use setting drawings, templates, diagrams, published instructions, and directions furnished with items to be embedded.
    c. Install anchor bolts to elevations required for proper attachment to switchboards.
    d. Securley fasten switchboard to concrete floor as per manufacturer recommendations.

2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.
3. Operating Instructions: Frame and mount printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
4. Install filler plates in unused spaces of panel-mounted sections.
5. Install overcurrent protective devices, surge protection devices, and instrumentation.

    a. Set field-adjustable switches and circuit-breaker trip ranges.

3.3 CONNECTIONS

A. Bond conduits entering underneath switchboard to equipment ground bus with bonding conductor sized in accordance with NFPA 70.

B. Support and secure conductors within switchboard in accordance with NFPA 70.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification.

B. Switchboard Nameplates: Label each switchboard compartment with nameplate, indicating name, voltage, amperage. Provide warning sign for second service as required and its location as required by NFPA 70.

C. Device Nameplates: Label each disconnecting and overcurrent protective device.

D. Service Equipment Label: Labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:Acceptance Testing:

a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
b. Test continuity of each circuit.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

B. Nonconforming Work:

1. Switchboard will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

C. Collect, assemble, and submit test and inspection reports, including certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

3.7 PROTECTION

A. Temporary Heating: Apply temporary heat, to maintain temperature in accordance with manufacturer's published instructions, until switchboard is ready to be energized and placed into service.

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.

2. Power Studies

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for SPD as installed in panelboard.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Key interlock scheme drawing and sequence of operations.
9. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

B. Short Circuit and Arc Flash results and recommendations

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

D. Enclosures: Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
b. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
d. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

E. Incoming Mains Location: Convertible between top and bottom.

F. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.

G. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

H. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

I. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

J. Panelboard Short-Circuit Current Rating: Fully rated. Series rated panelboards are unacceptable.

2.2 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. ABB, Electrification Products Division.
2. Eaton.
3. ESL Power Systems, Inc.
4. Mersen USA.
5. Siemens Industry, Inc., Energy Management Division.
6. Square D; Schneider Electric USA.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Mains: Circuit breaker or main lugs as identified on drawings.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. ABB, Electrification Products Division.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

   a. Inverse time-current element for low-level overloads.
   b. Instantaneous magnetic trip element for short circuits.
   c. Adjustable magnetic trip setting for circuit-breaker frame sizes 200 A and larger.
   d. Shunt trip: Provide for circuit breakers indicated on drawings. 120 V trip coil energized from separate circuit.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
5. Subfeed Circuit Breakers: Vertically mounted.
6. MCCB Features and Accessories:

   a. Standard frame sizes, trip ratings, and number of poles.
   b. Breaker handle indicates tripped status.
   c. UL listed for reverse connection without restrictive line or load ratings.
   d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
   e. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
   f. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
   g. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.4 SHORT CIRCUIT AND ARC FLASH STUDY

A. Provide short circuit, arc flash and breaker coordination studies using computer software such as ETAP, SKM, or EasyPower. Provide arc flash labels as required and recommendations for breaker settings.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NEMA PB 1.1.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box.

E. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

F. Install filler plates in unused spaces.

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

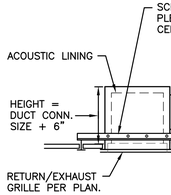
C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage circuit breakers stated in NETA ATS. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

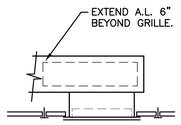
D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416



TYP. FLEX CONN.



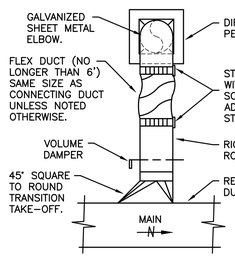
TYP. HARD CONN.

NOTES:

1. DOUBLE STRAPS ARE REQUIRED ON INSULATED FLEX DUCT. ONE OVER THE ACTUAL DUCT AND ONE OVER THE EXTERIOR INSULATION. TRIM EXCESS INSULATION TO PROVIDE A NEAT FINISHED PRODUCT.
2. FLEX DUCT MUST BE SUPPORTED AT INTERVALS NECESSARY TO AVOID EXCESSIVE SAGS WITH SHEET METAL BAND HANGERS.
3. GRILLES MUST BE SUPPORTED SEPARATE OF THE CEILING TILE IN WHICH PLACED TO AVOID WEIGHT INFLUENCE ON THE TILE.
4. ALL DUCTWORK THAT IS VISIBLE THROUGH THE GRILLE THAT DOES NOT HAVE ACOUSTIC LINING SHALL BE PAINTED FLAT BLACK.

TYPICAL RETURN/EXHAUST GRILLE DETAIL

N.T.S.

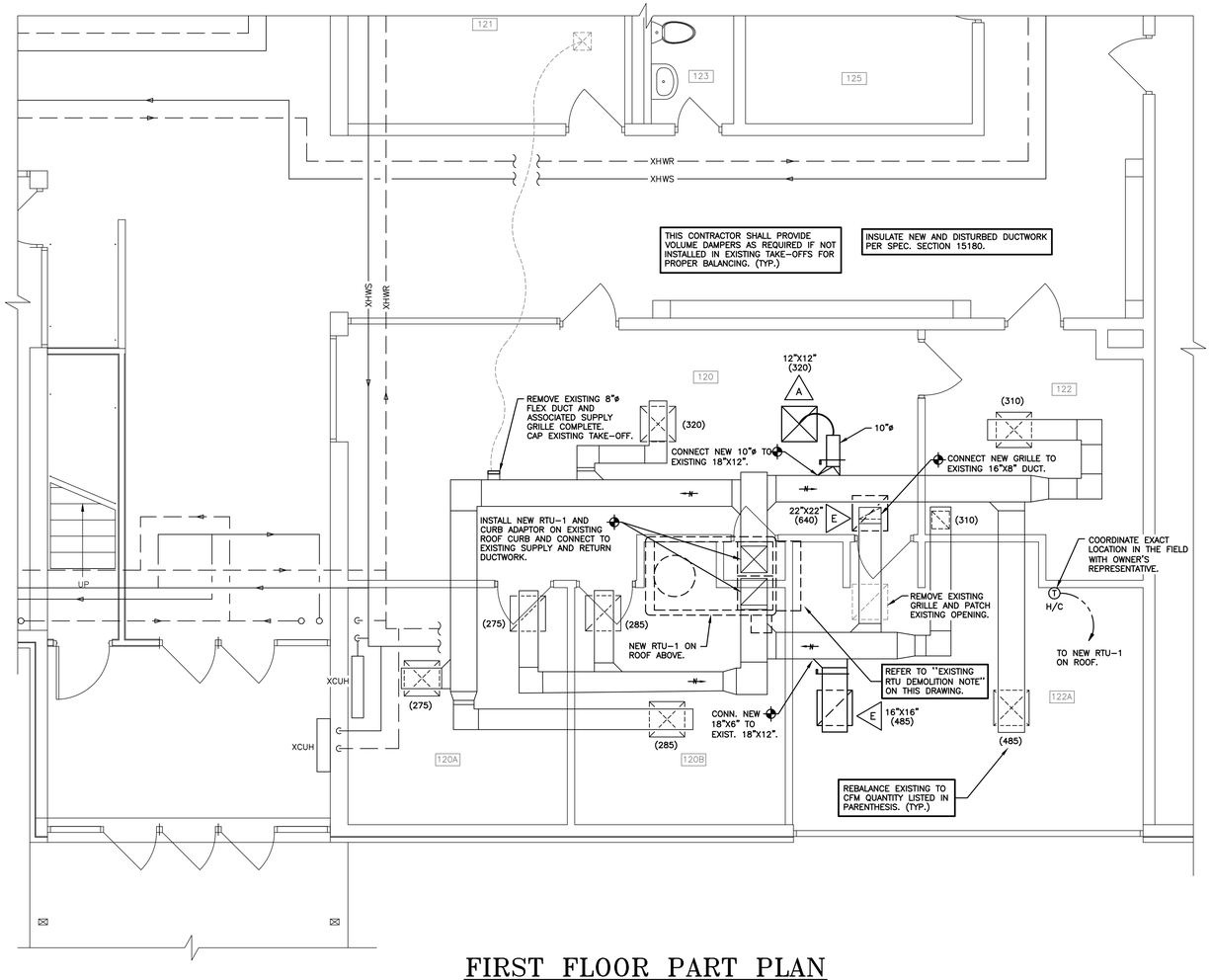


NOTES:

1. DOUBLE STRAPS ARE REQUIRED ON INSULATED FLEX DUCT. ONE OVER THE ACTUAL DUCT AND ONE OVER THE EXTERIOR INSULATION. TRIM EXCESS INSULATION TO PROVIDE A NEAT FINISHED PRODUCT.
2. FLEX DUCT MUST BE SUPPORTED AT INTERVALS NECESSARY TO AVOID EXCESSIVE SAGS WITH SHEET METAL BAND HANGERS.
3. DIFFUSERS MUST BE SUPPORTED SEPARATE OF THE CEILING TILE IN WHICH PLACED TO AVOID WEIGHT INFLUENCE ON THE TILE.

TYPICAL BRANCH TAKE-OFF DETAIL

N.T.S.



FIRST FLOOR PART PLAN

SCALE: 1/4" = 1'-0"

LEGEND

AD	ACCESS DOOR		SUPPLY DUCT
ATC	AUTOMATIC TEMPERATURE CONTROL		RETURN DUCT
CFM	CUBIC FEET PER MINUTE		EXHAUST DUCT
C.M.	CONSTRUCTION MANAGER		
EAT	ENTERING AIR TEMPERATURE		GRILLE, REG., DIFF. SYMBOL
E.C.	ELECTRICAL CONTRACTOR		
ESP	EXTERNAL STATIC PRESSURE		SQUARE ELBOW W/TURNING VANES (T.V.)
HP	HORSEPOWER		
LAT	LEAVING AIR TEMPERATURE		
MBH	THOUSAND BTU'S PER HOUR		EQUIPMENT
M.C.	MECHANICAL CONTRACTOR		
NTS	NOT TO SCALE		PIPE RISE
RPM	REVOLUTIONS PER MINUTE		PIPE DROP
TSP	TOTAL STATIC PRESSURE		DIRECTION OF FLOW (WATER)
TYP.	TYPICAL		DIRECTION OF FLOW (AIR)
VD	VOLUME DAMPER	XHWS	EXISTING HOT WATER SUPPLY
$	SWITCH	XHWR	EXISTING HOT WATER RETURN
T H/C	THERMOSTAT	XG	EXISTING HOT WATER SUPPLY
	CONN. POINT OF NEW WORK TO EXISTING	G	EXISTING HOT WATER RETURN
			MECHANICAL DEMOLITION

GENERAL NOTES

1. ALL EQUIPMENT AND DUCTWORK SHOWN DIAGRAMMATICALLY ONLY. EXACT LOCATION TO BE DETERMINED AND COORDINATED IN THE FIELD WITH EXISTING CONDITIONS AND BY ALL TRADES INVOLVED.
2. SEAL ALL DUCTWORK PENETRATIONS THRU FIRE RATED PARTITIONS, WALLS AND FLOORS WITH SILICONE BASE ELASTOMERIC UL 1479 SEALANT.
3. FLEXIBLE DUCTS NOT TO BE OVER 6 FEET LONG WITH APPROVED TRANSITIONS AND SMOOTH BENDS TO TERMINAL CONNECTIONS.
4. FLEX DUCT TO MATCH RUNOUT SIZE UNLESS NOTED OTHERWISE.
5. MOUNTING HEIGHTS FOR THERMOSTATS, EQUIPMENT ON/OFF SWITCHES, ETC., LOCATED IN HANDICAP ACCESSIBLE SPACES SHALL BE 48" TO TOP OF CONTROL UNLESS NOTED OTHERWISE.

EXISTING RTU DEMOLITION NOTE

REMOVE EXISTING RTU, EXISTING CURB ADAPTOR, SPECIALTIES AND INCIDENTALS AS REQUIRED TO ACHIEVE THE INTENT OF THIS CONTRACT. REFER TO SPECIFICATION SECTION 15002.

GAS FIRED ROOFTOP UNIT SCHEDULE

NO.	MAKE & MODEL	TONS	ELECTRICAL							SUPPLY FAN					DX COOLING COIL				HEATING SECTION					MIN. OSA	UNIT WEIGHT	REMARKS
			VOLTS	PH	CY	MCA	MFS	EER	SEER	CFM	HP	TYPE	ESP	TSP	EAT (DB/WB)	LAT (DB/WB)	TOTAL CAPACITY	SENSIBLE CAPACITY	GAS TYPE	MBH INPUT	MBH OUTPUT	EAT	LAT			
RTU-1	TRANE PRECEDENT YHC060F3R0A	5.0	230	3	60	30.0	45.0	12.9	15.0	1995	1.0	FC CENTRIFUGAL	.75	.86	80°/67°	58.8°/57.2°	61.0 MBH	43.3 MBH	LP	130.0	106.6	47°	95.4°	25%	950 LBS.	① ②

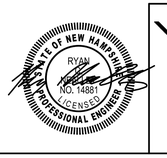
① FURNISH HIGH EFFICIENCY OUTDOOR UNIT WITH ALL STANDARD EQUIPMENT PLUS BOTTOM S.A. AND R.A. CONNECTIONS, DOUBLE WALL INSULATED CONSTRUCTION, WEATHERHOODS, 24" HIGH CURB ADAPTOR WITH 1" SPRING ISOLATORS, HAIL GUARDS, MERV 13 FILTERS (2 SETS), DX COOLING COIL WITH E-FLEX VARIABLE SPEED COMPRESSOR, CRANKCASE HEATERS, PHASE MONITORS AND HIGH/LOW PRESSURE CONTROL, LP GAS HEATING SECTION WITH THREE SINGLE STAGE STAINLESS STEEL BURNERS AND CORROSION RESISTANT STEEL THROUGHOUT, STAINLESS STEEL DRAIN PAN, DIRECT DRIVE FC SUPPLY AIR FAN, BAROMETRIC RELIEF WITH HOOD, 100% ECONOMIZER MODE WITH COMPARATIVE ENTHALPY CONTROL, MODULATING O.A. DAMPER, UNIT MOUNTED CONVENIENCE OUTLET, THROUGH THE BASE SINGLE POINT ELECTRICAL CONNECTION, FACTORY MOUNTED UNIT DISCONNECT SWITCH AND BACNET COMMUNICATIONS CARD.

② M.C. SHALL CONTACT THE WMCC PROJECT MANAGER TO VERIFY RTU-# IS CONSISTENT AND IN SEQUENCE WITH EXISTING EQUIPMENT. COORDINATE FINAL RTU-# WITH ATC CONTRACTOR FOR FRONT END GRAPHIC REPRESENTATION.

GRILLE & DIFFUSER SCHEDULE

SYMBOL	MANUFACTURER	TYPE & MODEL	REMARKS (SIZE AND CFM AS SHOWN ON PLANS)
A	METALAIRE	SUPPLY DIFFUSER SERIES 5500-6-S4 24"X24" PANEL	ALUMINUM CONSTRUCTION, WHITE FINISH
E	METALAIRE	RETURN/EXHAUST GRILLE (LAY-IN) MODEL CC15-6	ALUMINUM CONSTRUCTION, WHITE FINISH

KEY PLAN



YEATON ASSOCIATES, INC.
Bedford, NH | Littleton, NH
MEP/FP Engineers
603.444.6578
www.yeatonassociates.com
YA Project # 20038ME

WMCC - AIR CONDITIONING UPGRADES

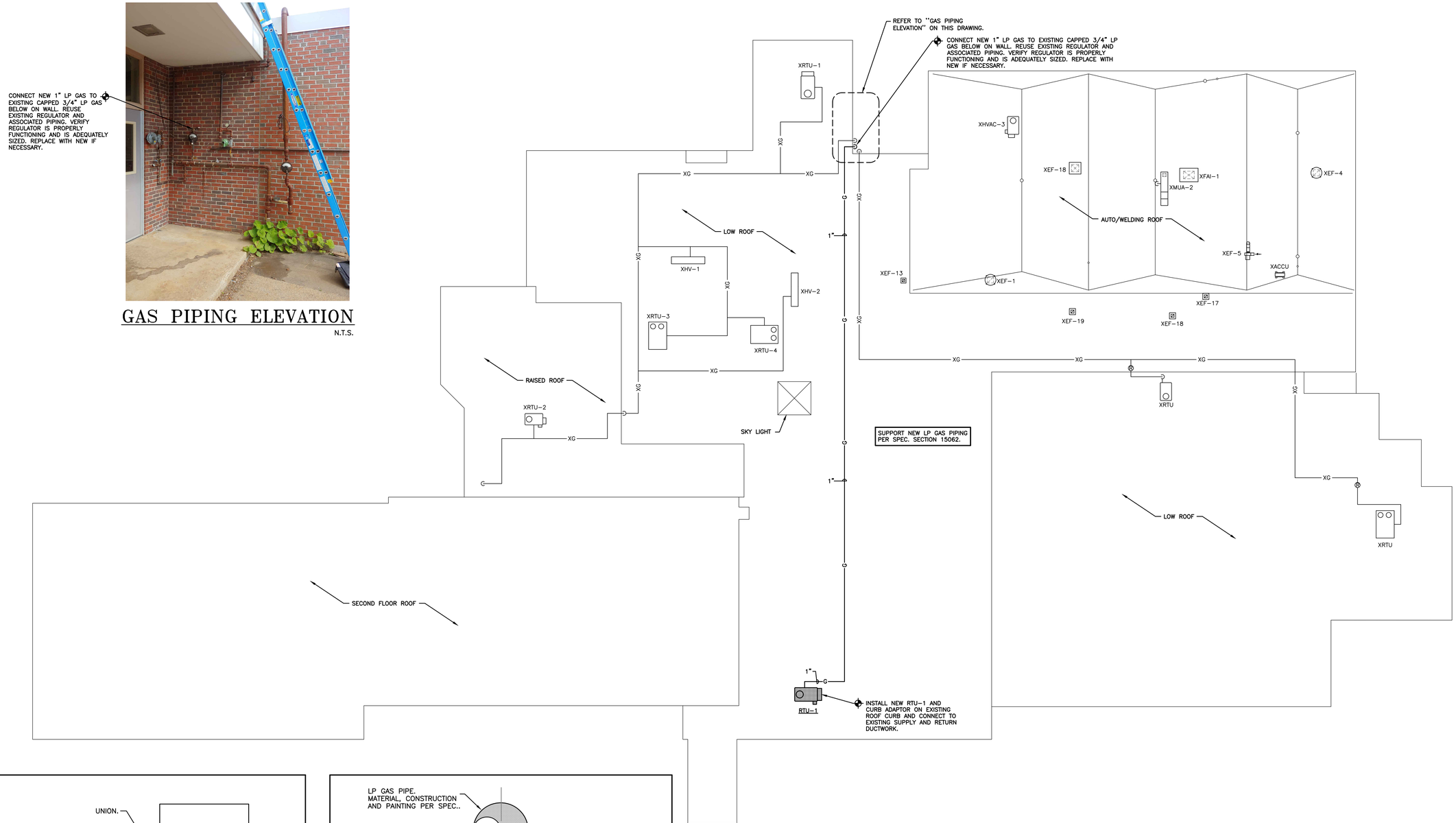
BERLIN NH

DATE:	05-03-24	DRAWN BY:	BLN
SCALE:	AS NOTED	CHECKED BY:	JDV
WHITE MOUNTAINS COMMUNITY COLLEGE 2020 RIVERSIDE DRIVE BERLIN, N.H. 03570		DRWG. NO. 1 of 3	M1.1

CONNECT NEW 1" LP GAS TO EXISTING CAPPED 3/4" LP GAS BELOW ON WALL. REUSE EXISTING REGULATOR AND ASSOCIATED PIPING. VERIFY REGULATOR IS PROPERLY FUNCTIONING AND IS ADEQUATELY SIZED. REPLACE WITH NEW IF NECESSARY.

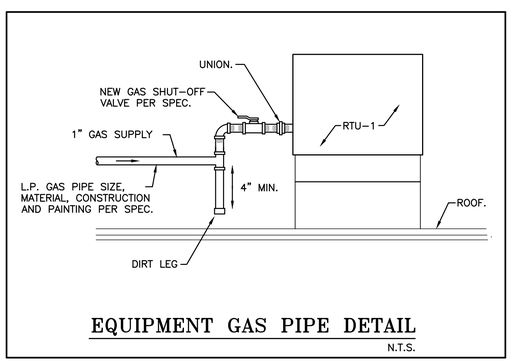
GAS PIPING ELEVATION

N.T.S.



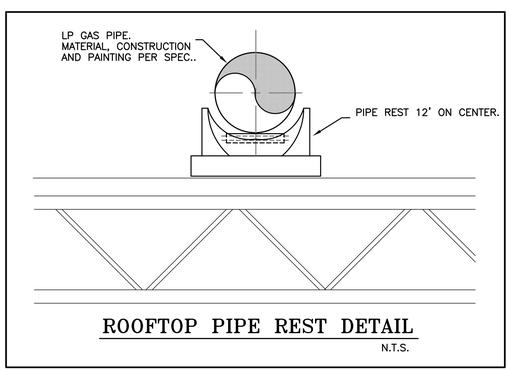
ROOF PLAN

SCALE: 1/16" = 1'-0"



EQUIPMENT GAS PIPE DETAIL

N.T.S.



ROOFTOP PIPE REST DETAIL

N.T.S.

YEATON ASSOCIATES, INC.
Bedford, NH | Littleton, NH
MEP/FP Engineers
603.444.6578
www.yeatonassociates.com
YA Project # 20038ME

STATE OF NEW HAMPSHIRE — RYAN — NO. 14881 — LICENSED PROFESSIONAL ENGINEER

WMCC – AIR CONDITIONING UPGRADES

BERLIN NH

DATE: 05-03-24	DRAWN BY: BLN
SCALE: AS NOTED	CHECKED BY: JDV
WHITE MOUNTAINS COMMUNITY COLLEGE 2020 RIVERSIDE DRIVE BERLIN, N.H. 03570	DRWG. NO. 2 of 3 M1.2

DIVISION 15000 – MECHANICAL SPECIFICATIONS

15002 – DEMOLITION

A. THIS CONTRACTOR SHALL REMOVE ALL EXISTING DUCTWORK, HVAC EQUIPMENT, SPECIALTIES AND INCIDENTALS AS REQUIRED TO ACHIEVE THE INTENT OF THIS CONTRACT. ALL REMOVED EQUIPMENT SHALL BECOME THE PROPERTY OF THIS CONTRACTOR, UNLESS DIRECTED OTHERWISE BY THE OWNER, AND SHALL BE HAULED AWAY FROM THE SITE AND DISPOSED OF PROPERLY. THE OWNER RESERVES THE RIGHT OF FIRST REFUSAL. COORDINATE EXACT MECHANICAL DEMOLITION RESPONSIBILITIES WITH THE COMMUNITY COLLEGE SYSTEM OF NEW HAMPSHIRE (CCSNH) CONSTRUCTION MANAGER PRIOR TO BID.

15003 – SITE VISIT

A. THE MECHANICAL CONTRACTOR INVITED TO SUBMIT A PRICE FOR PERFORMING THE WORK SHOWN ON DRAWINGS AND SPECIFIED HEREIN SHALL VISIT THE SITE TO MAKE THEMSELVES FULLY AWARE OF THE EXISTING CONDITIONS, PRIOR TO SUBMITTING A BID, IN COOPERATION WITH THE C.M.

SECTION 15010 – GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS OR METHODS LISTED, MENTIONED, SCHEDULED ON THE DRAWINGS AND/OR SPECIFIED HEREIN INCLUDING ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS NECESSARY AND REQUIRED FOR PROJECT COMPLETION.

B. THE INTENT OF THE SPECIFICATIONS AND DRAWINGS IS TO CALL FOR FINISH WORK, TESTED AND READY FOR OPERATION.

C. ALL WORK SHALL COMPLY WITH APPLICABLE PORTIONS OF ALL STATE OR LOCAL LAWS AND ORDINANCES, AS WELL AS CCSNH STANDARDS, ALL RULES AND REGULATIONS OF LOCAL UTILITY COMPANIES AND THE BERLIN FIRE DEPARTMENT, INCLUDING NFPA, THE INTERNATIONAL BUILDING CODES WITH NH AMENDMENTS (AS ADOPTED BY THE AUTHORITIES HAVING JURISDICTION [AHJ]), NATIONAL ELECTRIC CODE (N.E.C.), ADA WITH NH AMENDMENTS AND ALL OTHER STANDARDS SET FORTH BY THE AUTHORITIES HAVING JURISDICTION (AHJ).

D. ALL REQUIRED PERMITS AND FEES RELATIVE TO THIS DIVISION SHALL BE OBTAINED AND PAID FOR BY THE CCSNH.

E. GUARANTEE/WARRANTY ALL MECHANICAL EQUIPMENT AND WORKMANSHIP FOR ONE (1) YEAR FROM THE DATE OF PROJECT FINAL ACCEPTANCE BY THE OWNER.

F. ELECTRONICALLY SUBMIT COPIES OF SHOP DRAWINGS OF EQUIPMENT PROPOSED FOR INSTALLATION UNDER THIS CONTRACT FOR REVIEW AND APPROVAL BY OWNER REPRESENTATIVES.

G. ALL REQUIRED GENERAL CONSTRUCTION CUTTING, PATCHING, PAINTING AND SEALING SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR. REVIEW RESPONSIBILITY FOR SAME PRIOR TO BID AND PRICE ACCORDINGLY.

H. PROVIDE AN OPERATING AND MAINTENANCE MANUAL FOR THE OWNER'S USE AT CONCLUSION OF THE CONTRACT THAT ADDRESSES ALL INSTALLED EQUIPMENT AND SPECIALTIES.

I. ALL POWER WIRING TO THE MOTOR STARTERS, OR TO THE TERMINAL BLOCKS OF PREWIRED MOTOR CONTROL CABINETS, AND BETWEEN THE MOTOR STARTER AND ELECTRIC MOTOR SHALL BE COORDINATED/PROVIDED AS PART OF THIS CONTRACT. REVIEW RESPONSIBILITY FOR SAME PRIOR TO BID AND PRICE ACCORDINGLY.

J. THIS CONTRACTOR SHALL THOROUGHLY INSTRUCT THE OWNER'S MAINTENANCE PERSONNEL IN THE PROPER PROCEDURES FOR MAINTENANCE AND OPERATION OF MECHANICAL SYSTEMS INSTALLED UNDER THIS CONTRACT.

SECTION 15011 – TESTING AND BALANCING

PART 1 – GENERAL

1.01 SCOPE

A. PROCURE THE SERVICES OF A BALANCING AGENCY THAT SPECIALIZES IN THE TESTING AND BALANCING OF HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS.

B. WORK SHALL NOT BEGIN UNTIL ALL SYSTEMS HAVE BEEN COMPLETED, CLEANED AND PLACED IN FULL WORKING OPERATION BY THE MECHANICAL CONTRACTOR.

C. TEST, BALANCE AND ADJUST ALL AIR MOVING EQUIPMENT, TERMINALS, SUPPLY, RETURN AND EXHAUST SYSTEMS. WORK TOGETHER WITH THE ATC CONTRACTOR TO ADJUST SETPOINTS OF DAMPERS WHERE APPLICABLE.

D. WHEN NOTIFIED THAT ALL CONTROL SYSTEMS ARE COMPLETE AND TESTED, THE TESTING AND BALANCING CONTRACTOR SHALL PERFORM AN INDEPENDENT TEST OF ALL SYSTEMS FOR SPECIFIED SEQUENCES OF OPERATION. REPORT FINDINGS PER H BELOW.

E. PERFORM ALL TESTS IN ACCORDANCE WITH STANDARD PROCEDURES INCLUDING THOSE OUTLINED BY THE ASSOCIATED AIR BALANCE COUNCIL (AABC) AND/OR SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC., (SMACNA).

F. AT COMPLETION OF ALL TESTING AND BALANCING, LEAVE ALL EQUIPMENT SYSTEMS, COMPONENTS, ETC., ADJUSTED WITHIN THE LIMITS OF INSTALLED EQUIPMENT AND TO MEET ALL DESIGN REQUIREMENTS. MARK ALL SETPOINTS OF ALL DAMPERS WITH DISTINGUISHING MARKS. IF REQUESTED, CONDUCT TESTS IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE.

G. WITHIN 15 DAYS AFTER COMPLETION OF TESTING BALANCING, SUBMIT TO THE OWNER'S REPRESENTATIVE FOR REVIEW SIX (6) COPIES OF THE TESTING AND BALANCING RESULTS ON APPROVED FORMS. INCLUDE A WARRANTY PERIOD OF 90 DAYS DURING WHICH TIME THE OWNER'S REPRESENTATIVE MAY REQUEST A RECHECK OR READJUSTMENT OF ANY PART OF THE JOB.

H. ALL REPORTS SHALL CLEARLY INDICATE THE FOLLOWING MINIMUM INFORMATION:

1. AIR – RATED AND ACTUAL HP, BHP, VOLTAGE, AMPERAGE, FAN RPM, SUCTION, DISCHARGE AND TOTAL STATIC PRESSURE, TOTAL SYSTEM FLOW RATE (SYSTEM TRAVERSE) AND INDIVIDUAL TERMINAL FLOW RATES. TERMINAL READINGS MUST SHOW LOCATION, MAKE, MODEL, SIZE OF GRILLE, REGISTER AND DIFFUSER. INCLUDE A STATIC PROFILE OF THE NEW ROOFTOP UNIT (RTU) COMPONENTS.

2. ATC SEQUENCE CHECK – DEVIATIONS FROM SPECIFICATION. (NOTE: SHOULD SYSTEMS BE FOUND INCOMPLETE OR NOT PERFORMING PER SPECIFICATION, THE ATC CONTRACTOR SHALL CORRECT DEFICIENCIES AND THE TESTING AND BALANCING AGENCY SHALL RECHECK UNTIL ALL SEQUENCES HAVE BEEN VERIFIED.)

SECTION 15060 – PIPE AND PIPE FITTINGS

PART 1 – GENERAL

1.01 SCOPE

A. ALL LP GAS PIPING SHALL BE INSTALLED IN ACCORDANCE WITH GOVERNING CODES AND IN A WORKMANLIKE MANNER.

B. THE ENTIRE INSTALLATION SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AHJ AND NFPA PAMPHLET NO. 54 AND 58 (ADOPTED EDITION).

C. STARTING AT THE EXISTING GAS REGULATOR AS INDICATED ON THE DRAWINGS, PROVIDE DISTRIBUTION SYSTEM TO NEW RTU–1, INCLUDING ALL RISERS, DRIPS, SHUT–OFFS AND ALL OTHER REQUIRED PARTS.

D. PROVIDE A GAS SHUT–OFF VALVE AT INDIVIDUAL PIECES OF EQUIPMENT TO PERMIT ISOLATION FROM ADJOINING SYSTEM.

E. INSTALL DRAINS AT ALL LOW POINTS IN PIPING SYSTEM.

F. PAINT ALL EXTERIOR GAS PIPING AND EXPOSED INTERIOR PIPING WITH TWO (2) COATS OF RUST INHIBITOR ''CAUTION YELLOW'' PAINT. LABEL ALL CLEARLY PER SPECIFICATION.

1.02 SCHEDULE OF PIPE MATERIALS

SERVICE	LOCATION	SIZE	MATERIAL	TYPE	WEIGHT
LP GAS	BUILDING	ALL	STEEL	SCREWED OR WELDED	SCHED. 40

SECTION 15062 – EQUIPMENT SUPPORTS

PART 1 – GENERAL

1.01 SCOPE

A. DUCTWORK AND EQUIPMENT SHALL NOT BE HUNG FROM THE WORK OF OTHER TRADES.

B. HANG AND SUPPORT DUCTWORK IN ACCORDANCE WITH SMACNA STANDARDS AND BEST TRADE PRACTICES.

C. SUPPORT PIPING IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

PIPE MATERIAL	MAX. HORIZONTAL SPACING	MAX. VERTICAL SPACING
STEEL PIPE	12'	15'

SECTION 15064 – SLEEVES AND FLASHINGS

PART 1 – GENERAL

1.01 SCOPE

A. DUCTS PASSING THROUGH RATED WALLS SHALL BE CAULKED WITH A MINIMUM OF 1 1/4" THICKNESS OF FILL MATERIAL APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES OF WALL ASSEMBLY. AT THE POINT CONTACT LOCATION BETWEEN DUCT AND WALLBOARD, A MINIMUM 1/4" DIAMETER BEAD OF CAULK SHALL BE APPLIED AT THE WALLBOARD/DUCT INTERFACE ON BOTH SURFACES OF WALL ASSEMBLY. VOID FILL MATERIAL MUST BEAR THE UL CLASSIFICATION MARKING, EQUAL TO 3M SYSTEM NO. W–L–7013.

B. DUCTS PASSING THROUGH FIRE RATED FLOORS SHALL BE SEALED IN KEEPING WITH PARAGRAPHS A. AND C.

C. THIS CONTRACTOR SHALL SUBMIT FIRE SEALING DETAILS FOR ALL CASES OF FIRE RATED WALL, SHAFT AND FLOOR DECK PENETRATIONS APPLICABLE TO THE PROJECT. THE SHOP DRAWING SHALL BE PROVIDED BY THE FIRE SEALANT MANUFACTURER AND CLEARLY IDENTIFY ALL PRODUCTS AND THE APPLICABLE UL CLASSIFICATION OR LISTING.

SECTION 15100 – VALVES AND COCKS

1.01 MATERIALS

A. VALVES USED IN L.P. GAS LINES FOR ISOLATION SHALL BE EQUAL TO WATTS B–6000–UL–YRPV OR APOLLO 80–100–YRPV SERIES.

SECTION 15180 – THERMAL INSULATION

PART 1 – GENERAL

1.01 SCOPE

A. PROVIDE ALL INSULATING MATERIALS REQUIRED FOR SHEET METAL WORK. THE EXECUTION OF THE WORK SHALL BE BY AN EXPERIENCED INSULATION CONTRACTOR IN STRICT ACCORDANCE WITH THE BEST PRACTICE OF THE TRADE AND THE INTENT OF THE SPECIFICATIONS.

B. INSULATION THERMAL PROPERTIES AND THICKNESS SHALL COMPLY WITH THE CURRENT STATE ENERGY CODE: 2018 IECC – COMMERCIAL PROVISIONS.

C. INSULATING MATERIALS, JACKETS, ADHESIVES, ACCESSORIES AND APPLICATIONS SHALL DEVELOP A SYSTEM HAVING A UL RATING WITH A FLAME SPREAD OF NOT OVER 25, A FUEL CONTRIBUTED RATING OF NOT OVER 50 AND A SMOKE DEVELOPED RATING OF NOT OVER 50.

D. INSULATE ALL NEW AND DISTURBED EXISTING SUPPLY AIR CONDITIONING DUCTWORK WITH FOIL FACED FIBERGLASS INSULATION WITH AN R–VALUE OF 5.2 MIN.

SECTION 15840 – DUCTWORK

PART 1 – GENERAL

1.01 SCOPE

A. FURNISH AND INSTALL ALL DUCTWORK, GRILLE BOXES, PLENUM CHAMBERS, DAMPERS AND ALL AUXILIARY WORK OF ANY KIND NECESSARY TO MAKE THE VARIOUS AIR HANDLING SYSTEMS OF THE PROJECT COMPLETE AND READY FOR SATISFACTORY OPERATING. ALL DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA STANDARDS FOR APPLICABLE PRESSURE CLASSIFICATION.

B. THROUGHOUT CONSTRUCTION, ALL OPEN END SUPPLY/RETURN AIR DUCTWORK (INCLUDING GRILLES, REGISTERS AND DIFFUSERS) SHALL BE SEALED WITH PLASTIC AND TAPE UNTIL PROJECT AREA IS FREE OF DUST.

C. SEAL ALL JOINTS WITH A WATER BASED SEALANT, EQUAL TO DUCTMATE PROSEAL, APPLIED PER MANUFACTURER'S RECOMMENDATIONS. TRANSVERSE JOINTS IN LOW PRESSURE DUCTWORK SHALL BE SEALED TO MEET SMACNA SEAL CLASS C–2" W.G.

D. FLEXIBLE DUCT SHALL BE COATED, FIBERGLASS CLOTH FABRIC LINER AS MANUFACTURED BY BUCKLEY ''FLEXMASTER TYPE 4'' OR EQUAL, UNINSULATED FOR VENTILATING APPLICATIONS (EXHAUST AND RETURN) AND INSULATED FOR HEATING AND COOLING APPLICATIONS (SUPPLY).

E. LONGITUDINAL SNAP–LOCK GALVANIZED DUCTWORK (ASTM A653 AND A924) WITH G–60 GALVANIZED COATING OF SMACNA RECOMMENDED GAUGE, EQUAL TO DUCTMATE GREENSEAM PIPE, AND ASSOCIATED FITTINGS, INCLUDING ADJUSTABLE ELBOWS AND VOLUME DAMPERS, MAY BE USED FOR CONCEALED LOW PRESSURE (–1" W.G. TO 2" W.G.) APPLICATIONS. INSTALL ONE (1) MECHANICAL FASTENER (SCREW) IN LONGITUDINAL SEAM OF EACH STRAIGHT RUN.

F. FIRE DAMPERS SHALL BE INSTALLED WHERE SHOWN AND/OR REQUIRED BY ALL APPLICABLE CODES AND REGULATIONS. DAMPERS SHALL BE TYPE B, OUT–OF–AIRSTREAM TYPE AND MEET UL 555 RATING REQUIREMENTS FOR DYNAMIC SYSTEMS. ALL DYNAMIC FIRE DAMPERS INSTALLED IN LOW PRESSURE DUCTWORK SHALL BE RATED FOR 2000 FEET PER MINUTE AND 3" W.G. STATIC PRESSURE AS REQUIRED BY UL 555.

G. SQUARE AND RECTANGULAR LOW AND MEDIUM PRESSURE DUCTWORK SHALL BE MADE OF THE BEST GRADE GALVANIZED IRON, CONSTRUCTED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE ASHRAE GUIDE, AND SMACNA GUIDE, LATEST EDITION.

H. SPIRAL DUCT SHALL BE SMACNA RECOMMENDED GAUGE, MEDIUM AND LOW PRESSURE UNISEAL DUCT AND FITTINGS AS MANUFACTURED BY UNITED SHEET METAL OR APPROVED EQUAL.

I. ACCESS DOORS:

1. ACCESS DOORS SHALL BE PROVIDED NO SMALLER THAN 12"X12" (IF DUCT SIZE PERMITS) TO COMPLETELY ACCESS AND FUNCTIONALLY SERVICE EQUIPMENT CONTAINED WITHIN THE DUCTWORK.

2. ACCESS DOORS SHALL MEET ASHRAE STANDARDS CRITERIA, AND BE EQUAL TO RUSKIN MODEL ADC22 FOR RECTANGULAR DUCTWORK, OR UNITED MCGILL BOLTED ACCESS DOORS FOR SPIRAL DUCTWORK

3. ACCESS DOORS SHALL BE INSTALLED IN DUCTWORK ON UPSTREAM AND DOWNSTREAM SIDES OF ALL HEATING COILS AND AS REQUIRED TO RESET FIRE DAMPERS.

4. COORDINATE LOCATION OF ACCESS DOORS WITH ALL TRADES TO ALLOW FULL DOOR SIZE ACCESS TO INTERIOR OF DUCTWORK.

J. DIMENSIONS OF ACOUSTICALLY LINED DUCTWORK SHOWN ON PLANS ARE INSIDE OF THE DUCT AFTER THE LINING HAS BEEN INSTALLED.

STATE OF NEW HAMPSHIRE RYAN VEATON NO. 14881 LICENSED PROFESSIONAL ENGINEER

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WMCC – AIR CONDITIONING UPGRADES

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DATE: 05–03–24	DRAWN BY: BLN
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WHITE MOUNTAINS COMMUNITY COLLEGE 2020 RIVERSIDE DRIVE BERLIN, N.H. 03570	DRWG. NO. 3 of 3 M1.3

ELECTRICAL ABBREVIATIONS

ABBREVIATION	DESCRIPTION
XX"	MOUNTED XX" AFF
AFF OR A.F.F.	ABOVE FINISHED FLOOR HEIGHT NOTED
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AF/GF	ARC FAULT/GROUND FAULT CIRCUIT BREAKER
AFG	ABOVE FINISHED GRADE
AIC	AMPERES INTERRUPTING CAPACITY SYMMETRICAL
ARCH.	ARCHITECTUAL
C/B OR CB	CIRCUIT BREAKER
CLG.	CEILING
COMM.	COMMUNICATIONS
CU	COPPER
DWG. OR DWG	DRAWING
EC OR E.C.	ELECTRICAL CONTRACTOR
ECB	ENCLOSED CIRCUIT BREAKER
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELEC.	ELECTRIC, ELECTRICAL
EM, EMERG.	EMERGENCY
EXH.	EXHAUST
FWU	FURNISHED WITH UNIT
G.	EQUIPMENT GROUNDING CONDUCTOR
GEC	GROUNDING ELECTRODE CONDUCTOR
GF, G.F.C.I.	GROUND FAULT CIRCUIT INTERRUPTER
GFCI	GOVERNMENT FURNISHED, CONTRACTOR INSTALLED
GFGI	GOVERNMENT FURNISHED GOVERNMENT INSTALLED
GND.	GROUND
GF/CB	GROUND FAULT CIRCUIT BREAKER
GWB	GYPSUM WALLBOARD
HP	HORSEPOWER
HV	HIGH VOLTAGE
ID NO.	IDENTIFICATION NUMBER
IG	ISOLATED GROUND
KW	KILOWATTS
KVA	KILOVOLTS AMPERES
MAX.	MAXIMUM
MDP	MAIN DISTRIBUTION PANELBOARD
MFG	MANUFACTURER
MIN.	MINIMUM
MSB	MAIN SWITCHBOARD
NFPA	NATIONAL FIRE PREVENTION ASSOCIATION
NEC	NATIONAL ELECTRICAL CODE
NF	NON FUSED
N.I.C.	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
NL	NIGHTLIGHT
PH	PHASE
PMT	PAD MOUNTED TRANSFORMER
SAPF	SPECIAL ACCESS PROGRAM FACILITY
ST OR S.T.	SHUNT TRIP
STP	SHIELDED TWISTED PAIR
SPD	SURGE PROTECTIVE DEVICE
TEL.	TELEPHONE
UG OR U.G.	UNDERGROUND
UL	UNDERWRITERS LABORATORIES
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
V	VOLTS
VA	VOLT AMPERES
VDC	VOLTS DC
WP	WEATHERPROOF
VFD	VARIABLE FREQUENCY DRIVE

POWER AND CIRCUITRY SYMBOLS

SYMBOL	DESCRIPTION	MOUNTING	HEIGHT
CH	20A, 125V, 2 POLE, 3 WIRE GROUNDING DUPLEX RECEPTACLE, NEMA 5–20R, 'CH' DENOTES COUNTER HEIGHT	WALL	18" AFF UNO
GF	20A, 125V, 2 POLE, 3 WIRE GFCI, GROUNDING DUPLEX RECEPTACLE, NEMA 5–20R	WALL	18" AFF UNO
GF WP	20A, 125V, 2 POLE, 3 WIRE, WEATHER RESISTANT, GFCI TYPE GROUNDING DUPLEX RECEPTACLE, NEMA 5–20R WITH WEATHERPROOF WHILE–IN–USE COVER PLATE	WALL	18" AFF UNO
J J	JUNCTION BOX	VARIES	-----
$M	MOTOR RATED SWITCH WITH THERMAL MOTOR OVERLOAD PROTECTION – PROVIDE THERMAL UNIT SIZED FOR MOTOR LOAD ACTUALLY SERVED, VERIFY WITH EQUIPMENT MANUFACTURER	VARIES	-----
30/NF	NON–FUSED DISCONNECT SWITCH – SIZED TO MATCH OVER CURRENT PROTECTION DEVICE – '3R' INDICATES PROVIDE NEMA 3R DISCONNECT SWITCH	WALL	
30/30	FUSED DISCONNECT SWITCH – SUBSCRIPT INDICATES AMPS/FUSE SIZE – FUSES SHALL BE TIME DELAY TYPE – '3R' INDICATES PROVIDE NEMA 3R DISCONNECT SWITCH	WALL	
	MOTOR – SUBSCRIPT INDICATES HORSEPOWER	VARIES	-----
	120/208 VOLT PANELBOARD	WALL	
	277/480 VOLT PANELBOARD	WALL	
	EQUIPMENT CONNECTION	VARIES	
	HOMERUN TO PANELBOARD AND CIRCUIT BREAKER NUMBER(S) INDICATED ON THE DRAWINGS	-----	-----
VFD	VARIABLE SPEED DRIVE, INSTALLED BY OTHERS, WIRED BY E.C.	VARIES	
PB	PULLBOX		

SEISMIC NOTE

ALL EQUIPMENT SHALL CONFORM TO ASCE 7 FOR SEISMIC QUALIFICATION BY ANALYSIS, TESTING OR EXPERIENCE. SUBMIT COMPLIANCE WITH SUBMITTALS.

BRAND NAMES

WHERE A BRAND NAME IS USED, IT IS USED FOR INFORMATIONAL PURPOSES AND IS INTENDED TO DESCRIBE A STANDARD OF QUALITY.

ELECTRICAL SYMBOL NOTES

1. ALL SYMBOLS ARE NOT NECESSARILY USED.
2. ALL MOUNTING HEIGHTS SHOWN IN SYMBOL LEGEND SHALL BE AS PER ADA REQUIREMENTS UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. REFERENCE ARCHITECTURAL DOCUMENTS FOR DIMENSIONED LOCATION AND MOUNTING HEIGHT OF LIGHT FIXTURES AND MISCELLANEOUS ELECTRICAL DEVICES.

GENERAL ELECTRICAL NOTES

1. DO NOT SCALE THESE DRAWINGS. SEE ARCHITECTURAL DOCUMENTS FOR EXACT LOCATIONS AND MOUNTINGS FOR FIXTURES, DEVICES, ETC. EXCEPT AS SPECIFICALLY NOTED.
2. REFER TO DIVISION 23 FOR ADDITIONAL HVAC EQUIPMENT AND REQUIREMENTS.
3. PROVIDE BRANCH CIRCUITING AND FINAL CONNECTION FOR ALL FIXTURES, OUTLETS AND EQUIPMENT.
4. INSTALLATION SHALL COMPLY WITH 2020 EDITION OF NEC, INCLUDING LOCAL AMMENDMENTS.
5. CONTRACTOR SHALL VERIFY ROUGH–IN REQUIREMENTS FOR ALL MECHANICAL EQUIPMENT PRIOR TO BEGINNING ROUGH–IN.
6. THE MECHANICAL AND ELECTRICAL DRAWINGS INCLUDED IN THIS SET WERE ORIGINALLY PREPARED TO THE SCALE SHOWN ON THE TITLE BLOCK OF EACH SPECIFIC DRAWING. HOWEVER, BECAUSE OF THE INACCURACIES INHERENT TO THE ELECTRONIC PLOTTING AND/OR REPROGRAPHIC PROCESSES USED TO OBTAIN FINAL PRINTS, SPECIFIC DIMENSIONS SHOULD NOT BE OBTAINED BY SCALING OF THESE DRAWINGS.
7. ANY PENETRATIONS THROUGH PANS, WEBS, OR OTHER STRUCTURAL COMPONENTS SHALL NOT BE MADE.
8. PROVIDE ENGRAVED NAMEPLATES FOR ALL EQUIPMENT. ADHESIVE TYPES WILL NOT BE ACCEPTABLE. NAMEPLATES SHALL BE LAMINATED BLACK WITH WHITE ENGRAVED TEXT. TEXT HEIGHT SHALL BE 1/4".
9. PERMANENT TYPE MARKING PENS SHALL BE USED TO NEATLY LABEL ALL JUNCTION BOX AND PULL BOX COVERS. WHERE BOXES ARE INSTALLED FOR THE INSTALLATION OF POWER WIRING, THE COVER SHALL INDICATE THE PANEL DESIGNATION AND CIRCUIT BREAKER NUMBER(S) ASSOCIATED WITH EACH BOX.
10. THE CIRCUIT DIRECTORIES IN EXISTING PANELBOARDS SHALL BE REPLACED WITH NEW TYPEWRITTEN CIRCUIT DIRECTORIES THAT REFLECT THE NEW AND EXISTING CIRCUITS CONNECTED TO THESE PANELBOARDS. ALL SPARE CIRCUIT BREAKERS SHALL BE IDENTIFIED ON THE CIRCUIT DIRECTORIES AS "SPARES" AND SHALL BE LEFT IN THE OFF POSITION.
11. COORDINATE WITH ALL OTHER CONTRACTORS IN ORDER TO DETERMINE THE OVERALL PROJECT PHASING AND DEMOLITION WORK SEQUENCING. COORDINATE REQUIRED DEMOLITION BY OTHER TRADES RESULTING FROM ELECTRICAL SYSTEMS DEMOLITION.
12. NO EXISTING ELECTRICAL EQUIPMENT, SYSTEMS, OR APPURTENANCES SHALL BE ABANDONED IN PLACE. (CONDUIT LOCATED IN EXISTING REMAINING WALLS AND FLOOR SLABS MAY BE ABANDONED IN PLACE.)
13. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO BID. NO ALLOWANCE WILL BE MADE FOR ADDITIONAL COSTS DUE TO THE CONTRACTOR'S FAILURE TO FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS.

DIVISION 260000 – ELECTRICAL SPECIFICATIONS

SECTION 26 00 20 – DEMOLITION AND RENOVATION

A. THIS CONTRACTOR SHALL REMOVE ALL EXISTING DEVICES, DISCONNECTS, SPECIALTIES AND INCIDENTALS AS REQUIRED TO ACHIEVE THE INTENT OF THIS CONTRACT. ALL REMOVED EQUIPMENT SHALL BECOME THE PROPERTY OF THIS CONTRACTOR, UNLESS DIRECTED OTHERWISE BY THE OWNER, AND SHALL BE HAULED AWAY FROM THE SITE AND DISPOSED OF PROPERLY. THE OWNER RESERVES THE RIGHT OF FIRST REFUSAL.

B. PROVIDE OWNER WITH THE OPTION OF RETAINING ANY ITEM OF MATERIAL REMOVED UNDER THIS CONTRACT, REMOVE AND LEGALLY DISPOSE OF ITEMS OR MATERIALS NOT RETAINED BY OWNER.

C. EXISTING WIRING, DEVICES AND EQUIPMENT SHALL REMAIN AS INSTALLED EXCEPT WHERE REMOVAL IS CALLED FOR IN DRAWINGS AND SPECIFICATIONS.

SECTION 26 01 00 – ELECTRICAL GENERAL PROVISIONS

PART 1 – GENERAL

1.01 SCOPE

A. THIS SECTION INCLUDES ALL LABOR, MATERIAL, EQUIPMENT AND SERVICES NECESSARY AND INCIDENTAL AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY NATIONAL ELECTRICAL CODE (NEC) AND ALL APPLICABLE STATE AND LOCAL CODES AS FOLLOWS.

1. COMPLETE THE DEMOLITION AND REMOVAL OF ELECTRICAL WORK. NO PORTION OF ELECTRICAL SYSTEMS SHOWN FOR DEMOLITION MAY BE ABANDONED IN PLACE.
2. FURNISH AND INSTALL NEW ELECTRICAL EQUIPMENT.

B. EXAMINE THE BUILDING TO DETERMINE THE ACTUAL CONDITIONS AND EXTENT OF THE WORK. REFER ANY DETAILS NOT CLEAR TO THE ENGINEER FOR CLARIFICATION PRIOR TO BIDDING.

SECTION 26010 – ELECTRICAL GENERAL PROVISIONS

PART 1 – GENERAL

1.01 SCOPE

A. THIS SECTION INCLUDES ALL LABOR, MATERIAL, EQUIPMENT AND SERVICES NECESSARY AND INCIDENTAL AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY NATIONAL ELECTRICAL CODE (NEC) AND ALL APPLICABLE STATE AND LOCAL CODES AS FOLLOWS.

1. FURNISH AND INSTALL NEW ELECTRICAL EQUIPMENT.

B. EXAMINE THE BUILDING TO DETERMINE THE ACTUAL CONDITIONS AND EXTENT OF THE WORK. REFER ANY DETAILS NOT CLEAR TO THE ENGINEER FOR CLARIFICATION PRIOR TO BIDDING.

1.02 SUBMITTALS

A. SUBMIT PRODUCT DATA FOR THE FOLLOWING ELECTRICAL EQUIPMENT:

1. CIRCUIT BREAKERS

1.03 QUALITY ASSURANCE

A. SUBMIT A CONSTRUCTION SEQUENCE SCHEDULE OF WORK PRIOR TO THE START OF WORK. DO NOT PROCEED UNTIL RECEIVING WRITTEN APPROVAL.

B. THIS CONTRACTOR SHALL KEEP AS–BUILT DRAWINGS ON SITE AND TO MAKE MODIFICATIONS TO THE THESE DRAWINGS AS NECESSARY TO DOCUMENT THE ACTUAL INSTALLATION OF THE ELECTRICAL EQUIPMENT AND SYSTEM.

1.04 COORDINATION

A. PREVENT DISRUPTION TO THE OWNER AND MINIMIZE THE DOWNTIME BY COORDINATING SCOPE OF WORK AMONG ALL AFFECTED ELECTRICAL SYSTEMS AND WITH OTHER DIVISIONS.

SECTION 26050 – BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. RACEWAYS
2. BOXES
3. CONDUCTORS
4. CONVENIENCE OUTLETS
5. LABELS
6. ELECTRICAL PANELBOARDS (EXISTING)

PART 2 – PRODUCTS

2.01 RACEWAYS

A. RIGID STEEL CONDUIT: WITH COMPARABLE FITTINGS. MEETS UL 6, UL CARD #DYIX AND ANSI C80.1.

B. INTERMEDIATE METALLIC CONDUIT (IMC): MEETS UL 1242, UL CARD #DYIX AND ANSI C80.6.

C. ELECTRICAL METALLIC TUBING (EMT): STEEL WITH STEEL COMPRESSED FITTINGS. DOUBLE SET SCREW TYPE FITTINGS FOR EMT NOT LESS THAN 2 INCHES DIA. MEETS UL 797 AND ANSI C80.3.

D. FLEXIBLE CONDUIT: LIQUID–TIGHT CONDUIT WITH WATERTIGHT CONNECTORS WHERE NOTED ON PLANS. CONTINUOUS LENGTH, NO COUPLINGS. 1/2" MINIMUM EXCEPT 3/8" CONNECTIONS PERMITTED IN LENGTHS OF 6 FEET OR LESS AS PART OF A LISTED ASSEMBLY OR FOR TAP CONNECTIONS TO LIGHTING FIXTURES AS REQUIRED IN NEC SECTION 410–67(C).

B. RACEWAY FITTINGS:

1. ALL BOX CONNECTORS TO BE INSULATED THROAT TYPE.
2. CONDUIT STRAPS: GALVANIZED STEEL, 2–HOLE STRAPS, 1–HOLE STRAPS MAY BE USED FOR CONDUIT SIZES 1" AND SMALLER CONCEALED IN WALL OR ABOVE CEILING.
3. METALLIC CONDUITS RACEWAYS AND FITTINGS SHALL BE LISTED AND APPROVED AS A GROUNDING MEANS.

2.02 BOXES

A. GALVANIZED ONE–PIECE OR WELDED PRESSED STEEL TYPE. PROVIDE BLANK COVER FOR ALL BOXES WITHOUT FIXTURE OR DEVICE.

2.03 CONDUCTORS

A. WIRE SHALL BE COPPER ONLY, TYPES THHN/THWN.

B. WIRE SHALL BE CODE TYPE COPPER WIRE. WIRES #8 GAUGE AND LARGER SHALL BE STRANDED. WIRES SHALL BEAR THE UNDERWRITERS' LABEL, BE COLOR CODED AND BE MARKED WITH GAUGE, TYPE AND MANUFACTURER'S NAME ON 24" CENTERS. WIRES SMALLER THAN #8 MAY BE SOLID OR STRANDED.

C. COLOR CODING:

	120/208–VOLT	277/480–VOLT
PHASE A	BLACK	BROWN
PHASE B	RED	ORANGE
PHASE C	BLUE	YELLOW
NEUTRAL	WHITE	NATURAL/GRAY
GROUND	GREEN	GREEN

SWITCH LEGS SHALL USE THE SAME BRANCH CIRCUIT PHASE COLOR CODING WHICH THEY ARE CONNECTED TO.

2.04 CONVENIENCE OUTLETS

A. SHALL BE "COMMERCIAL SPECIFICATION GRADE" RATED 20 AMPERES AT 125 VOLTS, COMPOSITION BASE WITH SLOTS TO ACCOMMODATE PARALLEL PLUG CAPS WITH GROUNDING PEG. OUTLET SHALL BE UL LISTED. PLATES SHALL BE SMOOTH NYLON TYPE. GROUND FAULT CIRCUIT INTERRUPTER, TYPE, ETC.

B. GFIC DUPLEX RECEPTACLE SHALL BE OF THE 5mA TYPE AND PROVIDED WITH A LED INDICATOR LIGHT.

2.05 LABELS

A. LABEL SHALL BE ENGRAVED PLASTIC WITH BLACK LETTERING AND WHITE BACKGROUND. 1/2" LETTERS ON 3/4" LABEL FOR EQUIPMENT IDENTIFICATION ON DISCONNECT SWITCHES.

B. TAPE LABEL WITH TYPED BLACK LETTERING ON WHITE BACKGROUND. LABEL SHALL BE PRINTED LABELS INDICATING PANEL AND CIRCUIT NUMBERS FOR WIRING DEVICES AND LIGHTING.

2.06 PANELBOARDS – (EXISTING)

A. CIRCUIT BREAKERS PROVIDED SHALL BE COMPATIBLE WITH MANUFACTURER PANEL STYLE AND AIC RATING.

PART 3 – EXECUTION

3.01 CONDUITS

A. UNLESS NOTED OTHERWISE, ALL CONDUITS SHALL BE RIGID STEEL OR IMC EXCEPT EMT MAY BE USED IN FOLLOWING LOCATIONS:

1. IN DRY LOCATIONS IN FURRED SPACES.
2. IN PARTITIONS OTHER THAN CONCRETE, CONCRETE BLOCK, OR SOLID MASONRY.
3. FOR EXPOSED WORK INDOORS AND OUTDOORS ABOVE 8 FT, EXCEPT IN SPECIAL LOCATIONS PROHIBITED BY CODE.
4. CONCEALED ABOVE SUSPENDED CEILINGS.
5. CONDUITS EXPOSED ON/ABOVE THE ROOF SHALL BE RIGID STEEL.

B. PROVIDE FLEXIBLE CONNECTIONS OF SHORT LENGTH TO EQUIPMENT SUBJECT TO VIBRATION OR MOVEMENT AND TO ALL MOTORS. PROVIDE A SEPARATE BONDING CONDUCTOR IN ALL FLEXIBLE CONNECTIONS. FLEXIBLE CONDUIT SHALL BE ONE CONTINUOUS LENGTH WITHOUT COUPLINGS.

C. SUPPORT CONDUIT WITH STRAPS AND SECURE TO WOOD STRUCTURE BY MEANS OF BOLTS OR LAG SCREWS, TO CONCRETE BY MEANS OF INSERT OR EXPANSION BOLTS, TO BRICKWORK BY MEANS OF EXPANSION BOLTS, AND TO HOLLOW MASONRY BY MEANS OF TOGGLE BOLTS. EXPANDERS AND SHIELDS SHALL BE STEEL OR MALLEABLE IRON.

D. ALL PENETRATIONS THROUGH WALLS AND CEILING STRUCTURES SHALL BE SEALED AROUND THE CONDUIT OPENING.

3.03 BOXES

A. BOXES MUST BE ACCURATELY PLACED FOR FINISH, INDEPENDENTLY AND SECURELY SUPPORTED BY ADEQUATE WOOD BACKING OR BY MANUFACTURED ADJUSTABLE CHANNEL TYPE HEAVY–DUTY BOX HANGERS. BOXES WITH METAL BOX HANGERS SHALL BE ATTACHED TO METAL STUDS. BOXES INSTALLED IN MASONRY TILE OR CONCRETE BLOCK CONSTRUCTION SHALL BE SECURED WITH AUXILIARY PLATES, BARS OR CLIPS AND BE GROUTED IN PLACE.

B. INSTALL PULL BOXES OR JUNCTION BOXES AS REQUIRED IN ACCESSIBLE SPACES BUT DO NOT INSTALL IN FINISHED AREAS UNLESS APPROVED BY ARCHITECT.

C. WHERE FIRE RATED CONSTRUCTION IS REQUIRED (REFER TO ARCHITECTURAL DRAWINGS), DO NOT LOCATE ELECTRICAL OUTLET BOXES BACK–TO–BACK. PROVIDE A MINIMUM OF 24" HORIZONTAL SEPARATION BETWEEN OUTLET BOXES ON OPPOSITE SIDE OF THE SAME WALL.

3.04 CONDUCTORS

A. #12 AWG WIRE SHALL BE MINIMUM SIZE WIRE USED FOR LIGHTING AND POWER CIRCUITS. LOW VOLTAGE CONTROL CIRCUITS MAY BE #14 EXCEPT AS MARKED ON DRAWINGS, UNLESS SHOWN.

B. 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET SHALL BE INCREASED TO #10. 277 VOLT BRANCH CIRCUITS LONGER THAN 150 FEET SHALL BE INCREASED TO #10.

C. ALL CONDUCTORS SHALL BE IN CONDUIT UNLESS OTHERWISE INDICATED.

3.05 COVER PLATES

A. SWITCH, RECEPTACLE, AND DEVICE COVER PLATES SHALL BE SMOOTH NYLON PLASTIC TYPE, COLOR TO MATCH EXISTING.

3.06 GROUNDING AND BONDING

A. EQUIPMENT GROUNDING CONDUCTOR SHALL BE COPPER HAVING A CURRENT CAPACITY SIZED IN ACCORDANCE WITH NEC.

B. COMPLETELY GROUND ALL EQUIPMENT CASES, MOTOR FRAMES, ETC., TO SATISFY REQUIREMENTS OF NEC. INSTALL BOND WIRE IN FLEXIBLE CONDUIT. INSTALL COPPER BOND WIRE, SIZED IN ACCORDANCE WITH NEC, IN ALL RACEWAYS AND BOND TO ALL METALLIC PARTS USING APPROVED FITTINGS.

C. TOTAL GROUND RESISTANCE SHALL NOT EXCEED 25 OHMS.

D. ALL CONNECTIONS SHALL BE MADE WITH SOLDERLESS CONNECTORS OR MOLDED FUSION–WELDING PROCESS.

E. HCF–MC CABLE SHALL BE EQUIPPED WITH FULL SIZE, GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR AND A #10 SOLID ALUMINUM BOND CONDUCTOR, IN CONTACT WITH ALUMINUM ARMOR JACKET.

3.07 PANELBOARDS – EXISTING

A. EXISTING PANELBOARDS AS NOTED. PROVIDE UPDATED TYPEWRITTEN CIRCUIT DIRECTORIES FOR ADDED AND REMOVED EQUIPMENT AND PLUG LOAD BRANCH CIRCUITS.

B. PROVIDE CIRCUIT BREAKERS AS REQUIRED FOR THE PROJECT AND PROVIDE COMPATIBLE PRODUCT TO MATCH MANUFACTURER PANEL STYLE AND AIC RATING.

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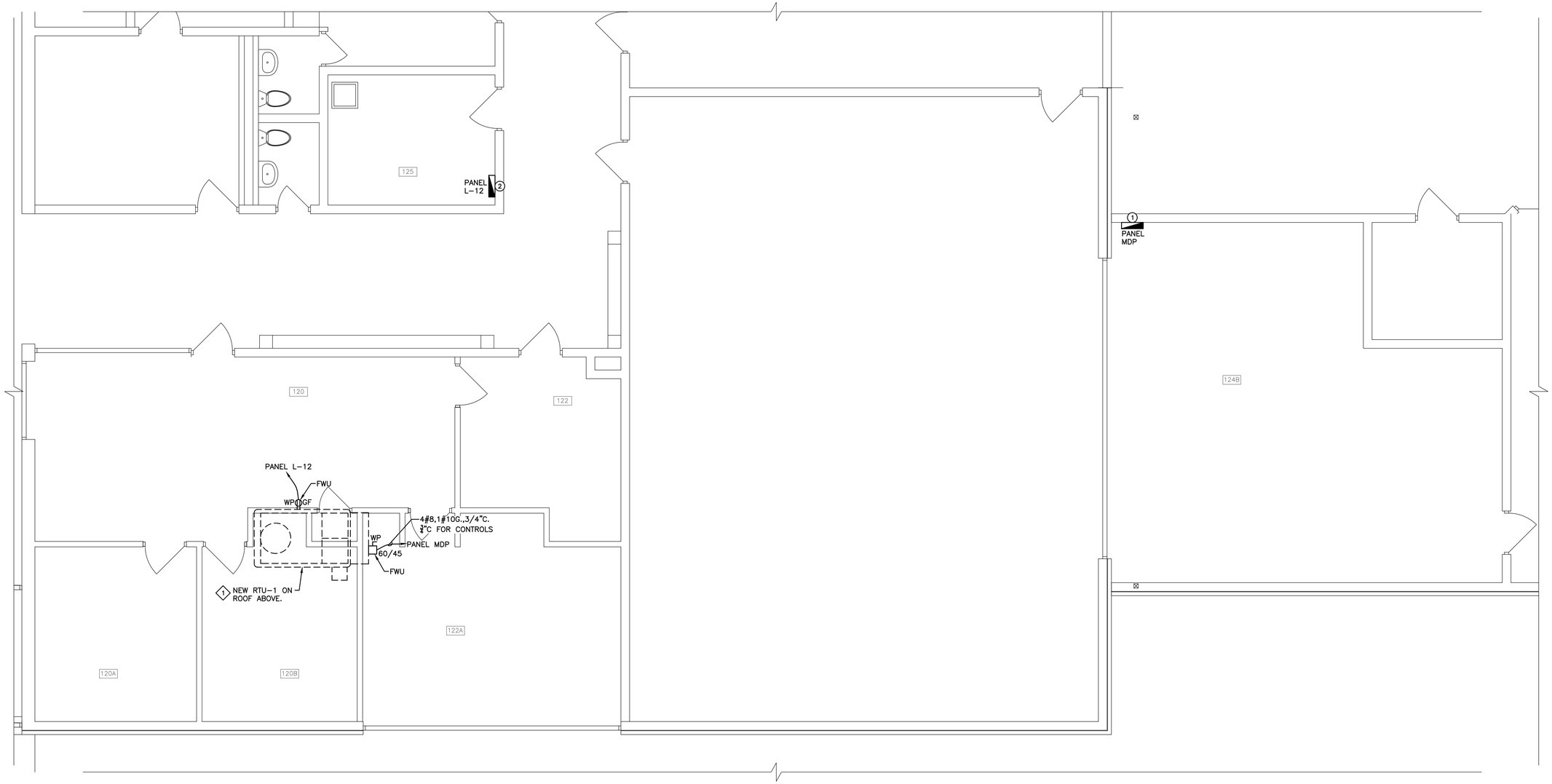


POWER GENERAL NOTES

1. MC TYPE CONDUCTOR WITH INTEGRAL GROUND WIRE MAY BE UTILIZED FOR POWER CIRCUITS. MC CABLE SHALL BE UTILIZED ONLY WHERE COMPLETELY CONCEALED.
2. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUITING AND SWITCHING SHOWN.
3. USE #10 AWG CONDUCTORS FOR 20 AMPERE, 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET, UNLESS SPECIFICALLY INDICATED OTHERWISE. THIS SHALL BE REQUIRED FOR THE ENTIRE LENGTH OF THE CIRCUIT.
4. CROSS REFERENCE AND CONFIRM ALL DEVICE LOCATIONS/ORIENTATIONS, AND MOUNTING HEIGHTS WITH OWNER PRIOR TO ROUGH-IN.
5. ALL PANELBOARDS, DISCONNECTS AND DEVICES SHALL BE PROPERLY LABELED. EXACT NAMING SHALL BE COORDINATED WITH OWNER.
6. BRANCH CIRCUITS SHALL BE SIZED ACCORDING TO THE CIRCUIT BREAKER RATING, UNLESS INDICATED OTHERWISE.
10. ALL CONDUIT ON ROOF SHALL BE GALVANIZED RIGID STEEL. THE LAST 18"-30" OF THE CONDUIT RUN TO EACH MOTOR SHALL BE LIQUID TIGHT FLEXIBLE METALLIC CONDUIT.
11. ALL SUPPORTS FOR EQUIPMENT (ELECTRICAL) AND RECEPTACLES SHALL BE BY E.C. UNISTRUT SHALL BE FIBERGLASS OR GALVANIZED RIGID STEEL. ALL HARDWARE SHALL BE STAINLESS STEEL.
12. E.C. SHALL UTILIZE ROOF CURBS FOR ALL ROOF PENETRATIONS.
13. ACTUAL POWER REQUIREMENTS AND LOCATIONS OF MECHANICAL EQUIPMENT CONNECTIONS SHALL BE COORDINATED WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGHING IN. EQUIPMENT LOCATIONS SHOWN ARE APPROXIMATE.

POWER KEYNOTES '○'

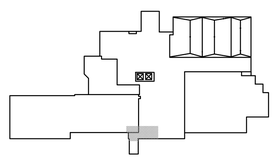
1. PROVIDE NEW CIRCUIT BREAKER (45A/3P) IN AVAILABLE EMPTY SPACE. NEW CIRCUIT BREAKER SHALL BE U.L. LISTED COMPATIBLE WITH EXISTING PANEL AND A.I.C RATING SHALL MATCH EXISTING. EXISTING PANEL IS 400A, 120/208V, 3PH, 4W SQUARE D I-LINE HCM.
2. REPLACE EXISTING 30A/2P DRYER CIRCUIT BREAKER IN 'OFF' POSITION WITH NEW CIRCUIT BREAKER. VERIFY WITH OWNER THAT DRYER CIRCUIT IS NO LONGER BEING USED AND CAN BE DISCONNECTED. NEW CIRCUIT BREAKER (20A/1P) SHALL BE U.L. LISTED COMPATIBLE WITH EXISTING PANEL AND A.I.C RATING SHALL MATCH EXISTING. EXISTING PANEL IS 225A, 120/208V, 3PH, 4W ITE NLA.

DEMOLITION KEYNOTES '◇'

1. DISCONNECT, REMOVE AND MAKE-SAFE ALL ELECTRICAL CONNECTIONS (INCLUDING BUT NOT LIMITED TO DISCONNECT, JUNCTION BOXES, WIREWAYS, WIRING AND APPURTENANCES) FOR EXISTING 'RTU' TO BE REMOVED AND REPLACED BY OTHERS.

FIRST FLOOR PART PLAN - ELECTRICAL

SCALE: 1/4" = 1'-0"



KEY PLAN

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YA Project # 20038ME

STATE OF NEW HAMPSHIRE - SHAWN PROULX No.16430 - LICENSED PROFESSIONAL ENGINEER

WMCC - AIR CONDITIONING UPGRADES

BERLIN NH

DATE:	05-03-24	DRAWN BY:	SMP
SCALE:	AS NOTED	CHECKED BY:	JDV

WHITE MOUNTAINS COMMUNITY COLLEGE
2020 RIVERSIDE DRIVE
BERLIN, N.H. 03570

DRWG. NO. 2 of 2 E1.2

EXISTING DUST COLLECTOR AIR COMPRESSOR TO REMAIN.

XDC-2

MAINTENANCE SHOP

CONNECT NEW 3/4" TO EXISTING 3/4" BELOW CEILING PENETRATION. CAP EXISTING PIPING AT CEILING PENETRATION AND ABANDON IN PLACE.

ALL COMPRESSED AIR PIPING SHOWN IS RUN BELOW THE EXISTING CEILING. INSTALL AS TIGHT TO CEILING AS POSSIBLE.

WELDING LAB

XTM SYNTH MIG (7, 8, 9, 10, 11, 12)

C300 350 MIG (1, 2, 3, 4, 5, 6)

SUB ARC

DEMO

MILL

LATHE

GRINDER

BACK DRAFT

CNC

CONNECT NEW 3/4" TO EXISTING 3/4" BELOW CEILING PENETRATION. CAP EXISTING PIPING AT CEILING PENETRATION AND ABANDON IN PLACE.

16"X16" R — 16"X16" R

16"X16" TRANSFER ASSEMBLY. MOUNT GRILLES AT 12" AFF.

16"X16" E

NEW WALL MOUNTED REFRIGERATED DRYER

IN-LINE FILTER (TYP.)

REFER TO "AIR COMPRESSOR PIPING DETAIL" ON DRAWING M1.3.

NEW VERTICAL AIR COMPRESSOR

EXISTING 1 1/2" COMPRESSED AIR UP TO ABOVE CEILING.

EXISTING INGERSOLL RAND AIR COMPRESSOR TO REMAIN.

TOOL ROOM

M1.1 M1.2

LEGEND

AFF	ABOVE FINISHED FLOOR		PIPE RISE
CFM	CUBIC FEET PER MINUTE		PIPE DROP
E.C.	ELECTRICAL CONTRACTOR		DIRECTION OF FLOW (WATER)
HP	HORSEPOWER		BALL VALVE
M.C.	MECHANICAL CONTRACTOR	XA	EXISTING COMPRESSED AIR PIPING
NTS	NOT TO SCALE	A	NEW COMPRESSED AIR PIPING
P.C.	PLUMBING CONTRACTOR		
TYP.	TYPICAL		
	CONN. POINT OF NEW WORK TO EXISTING		

GENERAL NOTES

1. ALL EQUIPMENT AND PIPING SHOWN DIAGRAMMATICALLY ONLY. EXACT LOCATION TO BE DETERMINED AND COORDINATED IN THE FIELD WITH EXISTING CONDITIONS AND BY ALL TRADES INVOLVED.
2. MOUNTING HEIGHTS FOR EQUIPMENT ON/OFF SWITCHES, ETC., LOCATED IN HANDICAP ACCESSIBLE SPACES SHALL BE 48" TO TOP OF CONTROL UNLESS NOTED OTHERWISE.
3. SEAL ALL PIPE PENETRATIONS THRU RATED PARTITIONS, WALLS AND FLOORS WITH NELSON CLK FIRESTOP, HILTI OR 3M SILICONE BASE ELASTOMERIC UL 1479 SEALANT.

PROJECT SCOPE

THE INTENT OF THE PROJECT IS TO INSTALL A NEW AIR COMPRESSOR AS DESCRIBED ON THESE DRAWINGS TO SERVE THE WELDING LAB. THE EXISTING INGERSOLL RAND AIR COMPRESSOR SHALL REMAIN IN PLACE TO SERVE THE AUTOMOTIVE LAB. INSTALL NEW COMPRESSED AIR PIPING AS INDICATED WITHIN THE AUTOMOTIVE LAB. THE EXISTING AIR COMPRESSOR IN THE MAINTENANCE SHOP SHALL REMAIN AS IS. REMOVE ALL COMPRESSED AIR PIPING NECESSARY TO CONNECT NEW AIR COMPRESSOR TO EXISTING WELDING LAB COMPRESSED AIR SYSTEM AND CAP. EXISTING COMPRESSED AIR PIPING THAT IS NO LONGER NECESSARY TO SERVE THE WELDING LAB MAY BE ABANDONED ABOVE THE EXISTING CEILING AND CAPPED AT CEILING PENETRATION.

GRILLE SCHEDULE

SYMBOL	MANUFACTURER	TYPE & MODEL	REMARKS (SIZE AND CFM AS SHOWN ON PLANS)
E	METAL AIRE	TRANSFER GRILLE (SURFACE MOUNT) MODEL CC15-1	ALUMINUM CONSTRUCTION, WHITE FINISH
R	METAL AIRE	TRANSFER GRILLE (WALL MOUNT) MODEL 4500	ALUMINUM CONSTRUCTION, WHITE FINISH

KEY PLAN
NTS

FIRST FLOOR PART PLAN - MECHANICAL

SCALE: 1/4" = 1'-0"

STATE OF NEW HAMPSHIRE — RYAN — NO. 14881 — LICENSED PROFESSIONAL ENGINEER

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WMCC - AUTO & WELDING LABS AIR

BERLIN NH

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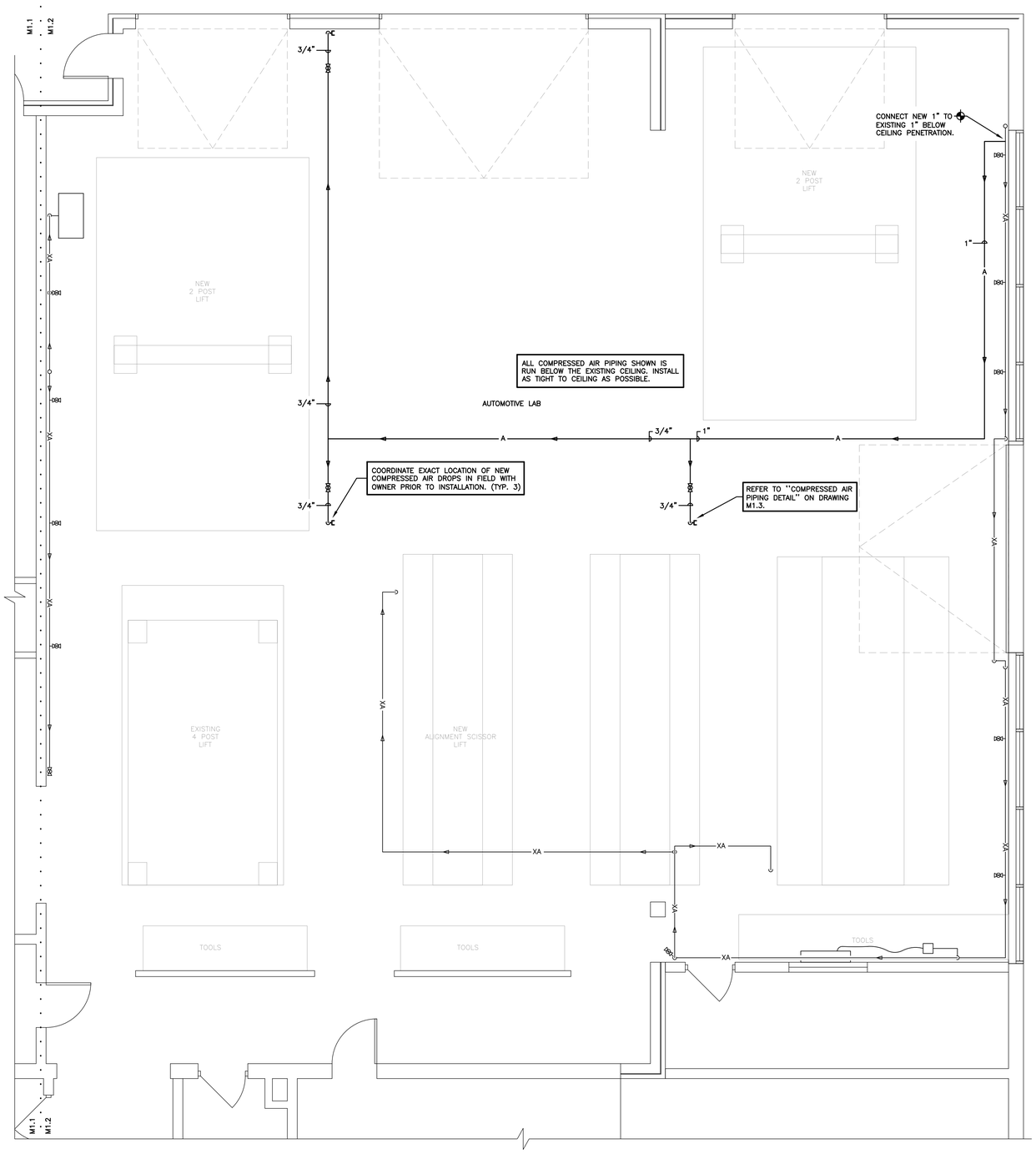
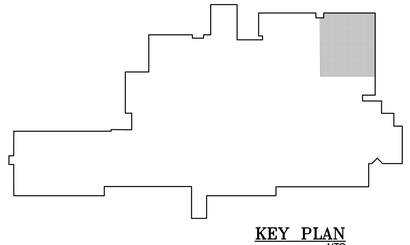
WHITE MOUNTAINS COMMUNITY COLLEGE 2020 RIVERSIDE DRIVE BERLIN, N.H. 03570		DRWG. NO. 1 of 3	M1.1



FIRST FLOOR PART PLAN – MECHANICAL

SCALE: 1/4" = 1'-0"



KEY PLAN
NTS

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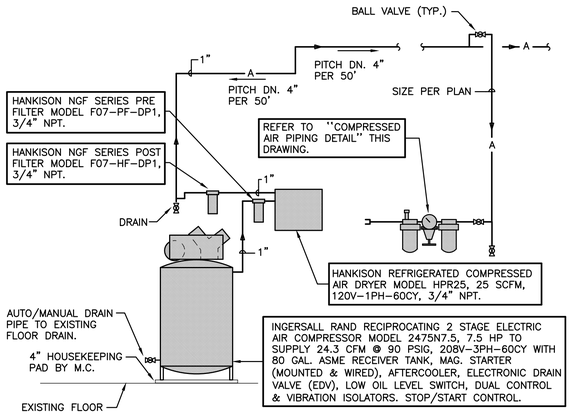
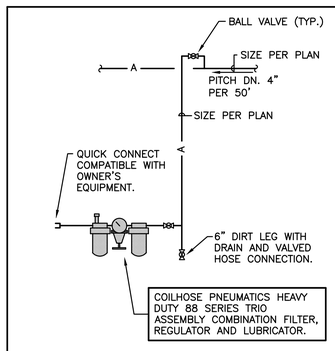
DRWG. NO. 2 of 3 M1.2



AIR COMPRESSOR PIPING DETAIL

N.T.S.



COMPRESSED AIR PIPING DETAIL

(TYP. AT ALL NEW TERMINALS) N.T.S.

DIVISION 15000 – MECHANICAL SPECIFICATIONS

15002 – DEMOLITION

A. THIS CONTRACTOR SHALL REMOVE ALL EXISTING PIPING, SPECIALTIES AND INCIDENTALS AS REQUIRED TO ACHIEVE THE INTENT OF THIS CONTRACT. ALL REMOVED EQUIPMENT SHALL BECOME THE PROPERTY OF THIS CONTRACTOR, UNLESS DIRECTED OTHERWISE BY THE OWNER, AND SHALL BE HAULED AWAY FROM THE SITE AND DISPOSED OF PROPERLY. THE OWNER RESERVES THE RIGHT OF FIRST REFUSAL. COORDINATE EXACT MECHANICAL DEMOLITION RESPONSIBILITIES WITH THE COMMUNITY COLLEGE SYSTEM OF NEW HAMPSHIRE (CCSNH) CONSTRUCTION MANAGER PRIOR TO BID.

15003 – SITE VISIT

A. THE MECHANICAL CONTRACTOR INVITED TO SUBMIT A PRICE FOR PERFORMING THE WORK SHOWN ON DRAWINGS AND SPECIFIED HEREIN SHALL VISIT THE SITE TO MAKE THEMSELVES FULLY AWARE OF THE EXISTING CONDITIONS, PRIOR TO SUBMITTING A BID.

SECTION 15010 – GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE

A. PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS OR METHODS LISTED, MENTIONED, SCHEDULED ON THE DRAWINGS AND/OR SPECIFIED HEREIN INCLUDING ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS NECESSARY AND REQUIRED FOR PROJECT COMPLETION.
B. THE INTENT OF THE SPECIFICATIONS AND DRAWINGS IS TO CALL FOR FINISH WORK, TESTED AND READY FOR OPERATION.
C. ALL WORK SHALL COMPLY WITH APPLICABLE PORTIONS OF ALL STATE OR LOCAL LAWS AND ORDINANCES, AS WELL AS CCSNH STANDARDS, ALL RULES AND REGULATIONS OF LOCAL UTILITY COMPANIES AND THE BERLIN FIRE DEPARTMENT, INCLUDING NFPA, THE INTERNATIONAL BUILDING CODES WITH NH AMENDMENTS (AS ADOPTED BY THE AUTHORITIES HAVING JURISDICTION [AHJ]), NATIONAL ELECTRIC CODE (N.E.C.), ADA WITH NH AMENDMENTS AND ALL OTHER STANDARDS SET FORTH BY THE AUTHORITIES HAVING JURISDICTION (AHJ).
D. ALL REQUIRED PERMITS AND FEES RELATIVE TO THIS DIVISION SHALL BE OBTAINED AND PAID FOR BY THE CCSNH.
E. GUARANTEE/WARRANTY ALL MECHANICAL EQUIPMENT AND WORKMANSHIP FOR ONE (1) YEAR FROM THE DATE OF PROJECT FINAL ACCEPTANCE BY THE OWNER.
F. ELECTRONICALLY SUBMIT COPIES OF SHOP DRAWINGS OF EQUIPMENT PROPOSED FOR INSTALLATION UNDER THIS CONTRACT FOR REVIEW AND APPROVAL BY OWNER REPRESENTATIVES.
G. ALL REQUIRED GENERAL CONSTRUCTION CUTTING, PATCHING, PAINTING AND SEALING SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR. REVIEW RESPONSIBILITY FOR SAME PRIOR TO BID AND PRICE ACCORDINGLY.
H. PROVIDE AN OPERATING AND MAINTENANCE MANUAL FOR THE OWNER'S USE AT CONCLUSION OF THE CONTRACT THAT ADDRESSES ALL INSTALLED EQUIPMENT AND SPECIALTIES.
I. ALL POWER WIRING TO THE MOTOR STARTERS, OR TO THE TERMINAL BLOCKS OF PREWIRED MOTOR CONTROL CABINETS, AND BETWEEN THE MOTOR STARTER AND ELECTRIC MOTOR SHALL BE COORDINATED/PROVIDED AS PART OF THIS CONTRACT. REVIEW RESPONSIBILITY FOR SAME PRIOR TO BID AND PRICE ACCORDINGLY.
J. THIS CONTRACTOR SHALL THOROUGHLY INSTRUCT THE OWNER'S MAINTENANCE PERSONNEL IN THE PROPER PROCEDURES FOR MAINTENANCE AND OPERATION OF MECHANICAL SYSTEMS INSTALLED UNDER THIS CONTRACT.

SECTION 15060 – PIPE AND PIPE FITTINGS

PART 1 – GENERAL

1.01 SCOPE

A. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH GOVERNING CODES AND IN A WORKMANLIKE MANNER.

1.02 SCHEDULE OF PIPE MATERIALS

SERVICE	LOCATION	SIZE	MATERIAL	TYPE	WEIGHT
COMPRESSED AIR	BUILDING	ALL	GALVANIZED STEEL OR COPPER	SCREWED OR HARD	SCH. 40 TYPE L

1.03 SCHEDULE OF PIPE FITTINGS

SERVICE	LOCATION	SIZE	MATERIAL	TYPE	WEIGHT
COMPRESSED AIR	BUILDING	ALL	GALVANIZED STEEL OR COPPER	SCREWED OR SOLDERED	SCH. 40 LEAD–FREE

ALL PIPING SHALL BE ASSEMBLED, SUPPORTED AND INSTALLED IN KEEPING WITH BEST TRADE PRACTICES.

PROVIDE AND INSTALL IDENTIFICATION LABELS FOR PIPING SERVICES AS WELL AS FLOW ARROWS ON ALL EXPOSED PIPING SERVICES.

SECTION 15062 – EQUIPMENT SUPPORTS

PART 1 – GENERAL

1.01 SCOPE

A. PROVIDE SUITABLE AND SUBSTANTIAL HANGERS AND SUPPORTS FOR ALL HORIZONTAL AND VERTICAL LINES AS MANUFACTURED BY B–LINE, ALLEGHENY INDUSTRIAL, TOLCO OR ITT GRINNELL.
B. SUPPORT PIPING IN ACCORDANCE WITH THE PIPE MANUFACTURER'S PUBLISHED INSTRUCTIONS, OR THE SCHEDULE BELOW, WHICHEVER IS MORE STRINGENT.
C. SUPPORT PIPING IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

PIPE MATERIAL	MAX. HORIZONTAL SPACING	MAX. VERTICAL SPACING
GALVANIZED STEEL PIPE	12'	15'
COPPER TUBING 1 1/2" AND SMALLER	6'	10'
COPPER TUBING 2" AND LARGER	12'	10'

D. PIPING AND EQUIPMENT SHALL NOT BE HUNG FROM THE WORK OF OTHER TRADES.
E. HANGERS SHALL BE OF HEAVY CONSTRUCTION SUITABLE FOR THE SIZE OF PIPE TO BE SUPPORTED. ALL MATERIALS SHALL BE WROUGHT OR MALLEABLE IRON OR STEEL. HANGERS SHALL BE ADJUSTABLE TYPE.
F. HANGERS AND PIPE CLAMPS USED ON COPPER TUBING SHALL BE SOLID COPPER OR COPPER PLATED WHERE TUBE IS IN CONTACT WITH DISSIMILAR METAL. PROTECT WITH SHIELD OR PLASTIC COVER.
G. HANGERS FOR PIPES SHALL BE SWIVEL RING, SPLIT RING, WROUGHT PIPE CLAMP, BAND OR ADJUSTABLE WROUGHT CLEVIS TYPE.

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ELECTRICAL ABBREVIATIONS

ABBREVIATION	DESCRIPTION
XX"	MOUNTED XX" AFF
AFF OR A.F.F.	ABOVE FINISHED FLOOR HEIGHT NOTED
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AF/GF	ARC FAULT/GROUND FAULT CIRCUIT BREAKER
AFG	ABOVE FINISHED GRADE
AIC	AMPERES INTERRUPTING CAPACITY SYMMETRICAL
ARCH.	ARCHITECTUAL
C/B OR CB	CIRCUIT BREAKER
CLG.	CEILING
COMM.	COMMUNICATIONS
CU	COPPER
DWG. OR DWG	DRAWING
EC OR E.C.	ELECTRICAL CONTRACTOR
ECB	ENCLOSED CIRCUIT BREAKER
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELEC.	ELECTRIC, ELECTRICAL
EM, EMERG.	EMERGENCY
EXH.	EXHAUST
FWU	FURNISHED WITH UNIT
G.	EQUIPMENT GROUNDING CONDUCTOR
GEC	GROUNDING ELECTRODE CONDUCTOR
GF, G.F.C.I.	GROUND FAULT CIRCUIT INTERRUPTER
GFCI	GOVERNMENT FURNISHED, CONTRACTOR INSTALLED
GFGI	GOVERNMENT FURNISHED GOVERNMENT INSTALLED
GND.	GROUND
GF/CB	GROUND FAULT CIRCUIT BREAKER
GWB	GYPSUM WALLBOARD
HP	HORSEPOWER
HV	HIGH VOLTAGE
ID NO.	IDENTIFICATION NUMBER
IG	ISOLATED GROUND
KW	KILOWATTS
KVA	KILOVOLTS AMPERES
MAX.	MAXIMUM
MDP	MAIN DISTRIBUTION PANELBOARD
MFG	MANUFACTURER
MIN.	MINIMUM
MSB	MAIN SWITCHBOARD
NFPA	NATIONAL FIRE PREVENTION ASSOCIATION
NEC	NATIONAL ELECTRICAL CODE
NF	NON FUSED
N.I.C.	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
NL	NIGHTLIGHT
PH	PHASE
PMT	PAD MOUNTED TRANSFORMER
SAPF	SPECIAL ACCESS PROGRAM FACILITY
ST OR S.T.	SHUNT TRIP
STP	SHIELDED TWISTED PAIR
SPD	SURGE PROTECTIVE DEVICE
TEL.	TELEPHONE
UG OR U.G.	UNDERGROUND
UL	UNDERWRITERS LABORATORIES
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
V	VOLTS
VA	VOLT AMPERES
VDC	VOLTS DC
WP	WEATHERPROOF
VFD	VARIABLE FREQUENCY DRIVE

POWER AND CIRCUITRY SYMBOLS

SYMBOL	DESCRIPTION	MOUNTING	HEIGHT
⇒CH	20A, 125V, 2 POLE, 3 WIRE GROUNDING DUPLEX RECEPTACLE, NEMA 5–20R, 'CH' DENOTES COUNTER HEIGHT	WALL	18" AFF UNO
⇒GF	20A, 125V, 2 POLE, 3 WIRE GFCI, GROUNDING DUPLEX RECEPTACLE, NEMA 5–20R	WALL	18" AFF UNO
⇒GF WP	20A, 125V, 2 POLE, 3 WIRE, WEATHER RESISTANT, GFCI TYPE GROUNDING DUPLEX RECEPTACLE, NEMA 5–20R WITH WEATHERPROOF WHILE–IN–USE COVER PLATE	WALL	18" AFF UNO
J	JUNCTION BOX	VARIES	-----
$M	MOTOR RATED SWITCH WITH THERMAL MOTOR OVERLOAD PROTECTION – PROVIDE THERMAL UNIT SIZED FOR MOTOR LOAD ACTUALLY SERVED, VERIFY WITH EQUIPMENT MANUFACTURER	VARIES	-----
30/NF	NON–FUSED DISCONNECT SWITCH – SIZED TO MATCH OVER CURRENT PROTECTION DEVICE – '3R' INDICATES PROVIDE NEMA 3R DISCONNECT SWITCH	WALL	
30/30	FUSED DISCONNECT SWITCH – SUBSCRIPT INDICATES AMPS/FUSE SIZE – FUSES SHALL BE TIME DELAY TYPE – '3R' INDICATES PROVIDE NEMA 3R DISCONNECT SWITCH	WALL	
1	MOTOR STARTER, SUBSCRIPT INDICATES STARTER SIZE	VARIES	
	MOTOR – SUBSCRIPT INDICATES HORSEPOWER	VARIES	-----
	120/208 VOLT PANELBOARD	WALL	
	277/480 VOLT PANELBOARD	WALL	
	EQUIPMENT CONNECTION	VARIES	
	HOMERUN TO PANELBOARD AND CIRCUIT BREAKER NUMBER(S) INDICATED ON THE DRAWINGS	-----	-----
VFD	VARIABLE SPEED DRIVE, INSTALLED BY OTHERS, WIRED BY E.C.	VARIES	
PB	PULLBOX		

SEISMIC NOTE

ALL EQUIPMENT SHALL CONFORM TO ASCE 7 FOR SEISMIC QUALIFICATION BY ANALYSIS, TESTING OR EXPERIENCE. SUBMIT COMPLIANCE WITH SUBMITTALS.

BRAND NAMES

WHERE A BRAND NAME IS USED, IT IS USED FOR INFORMATIONAL PURPOSES AND IS INTENDED TO DESCRIBE A STANDARD OF QUALITY.

ELECTRICAL SYMBOL NOTES

1. ALL SYMBOLS ARE NOT NECESSARILY USED.
2. ALL MOUNTING HEIGHTS SHOWN IN SYMBOL LEGEND SHALL BE AS PER ADA REQUIREMENTS UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. REFERENCE ARCHITECTURAL DOCUMENTS FOR DIMENSIONED LOCATION AND MOUNTING HEIGHT OF LIGHT FIXTURES AND MISCELLANEOUS ELECTRICAL DEVICES.

GENERAL ELECTRICAL NOTES

1. DO NOT SCALE THESE DRAWINGS. SEE ARCHITECTURAL DOCUMENTS FOR EXACT LOCATIONS AND MOUNTINGS FOR FIXTURES, DEVICES, ETC. EXCEPT AS SPECIFICALLY NOTED.
2. REFER TO DIVISION 15 FOR ADDITIONAL HVAC EQUIPMENT AND REQUIREMENTS.
3. PROVIDE BRANCH CIRCUITING AND FINAL CONNECTION FOR ALL FIXTURES, OUTLETS AND EQUIPMENT.
4. INSTALLATION SHALL COMPLY WITH 2020 EDITION OF NEC, INCLUDING LOCAL AMMENDMENTS.
5. CONTRACTOR SHALL VERIFY ROUGH–IN REQUIREMENTS FOR ALL MECHANICAL EQUIPMENT PRIOR TO BEGINNING ROUGH–IN.
6. THE MECHANICAL AND ELECTRICAL DRAWINGS INCLUDED IN THIS SET WERE ORIGINALLY PREPARED TO THE SCALE SHOWN ON THE TITLE BLOCK OF EACH SPECIFIC DRAWING. HOWEVER, BECAUSE OF THE INACCURACIES INHERENT TO THE ELECTRONIC PLOTTING AND/OR REPROGRAPHIC PROCESSES USED TO OBTAIN FINAL PRINTS, SPECIFIC DIMENSIONS SHOULD NOT BE OBTAINED BY SCALING OF THESE DRAWINGS.
7. ANY PENETRATIONS THROUGH PANS, WEBS, OR OTHER STRUCTURAL COMPONENTS SHALL NOT BE MADE.
8. PROVIDE ENGRAVED NAMEPLATES FOR ALL EQUIPMENT. ADHESIVE TYPES WILL NOT BE ACCEPTABLE. NAMEPLATES SHALL BE LAMINATED BLACK WITH WHITE ENGRAVED TEXT. TEXT HEIGHT SHALL BE 1/4".
9. PERMANENT TYPE MARKING PENS SHALL BE USED TO NEATLY LABEL ALL JUNCTION BOX AND PULL BOX COVERS. WHERE BOXES ARE INSTALLED FOR THE INSTALLATION OF POWER WIRING, THE COVER SHALL INDICATE THE PANEL DESIGNATION AND CIRCUIT BREAKER NUMBER(S) ASSOCIATED WITH EACH BOX.
10. THE CIRCUIT DIRECTORIES IN EXISTING PANELBOARDS SHALL BE REPLACED WITH NEW TYPEWRITTEN CIRCUIT DIRECTORIES THAT REFLECT THE NEW AND EXISTING CIRCUITS CONNECTED TO THESE PANELBOARDS. ALL SPARE CIRCUIT BREAKERS SHALL BE IDENTIFIED ON THE CIRCUIT DIRECTORIES AS "SPARES" AND SHALL BE LEFT IN THE OFF POSITION.
11. COORDINATE WITH ALL OTHER CONTRACTORS IN ORDER TO DETERMINE THE OVERALL PROJECT PHASING AND DEMOLITION WORK SEQUENCING. COORDINATE REQUIRED DEMOLITION BY OTHER TRADES RESULTING FROM ELECTRICAL SYSTEMS DEMOLITION.
12. NO EXISTING ELECTRICAL EQUIPMENT, SYSTEMS, OR APPURTENANCES SHALL BE ABANDONED IN PLACE. (CONDUIT LOCATED IN EXISTING REMAINING WALLS AND FLOOR SLABS MAY BE ABANDONED IN PLACE.)
13. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO BID. NO ALLOWANCE WILL BE MADE FOR ADDITIONAL COSTS DUE TO THE CONTRACTOR'S FAILURE TO FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS.

DIVISION 16000 – ELECTRICAL SPECIFICATIONS

SECTION 16010 – ELECTRICAL GENERAL PROVISIONS

PART 1 – GENERAL

1.01 SCOPE

A. THIS SECTION INCLUDES ALL LABOR, MATERIAL, EQUIPMENT AND SERVICES NECESSARY AND INCIDENTAL AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY NATIONAL ELECTRICAL CODE (NEC) AND ALL APPLICABLE STATE AND LOCAL CODES AS FOLLOWS.

1. FURNISH AND INSTALL NEW ELECTRICAL EQUIPMENT.

B. EXAMINE THE BUILDING TO DETERMINE THE ACTUAL CONDITIONS AND EXTENT OF THE WORK. REFER ANY DETAILS NOT CLEAR TO THE ENGINEER FOR CLARIFICATION PRIOR TO BIDDING.

1.02 SUBMITTALS

A. SUBMIT PRODUCT DATA FOR THE FOLLOWING ELECTRICAL EQUIPMENT:

1. CIRCUIT BREAKERS

1.03 QUALITY ASSURANCE

A. SUBMIT A CONSTRUCTION SEQUENCE SCHEDULE OF WORK PRIOR TO THE START OF WORK. DO NOT PROCEED UNTIL RECEIVING WRITTEN APPROVAL.

B. THIS CONTRACTOR SHALL KEEP AS–BUILT DRAWINGS ON SITE AND TO MAKE MODIFICATIONS TO THE THESE DRAWINGS AS NECESSARY TO DOCUMENT THE ACTUAL INSTALLATION OF THE ELECTRICAL EQUIPMENT AND SYSTEM.

1.04 COORDINATION

A. PREVENT DISRUPTION TO THE OWNER AND MINIMIZE THE DOWNTIME BY COORDINATING SCOPE OF WORK AMONG ALL AFFECTED ELECTRICAL SYSTEMS AND WITH OTHER DIVISIONS.

SECTION 16050 – BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. RACEWAYS
2. BOXES
3. CONDUCTORS
4. CONVENIENCE OUTLETS
5. LABELS
6. ELECTRICAL PANELBOARDS (EXISTING)

PART 2 – PRODUCTS

2.01 RACEWAYS

A. RIGID STEEL CONDUIT: WITH COMPARABLE FITTINGS. MEETS UL 6, UL CARD #DYIX AND ANSI C80.1.

B. INTERMEDIATE METALLIC CONDUIT (IMC): MEETS UL 1242, UL CARD #DYIX AND ANSI C80.6.

C. ELECTRICAL METALLIC TUBING (EMT): STEEL WITH STEEL COMPRESSED FITTINGS. DOUBLE SET SCREW TYPE FITTINGS FOR EMT NOT LESS THAN 2 INCHES DIA. MEETS UL 797 AND ANSI C80.3.

D. FLEXIBLE CONDUIT: LIQUID–TIGHT CONDUIT WITH WATERTIGHT CONNECTORS WHERE NOTED ON PLANS. CONTINUOUS LENGTH, NO COUPLINGS. 1/2" MINIMUM EXCEPT 3/8" CONNECTIONS PERMITTED IN LENGTHS OF 6 FEET OR LESS AS PART OF A LISTED ASSEMBLY OR FOR TAP CONNECTIONS TO LIGHTING FIXTURES AS REQUIRED IN NEC SECTION 410–67(C).

B. RACEWAY FITTINGS:

1. ALL BOX CONNECTORS TO BE INSULATED THROAT TYPE.
2. CONDUIT STRAPS: GALVANIZED STEEL, 2–HOLE STRAPS, 1–HOLE STRAPS MAY BE USED FOR CONDUIT SIZES 1" AND SMALLER CONCEALED IN WALL OR ABOVE CEILING.
3. METALLIC CONDUITS RACEWAYS AND FITTINGS SHALL BE LISTED AND APPROVED AS A GROUNDING MEANS.

2.02 BOXES

A. GALVANIZED ONE–PIECE OR WELDED PRESSED STEEL TYPE. PROVIDE BLANK COVER FOR ALL BOXES WITHOUT FIXTURE OR DEVICE.

2.03 CONDUCTORS

A. WIRE SHALL BE COPPER ONLY, TYPES THHN/THWN.

B. WIRE SHALL BE CODE TYPE COPPER WIRE. WIRES #8 GAUGE AND LARGER SHALL BE STRANDED. WIRES SHALL BEAR THE UNDERWRITERS' LABEL, BE COLOR CODED AND BE MARKED WITH GAUGE, TYPE AND MANUFACTURER'S NAME ON 24" CENTERS. WIRES SMALLER THAN #8 MAY BE SOLID OR STRANDED.

C. COLOR CODING:

	120/208–VOLT	277/480–VOLT
PHASE A	BLACK	BROWN
PHASE B	RED	ORANGE
PHASE C	BLUE	YELLOW
NEUTRAL	WHITE	NATURAL/GRAY
GROUND	GREEN	GREEN

SWITCH LEGS SHALL USE THE SAME BRANCH CIRCUIT PHASE COLOR CODING WHICH THEY ARE CONNECTED TO.

2.04 CONVENIENCE OUTLETS

A. SHALL BE "COMMERCIAL SPECIFICATION GRADE" RATED 20 AMPERES AT 125 VOLTS, COMPOSITION BASE WITH SLOTS TO ACCOMMODATE PARALLEL PLUG CAPS WITH GROUNDING PEG. OUTLET SHALL BE UL LISTED. PLATES SHALL BE SMOOTH NYLON TYPE. GROUND FAULT CIRCUIT INTERRUPTER, TYPE, ETC.

B. GFIC DUPLEX RECEPTACLE SHALL BE OF THE 5mA TYPE AND PROVIDED WITH A LED INDICATOR LIGHT.

2.05 LABELS

A. LABEL SHALL BE ENGRAVED PLASTIC WITH BLACK LETTERING AND WHITE BACKGROUND. 1/2" LETTERS ON 3/4" LABEL FOR EQUIPMENT IDENTIFICATION ON DISCONNECT SWITCHES.

B. TAPE LABEL WITH TYPED BLACK LETTERING ON WHITE BACKGROUND. LABEL SHALL BE PRINTED LABELS INDICATING PANEL AND CIRCUIT NUMBERS FOR WIRING DEVICES AND LIGHTING.

2.06 PANELBOARDS – (EXISTING)

A. CIRCUIT BREAKERS PROVIDED SHALL BE COMPATIBLE WITH MANUFACTURER PANEL STYLE AND AIC RATING.

PART 3 – EXECUTION

3.01 CONDUITS

A. UNLESS NOTED OTHERWISE, ALL CONDUITS SHALL BE RIGID STEEL OR IMC EXCEPT EMT MAY BE USED IN FOLLOWING LOCATIONS:

1. IN DRY LOCATIONS IN FURRED SPACES.
2. IN PARTITIONS OTHER THAN CONCRETE, CONCRETE BLOCK, OR SOLID MASONRY.
3. FOR EXPOSED WORK INDOORS AND OUTDOORS ABOVE 8 FT, EXCEPT IN SPECIAL LOCATIONS PROHIBITED BY CODE.
4. CONCEALED ABOVE SUSPENDED CEILINGS.
5. CONDUITS EXPOSED ON/ABOVE THE ROOF SHALL BE RIGID STEEL.

B. PROVIDE FLEXIBLE CONNECTIONS OF SHORT LENGTH TO EQUIPMENT SUBJECT TO VIBRATION OR MOVEMENT AND TO ALL MOTORS. PROVIDE A SEPARATE BONDING CONDUCTOR IN ALL FLEXIBLE CONNECTIONS. FLEXIBLE CONDUIT SHALL BE ONE CONTINUOUS LENGTH WITHOUT COUPLINGS.

C. SUPPORT CONDUIT WITH STRAPS AND SECURE TO WOOD STRUCTURE BY MEANS OF BOLTS OR LAG SCREWS, TO CONCRETE BY MEANS OF INSERT OR EXPANSION BOLTS, TO BRICKWORK BY MEANS OF EXPANSION BOLTS, AND TO HOLLOW MASONRY BY MEANS OF TOGGLE BOLTS. EXPANDERS AND SHIELDS SHALL BE STEEL OR MALLEABLE IRON.

D. ALL PENETRATIONS THROUGH WALLS AND CEILING STRUCTURES SHALL BE SEALED AROUND THE CONDUIT OPENING.

3.03 BOXES

A. BOXES MUST BE ACCURATELY PLACED FOR FINISH, INDEPENDENTLY AND SECURELY SUPPORTED BY ADEQUATE WOOD BACKING OR BY MANUFACTURED ADJUSTABLE CHANNEL TYPE HEAVY–DUTY BOX HANGERS. BOXES WITH METAL BOX HANGERS SHALL BE ATTACHED TO METAL STUDS. BOXES INSTALLED IN MASONRY TILE OR CONCRETE BLOCK CONSTRUCTION SHALL BE SECURED WITH AUXILIARY PLATES, BARS OR CLIPS AND BE GROUTED IN PLACE.

B. INSTALL PULL BOXES OR JUNCTION BOXES AS REQUIRED IN ACCESSIBLE SPACES BUT DO NOT INSTALL IN FINISHED AREAS UNLESS APPROVED BY OWNER'S REPRESENTATIVE.

C. WHERE FIRE RATED CONSTRUCTION IS REQUIRED, DO NOT LOCATE ELECTRICAL OUTLET BOXES BACK–TO–BACK. PROVIDE A MINIMUM OF 24" HORIZONTAL SEPARATION BETWEEN OUTLET BOXES ON OPPOSITE SIDE OF THE SAME WALL.

3.04 CONDUCTORS

A. #12 AWG WIRE SHALL BE MINIMUM SIZE WIRE USED FOR LIGHTING AND POWER CIRCUITS. LOW VOLTAGE CONTROL CIRCUITS MAY BE #14 EXCEPT AS MARKED ON DRAWINGS, UNLESS SHOWN.

B. 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET SHALL BE INCREASED TO #10. 277 VOLT BRANCH CIRCUITS LONGER THAN 150 FEET SHALL BE INCREASED TO #10.

C. ALL CONDUCTORS SHALL BE IN CONDUIT UNLESS OTHERWISE INDICATED.

3.05 COVER PLATES

A. SWITCH, RECEPTACLE, AND DEVICE COVER PLATES SHALL BE SMOOTH NYLON PLASTIC TYPE, COLOR TO MATCH EXISTING.

3.06 GROUNDING AND BONDING

A. EQUIPMENT GROUNDING CONDUCTOR SHALL BE COPPER HAVING A CURRENT CAPACITY SIZED IN ACCORDANCE WITH NEC.

B. COMPLETELY GROUND ALL EQUIPMENT CASES, MOTOR FRAMES, ETC., TO SATISFY REQUIREMENTS OF NEC. INSTALL BOND WIRE IN FLEXIBLE CONDUIT. INSTALL COPPER BOND WIRE, SIZED IN ACCORDANCE WITH NEC, IN ALL RACEWAYS AND BOND TO ALL METALLIC PARTS USING APPROVED FITTINGS.

C. TOTAL GROUND RESISTANCE SHALL NOT EXCEED 25 OHMS.

D. ALL CONNECTIONS SHALL BE MADE WITH SOLDERLESS CONNECTORS OR MOLDED FUSION–WELDING PROCESS.

E. HCF–MC CABLE SHALL BE EQUIPPED WITH FULL SIZE, GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR AND A #10 SOLID ALUMINUM BOND CONDUCTOR, IN CONTACT WITH ALUMINUM ARMOR JACKET.

3.07 PANELBOARDS – EXISTING

A. EXISTING PANELBOARDS AS NOTED. PROVIDE UPDATED TYPEWRITTEN CIRCUIT DIRECTORIES FOR ADDED AND REMOVED EQUIPMENT AND PLUG LOAD BRANCH CIRCUITS.

B. PROVIDE CIRCUIT BREAKERS AS REQUIRED FOR THE PROJECT AND PROVIDE COMPATIBLE PRODUCT TO MATCH MANUFACTURER PANEL STYLE AND AIC RATING.

STATE OF NEW HAMPSHIRE – SHAWN PROULX No. 16430 – PROFESSIONAL ENGINEER

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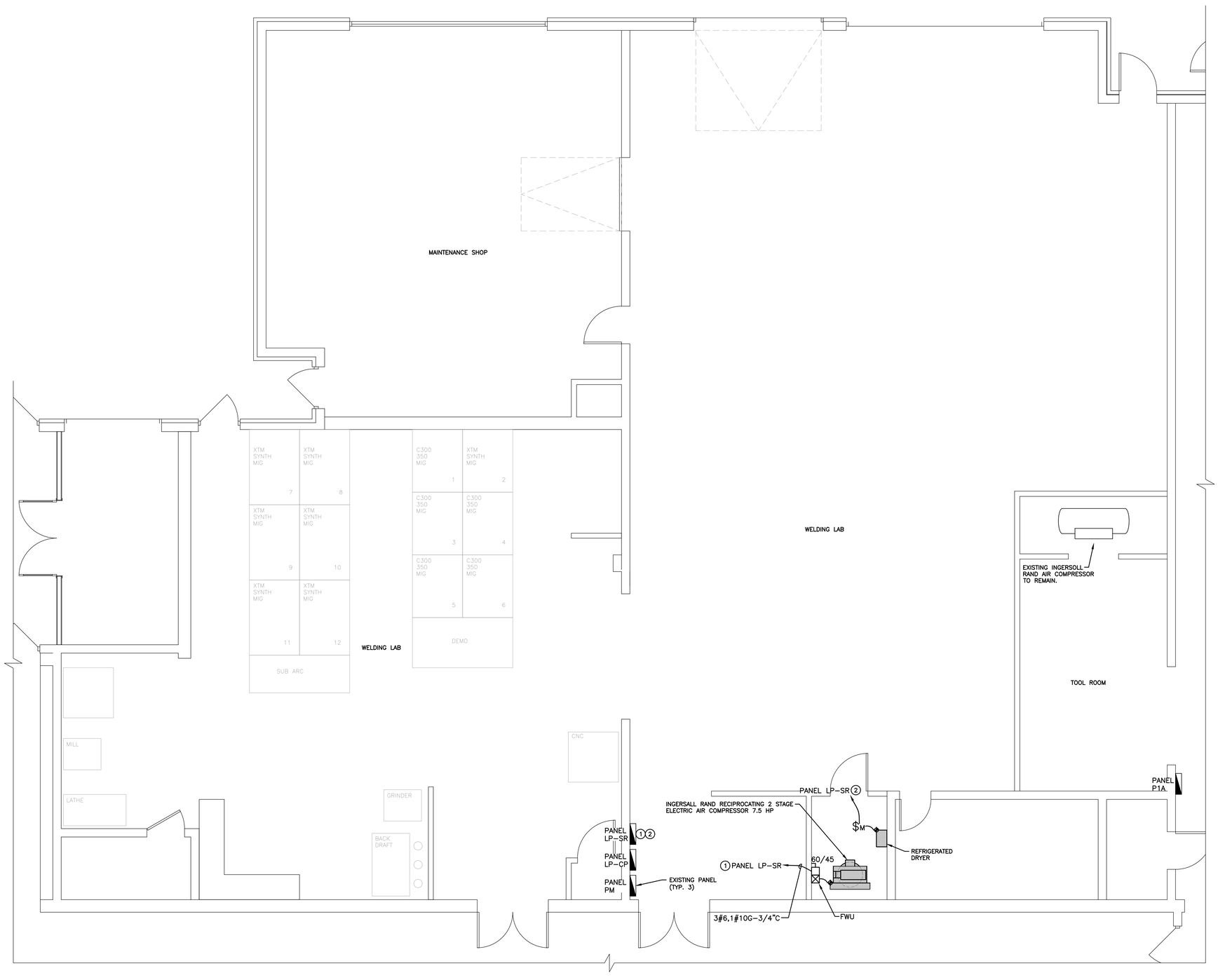
BERLIN NH

DATE:	05–03–24	DRAWN BY:	SMP
SCALE:	AS NOTED	CHECKED BY:	JDV
WHITE MOUNTAINS COMMUNITY COLLEGE 2020 RIVERSIDE DRIVE BERLIN, N.H. 03570		DRWG. NO. 1 of 2	E0.1



FIRST FLOOR PART PLAN – ELECTRICAL

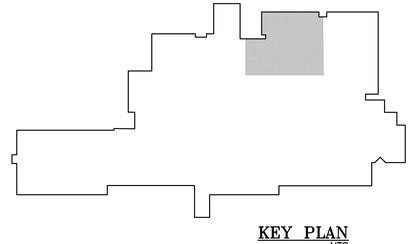
SCALE: 1/4" = 1'-0"

POWER GENERAL NOTES

1. MC TYPE CONDUCTOR WITH INTEGRAL GROUND WIRE MAY BE UTILIZED FOR POWER CIRCUITS. MC CABLE SHALL BE UTILIZED ONLY WHERE COMPLETELY CONCEALED.
2. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUITING AND SWITCHING SHOWN.
3. USE #10 AWG CONDUCTORS FOR 20 AMPERE, 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET, UNLESS SPECIFICALLY INDICATED OTHERWISE. THIS SHALL BE REQUIRED FOR THE ENTIRE LENGTH OF THE CIRCUIT.
4. CROSS REFERENCE AND CONFIRM ALL DEVICE LOCATIONS/ORIENTATIONS, AND MOUNTING HEIGHTS WITH OWNER PRIOR TO ROUGH-IN.
5. ALL PANELBOARDS, DISCONNECTS AND DEVICES SHALL BE PROPERLY LABELED. EXACT NAMING SHALL BE COORDINATED WITH OWNER.
6. BRANCH CIRCUITS SHALL BE SIZED ACCORDING TO THE CIRCUIT BREAKER RATING, UNLESS INDICATED OTHERWISE.
10. ACTUAL POWER REQUIREMENTS AND LOCATIONS OF MECHANICAL EQUIPMENT CONNECTIONS SHALL BE COORDINATED WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGHING IN. EQUIPMENT LOCATIONS SHOWN ARE APPROXIMATE.

POWER KEYNOTES '○'

1. PROVIDE NEW CIRCUIT BREAKER (50A/3P) IN AVAILABLE EMPTY SPACE. NEW CIRCUIT BREAKER SHALL BE U.L. LISTED COMPATIBLE WITH EXISTING PANEL AND A.I.C RATING SHALL MATCH EXISTING. EXISTING PANEL IS 200A, 120/208V, 3PH, 4W SIEMENS INDOOR LOAD CENTER TYPE 1. VERIFY POWER REQUIREMENTS AND CONNECTIONS WITH MANUFACTURER PRIOR TO ROUGH-IN.
2. PROVIDE NEW CIRCUIT BREAKER (20A/1P) IN AVAILABLE EMPTY SPACE. NEW CIRCUIT BREAKER SHALL BE U.L. LISTED COMPATIBLE WITH EXISTING PANEL AND A.I.C RATING SHALL MATCH EXISTING. VERIFY POWER REQUIREMENTS AND CONNECTIONS WITH MANUFACTURER PRIOR TO ROUGH-IN.



KEY PLAN
NTS

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